Ensayos Económicos | 79

Mayo de 2022

Dollar Liquidity, Money and Credit in a Small Open Dollarized Economy
Joseph Bitar

Sustitución de monedas y efecto histéresis: una aplicación empírica para Argentina
Patricio Temperley

Reassessing Sticky Price Models through the Lens of Scraped Price Data
Tomás Carrera de Souza

Jornadas Monetarias y Bancarias 2021

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Ensayos Económicos está orientada a la publicación de artículos de economía de carácter teórico, empírico o de política aplicada, y busca propiciar el diálogo entre las distintas escuelas del pensamiento económico para contribuir a diseñar y evaluar las políticas adecuadas para sortear los desafíos que la economía argentina enfrenta en su proceso de desarrollo. Las opiniones vertidas son exclusiva responsabilidad de los autores y no se corresponden necesariamente con la visión institucional del BCRA o de sus autoridades.

Buenos Aires, 27 de mayo de 2022

En esta nueva entrega de la revista académica del BCRA, Ensayos Económicos, presentamos tres trabajos académicos revisados bajo el formato doble ciego habitualmente utilizado en la revista y, además, un compendio de trabajos que resume las ponencias de las Jornadas Monetarias y Bancarias 2021 del BCRA.

En el primer artículo, Joseph Bitar (Sciences Po Bordeaux), analiza los problemas de liquidez relacionados con la dolarización financiera y propone una medida novedosa de liquidez para economías dolarizadas, que incluye a los activos externos brutos líquidos del sector bancario doméstico.

En el siguiente trabajo, Patricio Temperley (Universidad Nacional de Córdoba), ganador del 1er. Premio de la categoría Estudiantes Universitarios del Premio Anual de Investigación Económica "Dr. Raúl Prebisch" de 2020, analiza el problema de sustitución de monedas en la economía argentina para el período 2003-2019; y cuantifica el efecto de histéresis detrás de este fenómeno, el cual resulta persistente en el largo plazo.

El tercer trabajo, de Tomás Carrera de Souza (Universidad de Buenos Aires), ganador del 1er. Premio de la categoría de Jóvenes Profesionales del Premio Anual de Investigación Económica "Dr. Raúl Prebisch" de 2020, estudia los hechos estilizados a nivel micro que en la visión del autor deben ser incorporados en los modelos macroeconómicos con rigideces de precios nominales. Para ello, utiliza un nuevo conjunto de microdatos obtenidos con técnicas de web-scraping, que contienen los precios diarios de ocho minoristas de seis países con condiciones macroeconómicas heterogéneas.

En 2021, las Jornadas Monetarias y Bancarias del Banco Central de la República Argentina se abocaron al tema de "Condiciones macroeconómicas, crecimiento y distribución. Problemas subyacentes de la economía global y lecciones de la pandemia", buscando generar un espacio de reflexión sobre los desafíos que enfrentan los Bancos Centrales en el contexto global signado por los efectos del COVID-19. En esta edición de Ensayos Económicos, se presentan los trabajos basados en las ponencias de Barry Eichengreen (University of California), Özlem Onaran (University of Greenwich) y Mark Setterfield (New School for Social Research) en el panel sobre Política fiscal, crecimiento y desigualdad; de Claudio Borio (BIS) y Annina Kaltenbrunner (Leeds University Business School) en el panel sobre Políticas monetaria y financiera, estabilidad macroeconómica y desarrollo; y de Alejandro Díaz de León Carrillo (Banco de México), Roger Edwin Rojas Ulo (Banco Central de Bolivia) y Julio Velarde (Bando de Reserva del Perú) en el panel sobre el Rol de los Bancos Centrales.

Finalmente, quiero invitar a todos y todas a enviar sus artículos académicos para ser evaluados para su publicación en nuestra revista, y de este modo contribuir a enriquecer la discusión sobre economía y política económica en nuestro país.

Germán Feldman
Editor
Ensayos Económicos - BCRA

Índice

Dollar Liquidity, Money and Credit in a Small Open Dollarized Economy

Joseph Bitar[*]
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Abstract

This paper analyzes the liquidity questions relating to financial dollarization. We formalize monetary mechanisms under dollarization, shedding light on the interconnection of the balance of payments with money and credit aggregates in a small open dollarized economy. After presenting the dollar money creation mechanism under financial dollarization, we propose a new measure of dollar liquidity in dollarized economies defined as the Gross Foreign Assets of the Locational Banks Sector, equal to the sum of the central bank's gross international reserves and the gross liquid foreign assets of the locational banks sector. Our empirical results for Lebanon suggest that our measure of dollar liquidity has a significant and positive contemporaneous connection with total banks deposits and a lagged connection with total banks credit to the private sector in the period extending from 2002Q1 to 2017Q2. We test our results for robustness during the ongoing financial and monetary crisis period in Lebanon, that is a dollar liquidity crisis. We also test our results using data from two other major dollarized economies: Peru and Russia.

JEL Classification: E42, E51, F34.

Keywords: balance of payments, dollarization, dollar liquidity, emerging markets, money supply.

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[*] The opinions in this article are of the author and not necessarily correspond to those of the Central Bank of Argentina or its authorities. Email: josephbitar@hotmail.fr.

Liquidez, dinero y crédito en dólares en una economía pequeña abierta y dolarizada

Joseph Bitar
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Resumen

Este artículo analiza las cuestiones de liquidez relacionadas con la dolarización financiera. Formalizamos los mecanismos monetarios bajo dolarización, arrojando luz sobre la interconexión entre la balanza de pagos y los agregados monetarios y crediticios en una economía pequeña, abierta y dolarizada. Después de presentar el mecanismo de creación de dinero en dólares bajo dolarización financiera, proponemos una nueva medida de liquidez en dólares en economías dolarizadas definida como los Activos Externos Brutos del Sector de Bancos Locales, igual a la suma de las reservas internacionales brutas del banco central y los activos externos brutos líquidos del sector de Bancos Locales. Nuestros resultados empíricos para el Líbano sugieren que nuestra medida de liquidez en dólares tiene una conexión contemporánea significativa y positiva con los depósitos bancarios totales y una conexión rezagada con el crédito bancario total al sector privado en el período que se extiende desde el primer trimestre de 2002 hasta el segundo trimestre de 2017. Comprobamos la solidez de nuestros resultados durante el actual período de crisis financiera y monetaria en el Líbano, que es en esencia una crisis de liquidez en dólares. También probamos nuestros resultados utilizando datos de otras dos grandes economías dolarizadas: Perú y Rusia.

Clasificación JEL: E42, E51, F34.

Palabras clave: balanza de pagos, dolarización, liquidez en dólares, mercados emergentes, oferta monetaria.

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1. Introduction and literature review

Financial dollarization is a common feature in many emerging and developing economies. Honohan (2008) notes that in 45 countries, more than half of total bank deposits were denominated in foreign currency at some stage since 1990. Rajan and Tokatlidis (2005) stress that dollarization is a response to institutional infirmities and that countries have to learn to "live with dollarization" until those infirmities are fixed. Having that in mind, dollar liquidity management should be approached as a persistent monetary policy concern in dollarized economies.

Our paper is an attempt to formalize monetary mechanisms in dual currency environments. A good understanding of those mechanisms is needed for monetary authorities in economies that allow any form of dollarization of their financial sector, in order to be able to better monitor inflation and achieve financial stability. This paper is singular in the sense that it focuses on the liquidity dimension linked to the dollarization of banking systems, while most past literature has focused on the currency mismatch that liability dollarization induces and its macroeconomic implications. We study the relationship between the balance of payments (BoP) and the deposit and credit components of the locational banks' balance sheet in a dollarized small open economy. We use the term locational in order to refer to the residence criteria, following the terminology of the Bank for International Settlements.

This is, to our knowledge, the first analysis of its kind in the literature relating to dollarization. The detailed analysis of monetary mechanisms under partial dollarization that we undertake in this paper is very important for the academic literature on dollarization. By focusing solely on some behavioral patterns, past literature has suffered from crucial conceptual shortcomings. One of the common errors in this literature consists in treating equivalently domestic dollar denominated assets and liabilities and foreign dollar denominated assets and liabilities. Another common error relates to the misunderstanding of the basic monetary mechanisms in dollarized monetary systems. For example, some of the most influential papers in the dollarization literature fail to account for the fact that dollar denominated credit made by domestic banks in a dollarized economy results in the creation of dollar denominated deposits. This is to be seen as "domestic dollar" creation.

Past literature on dollarization has mainly focused on the causes and determinants of deposits and liabilities dollarization, on the advantages and inconveniences of dollarization, on the effects of dollarization on macroeconomic performance, and on the implications of dollarization for monetary policy and for the choice of an exchange rate regime - see for example: Calvo and Vegh (1996), Balino, Bennett, and Borensztein (1999), Honohan and Shi (2001), De Nicolo, Honohan and Ize (2003), Ize and Levy-Yeyati (2003), Feige (2003), Havrylyshyn and Beddies (2003), Levy-Yeyati (2006), Honohan (2008), Haiss and Rainer (2012). Levy-Yeyati (2008) and Ize, Kiguel and Levy-Yeyati (2005) approach dollar liquidity in dollarized economies from the angle of the insurance against bank runs and the limit it imposes to the central bank as a lender of last resort. Our approach is different in the sense that we view dollar liquidity as an ongoing monetary policy concern.

In dollarized economies, banks generally hold foreign currency reserves at the central bank or alternatively hold foreign cash or bonds. One of the main contributions of our paper is to show that, in economies where banks are allowed to hold liquid foreign assets, the variation of the Gross Foreign Assets of the Locational Banks Sector aggregate (equal to the sum of the central bank's gross international reserves and domestic banks liquid foreign assets) is a better measure of the bottom line of the balance of payments (i.e. the sum of the net current and capital accounts and net financial inflows) than is the change in gross international reserves alone. It allows to account for the variation of the economy's international liquidity (dollar liquidity) more accurately than does the change of the central bank's international reserves. We back our reasoning with the more general analysis of balance of payments transactions made in the recent paper by Kumhof, Rungcharoenkitkul and Sokol (2020). We show that standard textbook assumptions do not hold if domestic banks are allowed to hold foreign assets. The inflow of capital in a fixed exchange rate regime does not automatically lead to the growth of the domestic money base, resulting from the increase of the central bank's international reserves, if the resulting foreign liquid assets are not converted into domestic base money by the domestic banks sector.

We then explain how BoP flows impact in different ways deposits at domestic banks, depending on their nature: flows in the form of bank deposits transfers translate fully, FDI and portfolio flows translate partially, while loans of foreign banks to domestic banks do not have a direct impact on domestic banks deposits. We also argue that credit of domestic banks to the private non-bank sector responds with a lag to BoP flows.[1] Those mechanisms operate whether the banking system is partially dollarized or not. The currency composition of deposits and credit (banks liabilities and assets dollarization ratios), that has been extensively studied in the literature, depends mainly on the domestic nonbank sector preferences.

The existing literature on dollar liquidity, resulting both from foreign banks loans and dollar bank deposits, has identified its effects on domestic banks credit, but no clear measure of the dollar liquidity of the economy has been defined so far.[2] Previous papers used foreign currency liquidity proxies including flows measures, like gross and net capital inflows or foreign banks loans to

[1] Historically, capital inflows have often fueled domestic banks credit in advanced and emerging economies alike - see for example: Mendoza and Terrones (2008), Montiel and Reinhart (2001), Magud, Reinhart and Vesperoni (2014), Boudias (2015), Lane and McQuade (2014), Calderon and Kubota (2012), Igan and Tan (2017). The standard textbook prediction tells us that in an economy with a free-floating exchange rate regime, capital inflows would appreciate the domestic currency without any effect on monetary aggregates. Under a fixed exchange rate, the central bank would have to intervene, accumulating international reserves in order to maintain the peg. Part or all of this reserves accumulation can be set through sterilization, effected through open market sales of domestic bonds by the central bank (see for example: Krugman et al., 2010; Calvo, Leiderman and Reinhart, 1994; Dominguez, 2009). In practice, sterilization is often partial, and foreign exchange intervention is associated with an increase of the monetary base. Consequently, economies with less flexible exchange rate regimes are more likely to experience credit expansions in the presence of large capital inflows, as the expanding monetary base allows banks to expand their credit to the domestic non-bank sector. Also, the magnitude of the effect of capital inflows on domestic banks credit might vary, depending on their nature, i.e. Foreign Direct Investments (FDI), Portfolio Investments (PI), and Other Investments (OI - mainly capital transfers channeled through banks).

[2] As regards dollar liquidity, past literature has mainly focused on international dollar liquidity provision through cross-border interbank loans. Borio, McCauley and McGuire (2011) argue that, as emerging market central banks tighten monetary policy, they face the challenge of borrowers obtaining credit from abroad or in lower-yielding international currencies such as the US dollar. Private borrowers obtain credit directly from abroad or indirectly access credit that local banks obtain from abroad, mainly from foreign banks. Alper, Kilinc and Yorukoglu (2015) argue that foreign currency funding in the form of dollar client deposits can be considered as stable as other domestic sources of funds.

domestic banks, and stock measures, like dollar deposits in the banking system or non-core foreign currency liabilities of domestic banks. Also, the monetary mechanisms involved remained unclear. Referring to dollar liquidity, Levy-Yeyati (2008) and Ize, Kiguel and Levy-Yeyati (2005) are the only papers that we are aware of, that clearly state that in dollarized economies, "reserves holdings can be centralized at the central bank or decentralized at individual banks (in the form of reserve money or liquid asset requirements)". This view is in line with our monetary analysis results.

We compare our measure of dollar liquidity to the IMF's "foreign currency liquidity" and "international reserves" concepts. Then, we discuss the dollar liquidity risk implied by dollar loans made by domestic banks to the domestic non-bank sector, as well as the liquidity and FX risks implied by the conversion of domestic currency banks deposits into dollar deposits. We argue that the absence of a dollar lender of last resort in a dollarized economy warrants applying the strictest degree of liquidity standards for the foreign currency part of banks' balance sheets.

We test the mechanisms we identified using quarterly data for Lebanon, whose deposit dollarization ratio varied from 51% to 77%, and credit dollarization ratio varied from 68% to 89%, during the 2002-2017 period. Our analytical results are confirmed as we find a contemporaneous positive effect of our favored measure of dollar liquidity on total locational banks deposits, and a lagged positive effect on banks private credit. For robustness, we perform the same tests during Lebanon's financial and monetary crisis period that started in October 2019, using monthly data. Our results are even more robust during the crisis.

Lebanon's crisis is a dollar liquidity crisis by essence, which justifies our analytical interest in the liquidity dimension linked to dollarized monetary systems that has been somehow neglected in the dollarization literature that focused mainly on the currency mismatch implications of liability dollarization. The main contribution of this paper is to stress the importance of monitoring dollar liquidity, as measured by the Gross Foreign Assets of the Locational Banks Sector aggregate, by the monetary authorities of dollarized economies. By doing so, they can have better control over monetary aggregates and credit and, consequently, achieve their inflation and financial stability targets, as well as exchange rate stability, and avoid costly monetary and banking crises.

Although dollar liquidity crises in dollarized economies have not been extensively analyzed in past literature, we could find few papers that alluded to them. Rajan and Tokatlidis (2005) pointed that a dollar shortage arising from a variety of causes, including excessive government borrowing, an external liquidity shock, or an overvalued exchange rate, can be magnified by a dollarized banking system, and lead to a total collapse of the financial system, the exchange rate, and other asset prices. Also, dollar deposits convertibility risk in dollarized economies, resulting from the lack of their coverage in foreign liquid assets, has been mentioned in few academic papers.[3] Rogers (1992) discusses the dollar convertibility risk of Mexdollars, i.e. dollar denominated demand deposits held in Mexican banks, after Mexdollars were forcibly converted to pesos amid a severe balance of

[3] Dollar denominated deposits convertibility should not be confused with the domestic currency convertibility, which is the ease with which a country's currency can be converted into gold or another currency.

payments crisis in August 1982. Honohan (2008) sees forced conversion as one of the risks inherent to dollarized banking systems.

Finally, we test our results for robustness in the context of two other major dollarized economies with different economic and monetary structures and exchange rate regimes: Russia and Peru. By doing so, we show empirically that the monetary mechanisms we identified are not specific to the Lebanese monetary system. They are universal mechanisms that apply in any institutional context.

The remainder of the paper is organized as follows: Section 2 is dedicated to the analysis of monetary mechanisms and their relation to the balance of payments in a dollarized economy. Section 3 is dedicated to the empirical analysis in the case of Lebanon in the period 2002-2017. In section 4, we test the robustness of our results during Lebanon's monetary and financial crisis period. In section 5, we test the robustness of our results with data from Peru and Russia. Section 6 concludes.

2. Monetary mechanisms and the balance of payments in a dollarized economy

2.1. Deposits dollarization

Dollarization of deposits is the willingness and the ability of the economy's residents to hold bank deposits denominated in a currency other than the domestic currency. Liabilities (or credit) dollarization is the willingness and the ability of the economy's residents to borrow money from a domestic bank in a currency other than the domestic currency. We will call the foreign currency "dollar" in the following sections, but that does not exclude that Euro and other major currencies can play that role.[4]

We will start our analysis of the dollar money supply mechanisms in a dollarized economy by the initial trigger of a dollar deposit in a domestic bank, which is the receipt of a payment, an income transfer or a capital transfer X from a foreign country by the Client a of domestic Bank A (any form of fund transfer relating to a BoP flow) - Table 1. We will call the foreign country "United States" (US) in the following sections.

We show the case where dollar deposits are allowed in domestic banks and subject to reserve requirements at the rate "r" in Table 2. Banks' reserve requirements on dollar deposits are held in the form of dollar deposits of the central bank at US Banks. They are of the same nature as other assets included in the international reserves of the central bank. However, the nature of reserve requirements holding makes the use of these deposits for foreign exchange intervention unadvised. From a liquidity risk point of view, if these reserves were used for foreign exchange interventions, and the dollar deposits they are linked to get withdrawn from the domestic banks by their non-bank depositors, the central bank would not be able to release these deposits to banks.

[4] Looking back at the motives for holding deposits and contracting loans in dollar, we see that hyperinflation is the main trigger of dollarization, as documented in most past research - See for example: Calvo and Vegh (1996), Balino, Bennett, and Borensztein (1999). Hyperinflation deteriorates the ability of the domestic currency to play its roles as a store of value, unit of account and sometimes as a medium of exchange. Monetary authorities can forbid domestic banks by law from accepting dollar deposits and/or providing dollar loans. However, forced de-dollarization has had adverse effects in the past (for example: Bolivia in 1982, Peru in 1985), as it led to capital outflows and had negative impacts on output growth in many economies.

Therefore, it is best practice for central banks in dollarized economies to separate reserve requirements amounts from international reserves amounts.

Table 1 | Deposits dollarization

Bank A	
1. Dollar Deposit at US Bank = X	2. Dollar Deposit of Client a = X
Total = X	Total = X

US Bank	
1. Loan to US non-bank sector = X	2. Dollar deposit of Bank A = X
Total = X	Total = X

Table 2 | Deposits dollarization with reserve requirements

Bank A	
1. Dollar Deposit at US Bank = X.(1-r)	3. Dollar Deposit of Client a = X
2. Dollar Reserves at CB = X.r	
Total = X	Total = X

US Bank	
1. Loan to US non-bank sector = X	2. Dollar deposit of Bank A = X.(1-r)
	3.Dollar Deposit of CB = X.r
Total = X	Total = X

Domestic Central Bank	
1. Dollar Deposit at US Bank = X.r	2. Dollar Reserves at Bank A = X.r
Total = X.r	Total = X.r

The IMF's "international reserves and foreign currency liquidity - guidelines for a data template (2013)" specifies that foreign currency deposits held at the monetary authorities by commercial banks of the reporting country in respect of the regulatory reserves/liquidity requirements, as well as foreign currency deposits with a remaining maturity of one year or less, should be deducted from the reported international reserves amount. Some emerging economies central banks currently abide by this rule while others do not.[5]

2.2. Credit dollarization and dollar creation

Dollar denominated loans made by a domestic bank to the non-bank sector should be met by a stable dollar source (a dollar term deposit at the domestic bank or a loan from an international bank) in order to limit the dollar liquidity risk. The domestic central bank cannot act as the lender of last resort, in case of international payments, or dollar cash withdrawals out of the domestic bank's dollar deposits resulting from the dollar loan. The alternative would be emergency dollar facility lines that the domestic bank can contract with a US bank, ideally covering the total amounts of dollar loans granted.

We present in Table 3 the case of a domestic bank A that holds a dollar deposit of an amount X and gives a dollar loan of the same amount to the non-bank sector Client a'.

[5] For example: Lebanon's central bank includes dollar reserve requirements amounts in its international reserves figure.

Table 3 | Credit dollarization

Bank A		US Bank		Domestic Central Bank	
1. Dollar Deposit at US Bank = X.(1-2r)	4. Dollar Deposit of Client a = X	1. Loan to US non-bank sector = X	2. Dollar deposit of Bank A = X.(1-2r)	1. Dollar Deposit at US Bank = X.2r	2. Dollar Reserves at Bank A = X.2r
2. Dollar Reserves at CB = X.2r	5. Dollar Deposit of Client a' = X		3.Dollar Deposit of CB = X.2r		
3. Dollar Loan to Client a' = X					
Total = 2.X	Total = 2.X	Total = X	Total = X	Total = X.2r	Total = X.2r

By giving a dollar loan, the domestic bank "creates dollar money".[6] While the domestic banking sector's gross dollar assets held at the US Bank is X, the dollar money aggregate in the domestic economy is 2X. The simple transaction of giving a dollar denominated loan financed by a dollar deposit in a dollarized economy is money creation in a currency (the dollar) other than the sovereign currency. In other words, while its gross dollar assets are X, the banking system "multiplied" this amount (by a factor of 2 in our example) in the same way the banking system multiplies the domestic base money in a standard fractional reserves monetary system. Thus, gross dollar assets of the locational banks sector (including the central bank) could be seen as the "dollar money base" of the economy. Gross dollar assets of the locational banks sector are either originated as counterparts of real transactions (operations of the current/capital accounts of the balance of payments), or as counterparts of financial flows (operations of the financial account of the balance of payments). The domestic banks sector bears a dollar liquidity risk as a result of this operation.

If the gross dollar assets of the domestic banking system are obtained through long term dollar loans from foreign banks, dollar loans given by domestic banks to the domestic non-bank sector do not multiply dollar deposits. If the amount of credit to the domestic non-bank sector does not exceed the amount of those foreign banks loans, this could be seen as full "funding" through foreign banks loans. The domestic banks sector does not bear a dollar liquidity risk as a result of this operation.

2.3. The BoP balance and the Gross Foreign Assets of the Locational Bank Sector (GFA_LBS) aggregate

In financially dollarized economies, domestic banks hold deposits in foreign currencies, either exclusively at the central bank, or at both the central bank and at foreign correspondent banks, if the holding of foreign currency accounts at foreign banks is allowed by law. In this case, and in contrast to the standard textbook assumption (see for example: Krugman et al., 2010), dollar inflows to the domestic banking system as a result of balance of payments surpluses, only translate into domestic base money if they are converted into domestic currency by banks and the central bank intervenes in the foreign exchange market to avoid the appreciation of the domestic currency. In that event, the central bank increases its international reserves in exchange for

[6] The only paper we are aware of, that mentions this dollar creation process is Rodriguez (1993), that refers to locally created dollar as "argendollars" for Argentina, and "perudollars" for Peru. It makes a narrative analysis of the current account implications of the increased dollar supply, but does not analyze the dollar creation process per se.

domestic currency deposits of domestic banks at the central bank.[7] Therefore, under dollarization, if banks are allowed to hold foreign assets, balance of payments surpluses in a fixed exchange regime do not automatically lead to an increase in the central bank international reserves.

The standard textbook implicit assumption is that domestic banks are either forbidden by law or do not have the willingness to hold liquid foreign assets, in the form of deposits at foreign banks or foreign bonds. In practice, every balance of payments flow materialized by a nonresident counterpart transferring funds to the domestic economy creates a liability (deposit) of a foreign bank in favor of a domestic counterpart bank. In that regard, a recent paper by Kumhof, Rungcharoenkitkul and Sokol (2020) highlights the role of the banking system, as an inseparable component of all cross-border real and financial flows and stocks. They point to the fact that any economic transaction, including both physical and financial trades, consists of two inseparably linked components or "legs", the second of which always involves the transfer of a retail or interbank monetary settlement medium. Any gross financial or real inflow must be matched by an inseparable automatic (thus unintentional) gross outflow resulting from settlement mechanics, in line with the balance of payments double-entry bookkeeping rules. This translates in practice into a short-term liquid liability (a deposit) of the foreign bank, in favor of the domestic bank. That deposit is acquired ultimately by the central bank in a fixed exchange rate regime, increasing its international reserves (see for example: Krugman et al., 2010 - Chapter 13, p. 312-313). Thus, the bottom line of the BoP must be the sum of the current account and capital account balances, plus the non-banks and the long-term commercial banks portion of the financial account balance (and not only the non-reserve portion of the financial account balance). This definition excludes cross-border short term interbank flows from the standard textbook BoP bottom line definition, as they only constitute counterparts of real and financial transactions, and not independent economic decisions.

If the unrealistic textbook assumption is eased, in an economy where domestic banks are allowed to hold liquid foreign assets, the bottom line of the BoP (i.e., the variation of the economy's international reserves) must be equal to the variation of the Gross Foreign Assets of the Locational Bank Sector (GFA_LBS), and not only the variation of the central bank's gross foreign assets (central bank's international reserves). GFA_LBS is the sum of the central bank's gross foreign liquid assets (gross international reserves) and the locational domestic banks gross foreign liquid assets. In practical terms, the computation of this aggregate should only include the liquid gross foreign currency assets of the central bank and the liquid gross foreign currency assets of domestic banks whose counterparts are non-resident agents. The level of the Gross Foreign Assets of the Locational Bank Sector in the economy is equal to the cumulative balances of the current and capital accounts plus the non-banks and the long term commercial banks portion of the financial account of the BoP (i.e. excluding the short-term interbank portion of the financial account of the BoP), adjusted to valuation changes.[8]

[7] The central bank could sterilize this increase in the domestic currency base money subsequently.

[8] As documented in the academic literature on capital flows, an economy attracts capital due to a positive interest rate differential to the rest of the world. Thus, the GFA_LBS aggregate is a function of this interest rate differential, in addition to other traditional pull and push factors. The structural part of this aggregate is important in economies that attract capital for reasons such as bank secrecy laws, home bias of expatriates, etc. This aggregate can be directly influenced as well by the ability of domestic banks and the central bank to contract loans with foreign banks, foreign central banks

The GFA_LBS aggregate is key in dollarized economies:

- It is an important aggregate alongside the central bank's international reserves when it comes to the ability to maintain a currency peg. The central bank can potentially borrow liquid foreign assets from domestic banks and use them to defend the external value of the domestic currency. Alternatively, the central bank can oblige domestic banks to place their foreign liquid assets in the form of deposits at the central bank by means of regulations, in order to increase the amount of its gross international reserves.

- It can be seen as the "dollar liquidity" or "dollar money base" in the economy. The ratio of dollar deposits in the locational banking system to the GFA_LBS can be seen as the "dollar multiplier".

2.4. "Dollar Liquidity" and IMF's "Foreign Currency Liquidity"

The IMF's concept of "foreign currency liquidity" defined in the "international reserves and foreign currency liquidity - guidelines for a data template (2013)", is broader than that of IMF's concept of international reserves in at least three respects:

- While reserve assets refer to external assets of the monetary authorities, foreign currency liquidity concerns foreign currency resources and drains on such resources of the monetary authorities and the central government.

- While reserve assets represent the monetary authorities' claims on nonresidents, foreign currency liquidity relates to the authorities' foreign currency claims on and obligations to residents and nonresidents.

- While the concept of reserve assets is based on the balance sheet framework, the concept of foreign currency liquidity encompasses inflows and outflows of foreign currency that result from both on and off-balance-sheet activities of the authorities.

Our measure of "dollar liquidity" (GFA_LBS) is different to the IMF's concept of "foreign currency liquidity" in the following respects:

- It does not only include assets of the monetary authorities (and of the central government generally), but also liquid foreign assets of the banking system.

- It only includes claims on and obligations to non-residents.

Our measure of "dollar liquidity" is similar to the IMF's concept of "foreign currency liquidity" in the following respect:

and international organizations. Also, the level of the GFA_LBS is a function of structural imbalances in the current/capital accounts of the economy, like long term trade competitiveness and income remittances of expatriates.

- It encompasses inflows and outflows of foreign currency that result from both on and off-balance-sheet activities. Any potential drain of foreign currency resulting from off-balance-sheet activities of authorities and banks, should be deducted from the dollar liquidity aggregate.

2.5. The "dollar multiplier" and dollar liquidity risk

We consider the example below (Table 4) where dollar liquidity (GFA_LBS) is generated by short term deposits (Client a) for half (X/2) and by foreign banks loans (or long term deposits) for the other half (X/2), and where the domestic banks sector grants dollar credit to the domestic non-bank sector (Client a') equal to the total amount of GFA_LBS (X). The final amount of dollar deposits is 1.5 X, thus the dollar multiplier is 1.5 in this case, as part of dollar funding (X/2) is done through long term stable sources. If all the dollar liquidity in the domestic banks sector results from long term foreign banks loans, there is no multiplication - it is simply a foreign funding of dollar loans, as is well documented in the literature on international banking and foreign currency intermediation.

Table 4 | Banks dollar credit and the "dollar multiplier"

Locational Banks Sector (Bank A + Central Bank)		US Bank	
1. Dollar Deposit at US Bank = X	3. Dollar Deposit of Client a = X/2	1. Loan to US non-bank sector = X/2	3. Dollar deposit of (Bank A + Central Bank) = X
	4. Loan from US Bank = X/2	2. Loan to Bank A = X/2	
2. Dollar Loan to Client a' = X	5. Dollar Deposit of Client a' = X		
Total = 2.X	**Total = 2.X**	**Total = X**	**Total = X**

From a macroprudential point of view, if the "dollar multiplier" (the ratio of dollar deposits in the locational banking system to the GFA_LBS) exceeds 1, the domestic banking system bears a dollar liquidity risk, in the absence of a dollar lender of last resort. The dollar liquidity risk can typically come (but not only) from the standard bank intermediation maturity mismatch between dollar sight deposits (that could be withdrawn out of the banking system in the form of notes - or transferred abroad) and dollar credit to the domestic non-bank sector that is of longer maturity.

At the level of the economy, in case dollar liquidity (GFA_LBS) is generated through sight or short-term dollar client deposits, this could be seen as unstable funding. In case dollar liquidity (GFA_LBS) results from foreign banks dollar loans, this is to be seen as stable funding if the maturity of the loans that domestic banks obtain from foreign banks equals or exceeds the maturity of the loans that domestic banks grant to domestic agents. Foreign banks dollar loans to domestic banks do not increase total deposits in the locational domestic banks balance sheet directly, but increase domestic banks dollar non-core liabilities.

Also, dollar liquidity risk should be considered at the individual bank level. Liquidity standards similar to those of Basel III - LCR and NSFR should be applied.[9] However, the Basel III standards do not put enough emphasis on multi-currency environments and the availability of foreign currency liquidity in the hands of the locational domestic banking systems. They only account for the currency risk resulting from any currency mismatch between assets and liabilities. However, the absence of a dollar lender of last resort in a dollarized economy warrants applying the strictest degree of liquidity standards for the foreign currency part of banks' balance sheets. It could be argued that in some institutional settings, the central bank does not have to or could not be willing to act as a dollar lender of last resort and to supply banks with dollar liquidity out of its international reserves. Also, it could be argued that the dollar lender of last resort intervention of the central bank would sometimes operate less smoothly than what is expected. In such instances, liquidity management of banks must mainly rely on individual banks dollar liquidity positions. Our analysis suggests separating domestic dollar denominated assets and liabilities from foreign dollar denominated assets and liabilities in the design of specific LCR/NSFR style liquidity regulations for dollarized banking systems. As our paper focuses on the macro dimension of the dollar liquidity risk in dollarized economies, we keep the detailed analysis of the design of individual banks dollar liquidity regulations beyond the scope of this paper.

2.6. Bank deposits currency conversion, dollar liquidity and FX risk

In a partially dollarized monetary system, money supply is made of two components: (1) domestic money supply (domestic currency bank deposits and bank notes) and (2) dollar money supply (dollar bank deposits and bank notes).[10] The interaction between the two components of the money supply happens only when the domestic non-bank sector converts domestic money into dollars or the other way round. Foreign exchange transactions between domestic banks and between domestic banks and the central bank do not affect money supply as these are operations involving banks reserves in dollar and banks reserves in domestic currency at the central bank (base money), without any effect on the denomination of the non-bank sector deposits at domestic banks.

We now consider the case where half of the domestic currency money supply (e.X/2; initial domestic currency money supply is determined by banks credit in domestic currency to Client a", equal to e.X in our example) gets converted into dollar deposits by the domestic non-bank sector (Table 5). The dollar multiplier becomes equal to 2 as a result of this currency conversion. Also, Table 5 shows a currency mismatch on the locational banks' balance sheet: the currency composition of banks assets does not vary while banks dollar liabilities share increases. In sum, the conversion of the domestic currency component of the money supply into dollar deposits creates additional liquidity risk as well as FX risk

[9] For details on the Basel III liquidity standards see:
- Basel III: The Liquidity Coverage Ratio and Liquidity Risk Monitoring Tools (2013), Basel Committee on Banking Supervision.
- Basel III: The Net Stable Funding Ratio (2014), Basel Committee on Banking Supervision.

[10] We will not make an analysis of the determinants of the degree of deposits and liabilities dollarization in this paper as this question has been extensively studied in the literature relating to dollarization. Monetary analysis of small open dollarized economies can be performed independently from the dollarization ratio consideration that mainly relates to the degree of confidence that domestic economic agents have in their domestic currency and the arbitrages they can make in a dual currency system.

on the locational banks sector balance sheet. At the individual bank's level, FX risk could be covered, with the central bank bearing the residual FX risk. If the exchange market pressure reaches a degree at which the central bank is not capable (considering its international reserves level) or unwilling to maintain the stability of the domestic currency exchange rate, the domestic currency would depreciate.

Table 5 | Deposits currency conversion, dollar liquidity and FX risk

Locational Banks Sector (Bank A + Central Bank)		US Bank	
1. Dollar Deposit at US Bank = X	3. Dollar Deposit of Client a = X/2	1. Loan to US non-bank sector = X/2	3. Dollar deposit of (Bank A + Central Bank) = X
	4. Loan from US Bank = X/2	2. Loan to Bank A = X/2	
2. Dollar Loan to Client a' = X	5. Dollar Deposit of Client a' = X		
6. DC Loan to Client a" = e.X	7. DC Deposit of Client a" = e.X/2		
	8. Dollar Deposit of Client a" = X/2		
Total = 3.X	**Total = 3.X**	**Total = X**	**Total = X**

2.7. BoP surpluses, banks deposits and banks credit

Net capital flows (excluding locational banking system short-term flows) added to the balance of the current and capital accounts of the BoP, should translate directly or indirectly into a variation of the deposits of the locational bank sector, as the point of entry of most of those flows is through the transfer of funds to the domestic economy in the form of bank deposits. Capital inflows in the form of bank transfers (Other Investments) directly feed domestic banks total deposits. However, Other Investments also include foreign banks dollar loans to domestic banks, that do not increase total deposits in the locational domestic banks balance sheet directly but increase domestic banks dollar noncore liabilities. This foreign funding of domestic banks has been extensively analyzed in the literature on capital flows and bank credit in emerging markets.

Capital inflows in the form of FDI and Portfolio Investments translate totally or partially into domestic banks deposits if the beneficiary companies use the proceeds of these flows to finance their domestic investments and working capital, in which case they will need to transfer their foreign funds into deposits in the domestic banking system. In a bank-based economy where the financial market is absent or of small size, the share of banks deposits transfers tends to be higher than Portfolio Investments. Consequently, the effect of BoP inflows on total banks deposits is larger and comes without a significant lag.

As a result, the bottom line of the BoP (variation of GFA_LBS) should be positively correlated to banks total deposits. It is worth mentioning that this correlation should exist whether the banking

system is partially dollarized or not. The currency denomination of those deposits variations is either fully in domestic currency if dollarization of deposits is legally forbidden, or both in the domestic currency and foreign currencies if foreign currency deposits are allowed. The central bank can reverse (totally or partially) the increase of total deposits at domestic banks if it reacts to capital flows by sterilizing them through the open market sales of securities.

The increase of dollar liquidity in the economy due to balance of payments flows gives room for domestic banks to expand dollar credit to the non-bank sector. Also, the conversion of dollar deposits into domestic currency deposits by non-bank depositors creates simultaneously an equal amount of domestic currency base money (as banks convert their foreign assets to domestic currency deposits at the central bank to avoid any currency mismatch in their balance sheet) and domestic currency deposits at banks, in the same way as described in standard textbooks. The additional domestic currency base money gives the possibility to banks to offset the facilities they may have had from the central bank previously. This increase in domestic base money can also be used to create domestic money via the standard money multiplier mechanism: banks can use these surplus domestic currency reserves to extend domestic currency loans to the domestic non-bank sector. However, this process is not automatic as loan demand by the non-bank sector is mainly determined by their activity needs and the loans nominal (and real) interest rate level. Also, the willingness of banks to offer loans to the private non-bank sector will depend on the risk adjusted return they can achieve in alternative uses of this liquidity, mainly central bank term deposits, government bonds, and foreign bonds. Therefore, increasing banks liquidity (either in the domestic currency or in dollar) should not be seen as an automatic trigger of credit growth to the domestic non-bank private sector. It should also be noted that a lag could be observed between the time the excess banks liquidity is observed and the time banks release loans to the non-bank sector, due to the administrative process involved in banks credit provision.

The results of the monetary and liquidity analyses we performed help explain the empirical findings of past studies:

- Net current account balances induce a variation of both banks' total deposits and the economy's dollar liquidity (GFA_LBS). These effects can sometimes come with a lag.
- Deposits transfers of non-residents increase domestic banks total deposits and the economy's dollar liquidity (GFA_LBS), in the same period they are effected.
- Foreign banks loans to domestic banks increase the economy's dollar liquidity (GFA_LBS) in the same period, but not total banks deposits directly.
- Portfolio Investments and FDI increase both dollar liquidity (GFA_LBS) and total banks deposits, sometimes partially and with a lag. This can explain the weaker impact of Portfolio Investments and FDI on domestic banks credit. However, the main reason of the weak impact of FDI and Portfolio Investments on domestic banks credit remains the fact that these flows are not directly intended at increasing domestic banks liquidity, as are foreign

banks loans to domestic banks, whose main economic motive is to allow the latter to expand credit to the domestic economy.

- The increase of dollar liquidity (GFA_LBS) resulting from BoP flows, can boost both dollar credit and domestic currency credit of domestic banks. This impact would come with a lag and is conditional on the existence of a demand for credit by the non-bank sector.

3. Empirical analysis: the case of Lebanon

We test the interconnections we identified in the previous section, between our favored measure of dollar liquidity (GFA_LBS) and total banks deposits and credit to the non-bank sector, in the case of Lebanon in the period 2002-2017. We also look into the use that Lebanese domestic banks made of their dollar liquidity, particularly in the form of liquid foreign assets and deposits at the central bank. In the last stage, we check our results for robustness during Lebanon's monetary and financial crisis that started in October 2019. That crisis is by essence a dollar liquidity crisis, which further justifies our focus on the liquidity dimension of dollarized monetary systems.

Lebanon has known one of the most complete forms of financial dollarization for more than three decades. Dollarization started during the Lebanese civil war that witnessed recurring depreciation episodes of the domestic currency. At present, Lebanese banks hold dollar deposits and provide dollar loans to their resident customers, alongside domestic currency deposits and loans. The deposits dollarization ratio was 70.67% and the loan dollarization ratio was at 68.46% at 2018 end, just before the start of the country's crisis. Therefore, all the mechanisms emphasized in our analysis would fully play in the country's context. Lebanon's exchange rate regime is classified as "stabilized arrangement" in the IMF AREAER for 2016.[11] The exchange rate of the US dollar (USD) has been fixed since December 1997 at the mid-rate of 1507.5 Lebanese Pounds (LBP), thanks to daily interventions of Banque du Liban in the domestic interbank foreign exchange market. From the adoption of the de facto fixed exchange rate regime until October 2019, the country has not experienced episodes of high inflation, as was the case during and after the civil war (1975-1989). In the period 2002-2017, the average annual real GDP growth rate was 4%, and the average annual inflation rate was 3.3%.[12]

3.1. Data

We obtained balance of payments and locational domestic commercial banks' balance sheet data from the Banque du Liban website statistics and research section. We obtained Lebanon's annual real GDP growth figures from the IMF WEO October 2017. The sample for the empirical analysis is the period from January 2002 to September 2017 as the data is available for all the aggregates during that period. All the data has been converted into USD billions. Whenever the data is in LBP, it has been converted at the official USD/LBP exchange rate of 1507.5, which has been fixed since December 1997. The fact that during the sample period starting in January 2002 the exchange rate has been fixed excludes any bias that could come from currency valuation changes. We converted

[11] International Monetary Fund - Annual Report on Exchange Arrangements and Exchange Restrictions.
[12] Source: IMF WEO - October 2017.

monthly series to quarterly series in the 2002-2017 period analysis by summing flow aggregates over the quarter, and by using quarter end figures for stock aggregates.

3.2. Stylized facts

Descriptive statistics of the balance of payments components and capital flows sub-components quarterly series are detailed in Table 6. Detailed variables description can be found in Table 13 in the Appendix. Looking at the means and the sums over the period, we notice a negative net (current/capital) account balance that is overcompensated by net capital inflows, leading to a substantial increase in the gross international reserves of the central bank.[13] Over the period, BdL's international reserves have increased by a cumulative amount of USD 35.25 billion (not accounting for valuation changes). We can notice that other investments (OI) are more important than portfolio investments (PI) and direct investments (FDI) in the composition of net capital flows, with a higher mean, sum and standard deviation over the period. This is explained by the fact that the Lebanese financial sector is essentially bank based, with a small size capital market, as is the case in the majority of small open emerging economies. We show the movements of BoP components (Figure 1) as well as capital flows components (Figure 2) quarterly series for the study period (2002Q1-2017Q2).

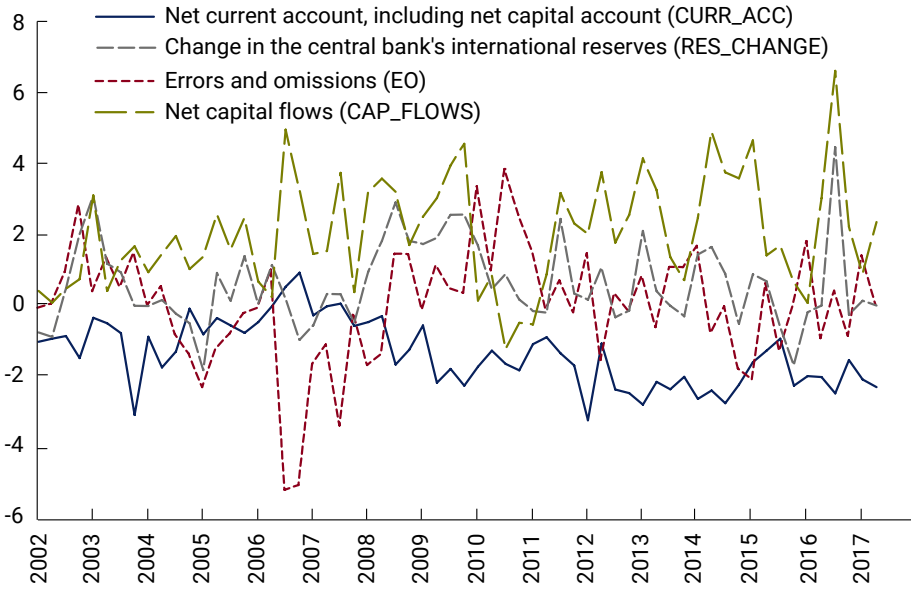
Table 6 | Balance of payments components - Descriptive statistics

	CURR_ACC	EO	RES_CHANGE	CAP_FLOWS	PI	OI	FDI
Mean	-1.414788	-0.026300	0.568676	2.009763	0.181786	1.291592	0.536385
Median	-1.378880	-0.021035	0.280700	1.705120	0.091370	1.209025	0.477130
Maximum	0.884890	3.829250	4.451590	6.617240	2.535400	3.670490	1.396760
Minimum	-3.300940	-5.278950	-1.878830	-1.285860	-2.124680	-1.483700	-0.069210
Std. Dev.	0.929704	1.672484	1.195253	1.577724	0.798354	1.226430	0.290598
Sum	-87.71688	-1.630630	35.25789	124.6053	11.27071	80.07872	33.25586
No. Obs	62	62	62	62	62	62	62

Note: All aggregates are in USD billions.

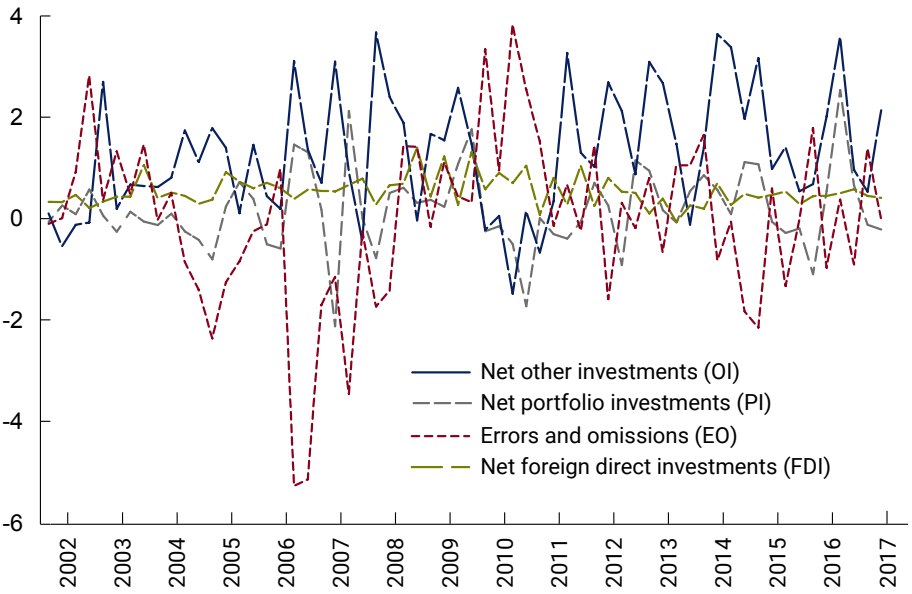
[13] The balance of payments accounting identity holds in every period: RES_CHANGE = CAP_FLOWS + CURR_ACC + EO. Figures are expressed in USD billions.

Figure 1 | Balance of payments components



Note: All aggregates are in USD Billions.
Data Source: Banque du Liban.

Figure 2 | Capital flows components

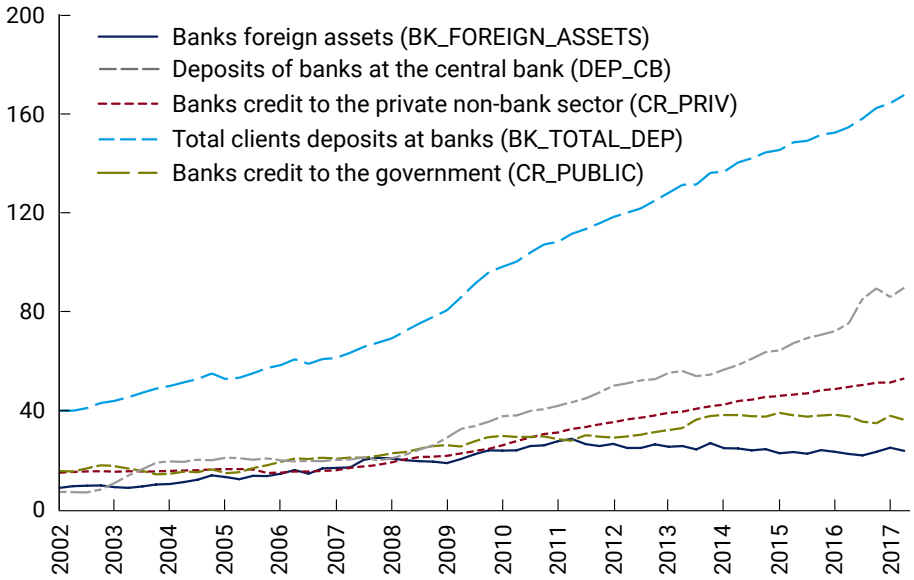


Note: All aggregates are in USD Billions.
Data Source: Banque du Liban.

Figure 3 shows the evolution of the Lebanese domestic commercial banks locational balance sheet components, from 1997Q1 to 2017Q3. We notice that the large increase in the total bank deposits amount (BK_TOTAL_DEP) has been mainly translated into an increase of the banks' deposits at the central bank (DEP_CB). We notice that the increases of the credit to the domestic non-bank private

sector (CR_PRIV), the credit to the government sector (CR_PUBLIC) and banks foreign assets holdings (BK_FOREIGN_ASSETS) have been relatively moderate, in comparison to the large increase of total banks deposits.

Figure 3 | Banks Locational balance sheet components



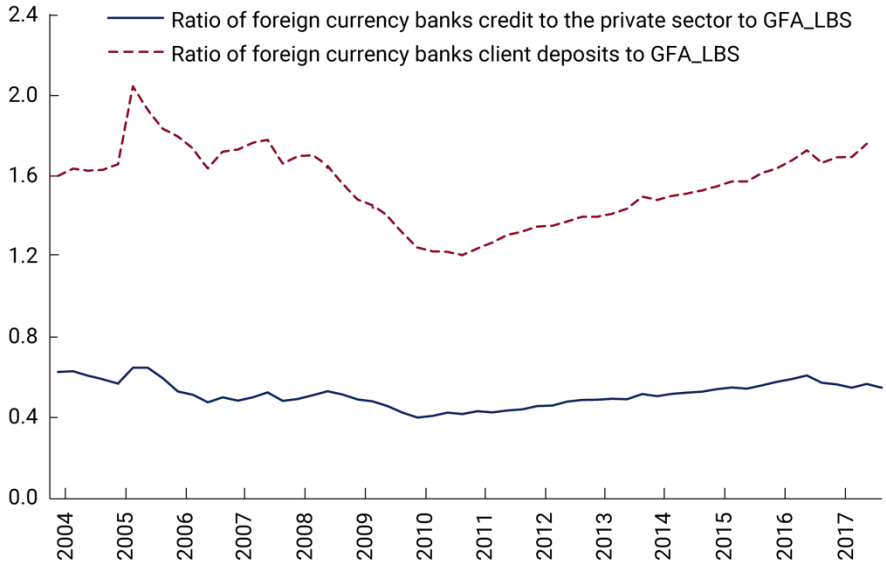
Note: All aggregates are in USD Billions.
Data Source: Banque du Liban.

BdL made no specific sterilization effort to counter the impact of large BoP in flows, but its facilities to domestic banks were naturally reduced to a minimum, because of their high liquidity balances. This is evidenced by the large deposits (denominated in both domestic currency and dollar) of commercial banks at the BdL, as well as their foreign assets holdings in the form of deposits at foreign banks and foreign bonds. This abundant liquidity and the increase of monetary aggregates ratios to GDP did not translate into high inflation, thanks to the exchange rate peg that proved to be a strong nominal anchor.

Figure 4 shows the evolution of the ratio of total foreign currency deposits (of residents and non-residents) to the GFA_LBS. This ratio reached a maximum level of 2.05 during the analysis period and has been constantly above 1. This shows that the domestic banks system has multiplied the amount of its gross dollar assets, by granting dollar denominated loans to the domestic non-bank sector. The co-movement of this ratio with the ratio of foreign currency denominated bank credit to the private non-bank sector to the GFA_LBS is clear visually. This shows the multiplying effect of foreign denominated loans on the foreign currency money supply. However, no direct mathematical relationship exists between the two ratios, as the choice of the currency of denomination of banks deposits depends ultimately on depositors' preferences.[14]

[14] Analysis of agents' preferences with regards to the use of domestic currency and dollar is outside the scope of our paper.

Figure 4 | Foreign currency deposits and credit to GFA_LBS



Data Source: Banque du Liban.

3.3. Empirical strategy

The empirical case of Lebanon is relevant to illustrate the mechanisms we identified, as the country has a longstanding history of both assets and liabilities dollarization, as well as open current, capital and financial accounts of the BoP. The country's de facto fixed exchange rate regime since 1997 improves the quality of the analysis by making the bottom line of the balance of payments more salient, in the sense that balances are not automatically offset via exchange rate movements. Also, the fixed exchange rate avoids any statistical discrepancy relating to exchange rate movements.

We aim at analyzing the interconnections between BoP total flows and domestic banks locational balance sheet components. We perform a series of OLS regressions between flow variables, in order to reveal the short-run dynamic interconnections that we emphasized in the previous section of the paper. Long run regressions are not necessary, as our analysis focuses on short run mechanics. The variables used in our regressions have been tested for unit roots: flow variables and stock variables in first difference do not show unit roots.[15] We estimate the following equations:

$$\Delta Y_t = \gamma_o + \sum_{k=1}^{p} \psi_k \Delta Y_{t-k} + \sum_{j=1}^{m} \sum_{l_j=0}^{q_j} \beta_{j,l_j} \Delta X_{j,t-l_j} + \epsilon_t \quad (1)$$

Where ΔY_t is the dependent flow variable or the first difference of the dependent stock variable at time t, γ_o is a constant, ψ_k are coefficients associated with lags of ΔY_t, β_{j,l_j} coefficients associated with lags of m regressors $\Delta X_{j,t}$ (flow variables or first difference of stock variables) for $j = 1, \dots, m$, and ϵ_t is the standard error term.

[15] Unit root tests results are available upon request.

We test the relationships of total banks deposits growth, banks credit to the private non-bank sector growth, and banks credit to the government growth (as dependent variables), with the BoP bottom line (explanatory variable). We also test the relationships of the two forms of banks dollar liquidity i.e. banks deposits at the central bank (that translate into international reserves of the central bank) and banks foreign assets (as dependent variables), with the BoP bottom line (explanatory variable). We first use our favored measure of the bottom line of the BoP (change in GFA_LBS), then the traditional measure of the bottom line of the BoP (change in the central bank's international reserves).

The change in the central bank's gross international reserves data series could be obtained directly from the balance of payments statistics and can be considered of good quality as it is directly taken from the accounting of the central bank. However, it was impossible to construct the GFA_LBS data series from balance of payments data as it would ideally have been done, as it requires the breakdown of banking flows into short-term and long-term flows, which is unavailable in Lebanon's statistics. This breakdown is also unavailable in other countries BoP statistics at present, but it is a desirable development both for dollarized and non-dollarized economies. Therefore, we proxied the GFA_LBS flow data using the first difference of its stock data, i.e. the sum of central bank's gross international reserves and commercial banks liquid foreign assets. This approximation integrates valuation effects, that are inherent to any stock- flow relationship, to the constructed GFA_LBS flow data series. However, in Lebanon's case valuation effects could be deemed to be minor as the exchange rate has been fixed through the study period, and the constituents of GFA_LBS are safe liquid assets whose market values are not very volatile.

Our regressions series is intended at uncovering the contemporaneous and lagged correlations of the locational banks' balance sheet components with the BoP bottom line measures. We do not aim at performing fully edged econometric analyses intending at explaining the determinants of each of those banks balance sheets components (thus, we do not introduce any control variable in the regressions). We include two lags (or three lags, if the third lag shows high statistical significance) of the dependent variables in order to account for their statistical inertia and to compensate for part of the information lost with omitted variables, that would be contained in the lagged dependent variables.

We focus on total bank deposits and total bank credit, and not on dollar denominated deposits and credit, as the inflow of dollar liquidity is deemed to impact LBP liquidity (through USD liquidity conversion into LBP liquidity), and consequently, the supply of LBP denominated credit. Also, as discussed in the previous section, the currency denomination of clients' bank deposits is mainly determined by their preference and their assessment of currency risk.

In the private credit regression, the impact of credit demand could be accounted for by including real GDP growth, following Den Haan, Sumner and Yamashiro (2007). However, the unconditional correlation between the change in GFA_LBS and real GDP growth over the study period is high (equal to 0.39), which suggests a pro-cyclical in flow of capital into the economy. Therefore, when we include both variables as explanatory variables, real GDP growth becomes insignificant. This makes it impossible to disentangle the impact of real GDP growth on dollar liquidity inflows (determinant of credit supply) from its impact on credit demand. An econometric identification

allowing to disentangle credit supply and credit demand effects would require the availability of more granular banking data, in the spirit of Khwaja and Mian (2008). Therefore, the relationship we identify between domestic banks credit to the private non-bank sector and dollar liquidity could be seen as correlational (not causal), as it is conditional on the behavior of credit demand that we are not able to identify separately with our set of data.

3.4. Econometric results

Effect of GFA_LBS variation on banks deposits, banks credit to the private non-bank sector, banks credit to government, banks deposits at the central bank, and banks foreign assets.

In Table 7 we show the results of the regression of the total deposits of the locational commercial banks' balance sheet (BK_TOTAL_DEP) in first difference on GFA_LBS in first difference.[16] The regression result shows a clear contemporaneous positive relationship between the GFA_LBS in first difference and total deposits in first difference. We regress the credit to the private non-bank sector in first difference over the GFA_LBS in first difference and its first, second and third lags. We find a strongly significant positive relationship with lag 3. The result of this second regression shows that over the period, the liquidity resulting from BoP flows has been used by banks to provide credit to the private non-bank sector with a lag of 3 semesters, which could be the average lag needed for banks credit process. We do not find any statistical relationship between the first difference of the GFA_LBS and the credit of commercial banks to the public sector. In the case of Lebanon, domestic banks credit to the public sector has been steadily increasing, without a dynamic connection with banks dollar liquidity.

We also look into the use commercial banks make of their dollar liquidity. We find a strongly significant positive contemporaneous relationship between the GFA_LBS in first difference and the growth of commercial banks deposits at the central bank. The regression also shows an alternating inertia in the banks' deposits at the central bank time series between quarters (i.e., a positive correlation with lags 1 and 3 and a negative correlation with lag 2). We also find a significant positive contemporaneous relationship between commercial banks foreign assets in first difference and the GFA_LBS in first difference.

We compute the cumulative dynamic multipliers of GFA_LBS, as the sum of its point estimates for statistically significant lags, for all the dependent variables. We have multipliers of 0.68 for total bank deposits, 0.12 for bank credit to the private sector, 0.37 for banks deposits at the central bank, and 0.48 for banks foreign assets.

[16] We use this measure in the absence of the change of the Gross Foreign Assets of the Locational Bank Sector (as the bottom line of the BoP) - the latter is not available to us as part of the BoP statistics. This is a minor concern in our case as valuation changes are of small magnitude, as explained in the previous section.

Table 7 | GFA_LBS regressions results

D(BK_TOTAL_DEP)	Coefficient	Prob.
C	0.824471***	0.0014
D(BK_TOTAL_DEP(-1))	0.003027	0.9716
D(BK_TOTAL_DEP(-2))	0.325182***	0.0003
D(GFA_LBS)	0.686727***	0.0000
Adj. R-squared	0.578813	
No. observations	63	
Sample (adj)	2002Q1 2017Q3	

D(CR_PRIV)	Coefficient	Prob.
C	0.110121	0.2866
D(CR_PRIV(-1))	0.185565	0.1396
D(CR_PRIV(-2))	0.466968***	0.0005
D(GFA_LBS)	0.009152	0.8273
D(GFA_LBS(-1))	-0.037541	0.3651
D(GFA_LBS(-2))	0.049498	0.2378
D(GFA_LBS(-3))	0.122388***	0.0050
Adj. R-squared	0.427085	
No. observations	60	
Sample (adj)	2002Q4 2017Q3	

D(DEP_CB)	Coefficient	Prob.
C	0.406157	0.2213
D(DEP_CB(-1))	0.512206***	0.0001
D(DEP_CB(-2))	-0.575145***	0.0000
D(DEP_CB(-3))	0.593751***	0.0000
D(GFA_LBS)	0.372886**	0.0145
Adj. R-squared	0.390054	
No. observations	63	
Sample (adj)	2002Q1 2017Q3	

D(BK_FOREIGN_ASSETS)	Coefficient	Prob.
C	-0.166760	0.2771
D(BK_FOREIGN_ASSETS(-1))	-0.036713	0.7382
D(BK_FOREIGN_ASSETS(-2))	-0.065165	0.5556
D(GFA_LBS)	0.480201***	0.0000
Adj. R-squared	0.294976	
No. observations	63	
Sample (adj)	2002Q1 2017Q3	

Note: ***p < 0.01; **p < 0.05; *p < 0.1.

Effect of the change in the central bank's international reserves (RES_CHANGE) on banks deposits, banks credit to the private non-bank sector, banks credit to government, banks deposits at the central bank, and banks foreign assets.

In Table 8 we perform the same regressions over the traditional measure of the bottom line of the BoP, i.e. the change in the central bank's international reserves (RES_CHANGE) - and its first, second and third lags for the credit to the private sector. RES_CHANGE is equal in accounting terms to the sum of the net current account, the net capital account and the net financial flows, adjusted to net errors and omissions. We find a clear contemporaneous positive relationship between RES_CHANGE and total banks deposits in first difference.

We regress the credit to the private non-bank sector in first difference over RES_CHANGE and its lags. The result of this regression shows again that, during the analysis period, BoP flows have been translated into banks credit to the private non-bank sector with a lag of 3 semesters. We do not find any statistical relationship between RES_CHANGE and banks credit to the public sector.

Table 8 | Change in Central Bank's international reserves regressions results

D(BK_TOTAL_DEP)	Coefficient	Prob.
C	1.052413***	0.0018
D(BK_TOTAL_DEP(-1))	-0.031900	0.7880
D(BK_TOTAL_DEP(-2))	0.398525***	0.0006
RES_CHANGE	0.481869***	0.0012
Adj. R-squared	0.284962	
No. observations	62	
Sample (adj)	2002Q1 2017Q2	

D(CR_PRIV)	Coefficient	Prob.
C	0.154177	0.1064
D(CR_PRIV(-1))	0.371595***	0.0055
D(CR_PRIV(-2))	0.304045**	0.0218
RES_CHANGE	-0.008716	0.8625
RES_CHANGE(-1)	0.022563	0.6668
RES_CHANGE(-2)	-0.078400	0.1262
RES_CHANGE(-3)	0.178075***	0.0005
Adj. R-squared	0.458646	
No. observations	59	
Sample (adj)	2002Q4 2017Q2	

D(DEP_CB)	Coefficient	Prob.
C	0.340497	0.2448
D(DEP_CB(-1))	0.374903**	0.0023
D(DEP_CB(-2))	-0.339296**	0.0193
D(DEP_CB(-3))	0.447415***	0.0015
RES_CHANGE	0.674223***	0.0001
Adj. R-squared	0.357164	
No. observations	62	
Sample (adj)	2002Q1 2017Q2	

D(BK_FOREIGN_ASSETS)	Coefficient	Prob.
C	0.426860**	0.0124
D(BK_FOREIGN_ASSETS(-1))	-0.133859	0.2909
D(BK_FOREIGN_ASSETS(-2))	-0.024406	0.8482
RES_CHANGE	-0.263673**	0.0342
Adj. R-squared	0.045213	
No. observations	62	
Sample (adj)	2002Q1 2017Q2	

Note: ***p < 0.01; **p < 0.05; *p < 0.1.

As regards the uses commercial banks make of their dollar liquidity, we find a strongly significant positive contemporaneous relationship between RES_CHANGE and banks deposits at the central bank. However, we find a significant negative contemporaneous relationship between commercial banks foreign assets in first difference and RES_CHANGE. This last result contrasts with the result we obtained when we regressed commercial banks foreign assets in first difference over GFA_LBS in first difference. This comes from the fact that GFA_LBS in first difference includes the variation of commercial banks foreign assets, while RES_CHANGE accounts for the variation of the central bank's international reserves only. Although GFA_LBS and the central bank's international reserves are closely related aggregates in the case of Lebanon, due to the fact that international reserves account for a large share of GFA_LBS through our study period, the last regression shows the superiority of GFA_LBS as a measure of dollar liquidity. In order to explain the negative relationship between RES_CHANGE and commercial banks foreign assets growth, we regress banks deposits at the central bank in first difference over banks foreign assets in first difference (Table 9) and find significant negative contemporaneous and lag 1 statistical relationships. This last regression shows the trade-off between Lebanese banks deposits at the central bank and their holding of foreign assets, as part of their foreign currency liquidity management. This interchangeability

between banks gross foreign assets and their deposits at the central bank (feeding the central bank's international reserves) - the two constituents of GFA_LBS - is another backing for our argument in favor of the GFA_LBS change being a more adequate measure of the BoP bottom line than is the change of the central bank's international reserves.

In sum, our results suggest that BoP inflows positively impact banks total deposits contemporaneously, while their positive effect on credit to the private non-bank sector is three quarters lagged. The lag we identified could be explained by the time the private sector credit process takes to materialize. Dollar liquidity does not have a direct impact on domestic banks credit to the government, during our analysis period. Also, increasing dollar liquidity in the banking system is invested in the same quarter, either in central bank deposits or in foreign assets (international banks deposits and international bonds).

Table 9 | Banks deposits at the Central Bank and banks foreign assets correlation regression

D(DEP_CB)	Coefficient	Prob.
C	0.808135***	0.0063
D(BK_FOREIGN_ASSETS)	-0.896955***	0.0001
D(BK_FOREIGN_ASSETS(-1))	-0.343592**	0.0457
D(DEP_CB(-1))	0.231849*	0.0552
D(DEP_CB(-2))	-0.036564	0.7696
D(GFA_LBS)	0.699199***	0.0001
Adj. R-squared	0.320250	
No. observations	62	
Sample (adj)	2002Q1 2017Q2	

Note: ***p < 0.01; **p < 0.05; *p < 0.1.

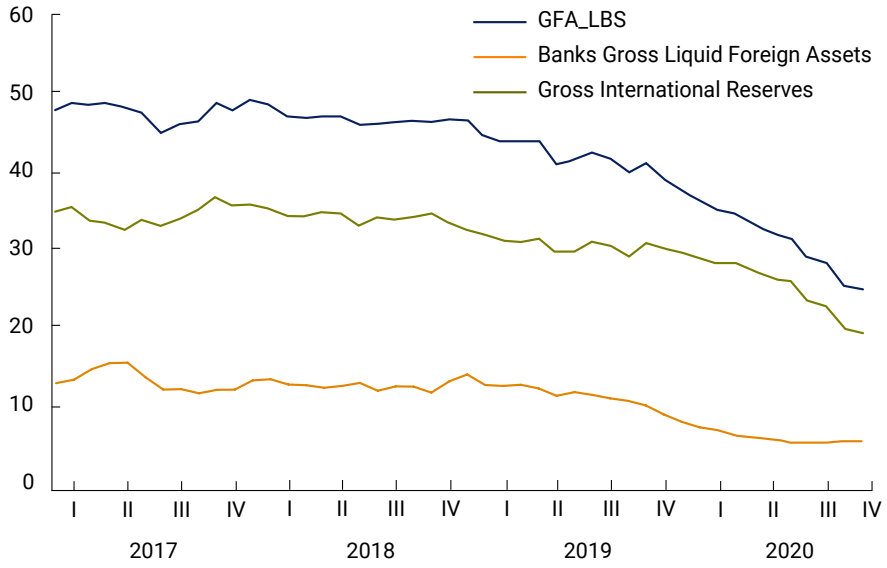
Our result on the relationship of dollar liquidity with domestic banks credit is in line with the results of previous studies of the link between international capital flows and credit cycles in emerging and developing economies. However, by focusing on dollar liquidity, we accounted for the bottom line of the balance of payments (i.e. the sum of net capital flows and the net current account), not only capital flows.

4. Robustness test I: Lebanon's 2019 monetary and financial crisis period

The initial study has been performed during the period spanning from January 2002 to September 2017, which could be considered a stable financial and monetary era in Lebanon, despite the occurrence of the 2008-2009 global financial crisis, that did not affect the country's economy substantially as it did in other parts of the world. However, we decided not to publish this paper until now, in order to test our results for robustness during the monetary and financial crisis that hit Lebanon in October 2019 and that is still ongoing at the time we are finalizing this paper. The reason is that this crisis is a dollar liquidity crisis, and thus, we wanted to test whether the monetary mechanisms we highlight in this paper hold during stressed periods. Figure 5 shows the rapid decrease of dollar liquidity (GFA_LBS) and its two components, i.e. gross international reserves and

the gross liquid foreign assets of the banking sector in Lebanon, in the three years period leading to the crisis and during the crisis. Figure 6 shows the evolution of the ratio of total USD bank deposits over GFA_LBS in Lebanon during the three years leading to the crisis and after the onset of the crisis. The coverage of USD bank deposits by the dollar liquidity in the hands of the locational bank sector (GFA_LBS) has substantially deteriorated during the crisis. This has led to the suspension of the convertibility of domestic banks USD deposits into international dollar deposits (funds transfers to overseas banks) and into US dollar notes.

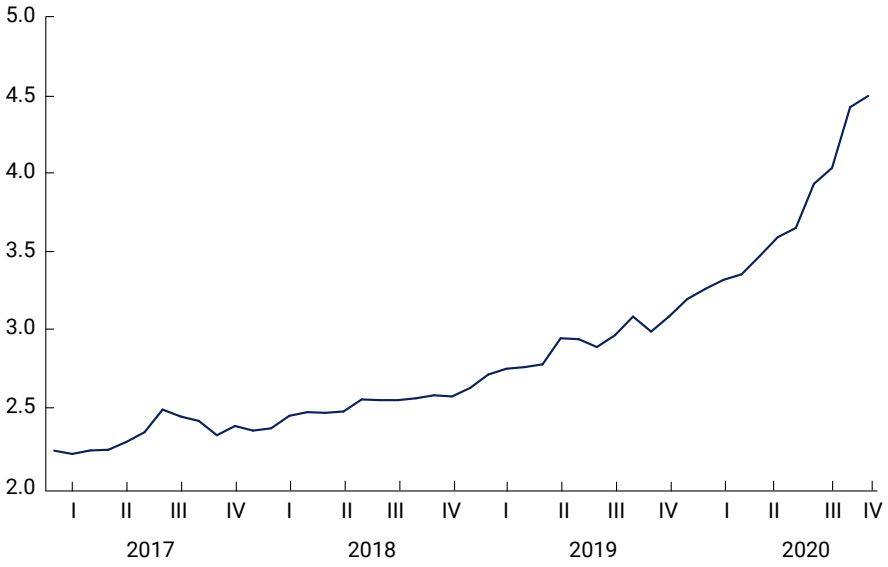
Figure 5 | GFA_LBS, gross international reserves, and banks gross liquid foreign assets (USD billions)



Data source: BdL Website.

Secondly, since the start of 2017, Banque du Liban started publishing monetary and financial statistics following the IFRS9 standards, which entailed a substantial change in data computing methods. Finally, a third change we made in our robustness tests is that we use the monthly frequency for the crisis period, instead of the quarterly frequency that we used for the initial study. All three changes constitute substantive robustness checks to our initial results.

Figure 6 | Ratio of USD deposits at domestic banks to GFA_LBS



Data source: BdL Website.

The results in Table 10 show that the positive contemporaneous relationship between the GFA_LBS in first difference and total deposits in first difference holds during the crisis period (the sample for these regressions comprise monthly data from March 2017 to January 2021). Also, a positive contemporaneous correlation is revealed between credit to the private non-bank sector in first difference and the GFA_LBS in first difference during this period. While the correlation of GFA_LBS with total bank deposits is quantitatively comparable to the one we obtained in the quiet period, its correlation with credit to the private non-bank sector does not come with any lag. This reflects the capital flight, that could not be fully contained by the informal capital control measures adopted by the banking system since the onset of the crisis, that happened in parallel with the reimbursement of dollar denominated bank loans by non-bank sector borrowers who were worried to be left with excessive liabilities in case of an official devaluation of the Lebanese pound - that did not happen so far, despite the large depreciation of the LBP versus the USD on the black FX market that emerged since the onset of the crisis. Thus, in this crisis episode, the reduction of banks credit to the private non-bank sector was primarily explained by borrowers' demand behavior, not by the diminished supply of loans by banks because of their shrinking dollar liquidity.

The bottom line is that the strong statistical relationship of dollar liquidity as defined by the GFA_LBS and total bank deposits holds even in crisis periods, in the presence of capital flight and (informal) capital controls.

Table 10 | GFA_LBS regressions results - Crisis period

D(BK_TOTAL_DEP)	Coefficient	Prob.
C	0.034890	0.8576
D(BK_TOTAL_DEP(-1))	0.529227***	0.0000
D(GFA_LBS)	0.611795***	0.0005
Adj. R-squared	0.475684	
No. observations	47	
Sample (adj)	2017M03 2021M01	

D(CR_PRIV)	Coefficient	Prob.
C	-0.064170	0.4335
D(CR_PRIV(-1))	0.657159***	0.0000
D(GFA_LBS)	0.184409***	0.0086
Adj. R-squared	0.597798	
No. observations	47	
Sample (adj)	2017M03 2021M01	

Note: ***p < 0.01; **p < 0.05; *p < 0.1.

5. Robustness test II: Russia and Peru

In this section, we test our results for robustness in the context of two major dollarized economies with different economic and monetary structures and exchange rate regimes: Russia and Peru. By doing so, we aim at showing that the monetary mechanisms we identified apply in any institutional context.

5.1 Russia

We use monthly data extending from January 2001 to January 2021 for the central bank's gross international reserves, banks' foreign liquid assets, banks' total deposits, and banks' credit to the resident private non-bank sector. For Russia, we could also get the breakdown of commercial bank deposits into domestic currency (ruble) denominated and dollar denominated. We obtained the data directly from the Bank of Russia economic research team. We elected to convert all the data into USD (not the other way around, into RUB), using the RUB/USD exchange rate series we obtained from the St Louis Fed website, as the target variable in our analysis is dollar liquidity.

The results of our regressions are presented in Table 11 below. We see a clear contemporaneous positive relationship between GFA_LBS in first difference and total deposits in first difference, with a high coefficient of 0.82. We also regress total deposits in first difference over the central bank's international reserves (IR_EX_GOLD) in first difference, and we find a contemporaneous positive relationship too, with a slightly lower coefficient of 0.78. The adjusted R-squared is also superior for the GFA_LBS first difference regression. This confirms the superiority of GFA_LBS over the central bank's international reserves alone as a measure of dollar liquidity.

We find a strongly significant contemporaneous positive relationship between the credit to the private non-bank sector in first difference and GFA_LBS in first difference, with a coefficient equal to 1. However, as explained earlier in the paper, we cannot interpret this in causal terms because the demand side is very important to account for when it comes to bank credit. Finally, data availability in the case of Russia allows us to test the relationship between dollar liquidity as defined by GFA_LBS and total USD denominated bank deposits (BK_DEP_USD) in the locational Russian banking system. We find no statistical relationship between the two aggregates. This result proves the wrongness of

previous studies in the dollarization literature that associate dollar liquidity to dollar denominated deposits in the domestic banking system or assume any direct relationship between them.

Table 11 | Regressions results for Russia

D(BK_TOTAL_DEP)	Coefficient	Prob.
C	1029.365	0.4433
D(BK_TOTAL_DEP(-1))	-0.011763	0.8482
D(GFA_LBS)	0.828935***	0.0000
Adj. R-squared	0.190186	
No. observations	240	
Sample (adj)	2001M02 2021M01	

D(BK_TOTAL_DEP)	Coefficient	Prob.
C	1342.247	0.3254
D(BK_TOTAL_DEP(-1))	0.019662	0.7503
D(IR_EX_GOLD)	0.786130***	0.0000
Adj. R-squared	0.159128	
No. observations	240	
Sample (adj)	2001M02 2021M01	

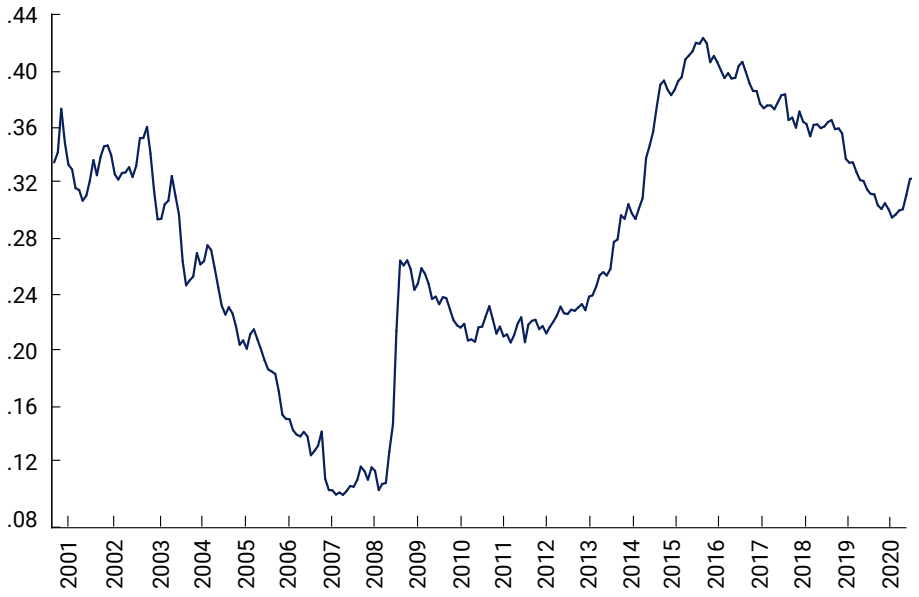
D(CR_PRIV)	Coefficient	Prob.
C	173.7479	0.9085
D(CR_PRIV(-1))	0.173429***	0.0028
D(GFA_LBS)	1.005390***	0.0000
Adj. R-squared	0.275341	
No. observations	240	
Sample (adj)	2001M02 2021M01	

D(BK_DEP_USD)	Coefficient	Prob.
C	716.1138**	0.0122
D(BK_DEP_USD(-1))	0.105086	0.1076
D(GFA_LBS)	0.026256	0.2440
Adj. R-squared	0.006387	
No. observations	240	
Sample (adj)	2001M02 2021M01	

Note: ***p < 0.01; **p < 0.05; *p < 0.1.

Finally, as shown by the evolution of the dollar multiplier in Figure 7, the dollar liquidity position of the Russian monetary system has always been very strong with a dollar multiplier never exceeding 0.43, even in the periods of economic and financial stress of 2008-2009 and 2013-2016.

Figure 7 | Dollar multiplier in Russia



Data source: Bank of Russia and authors' calculations

5.2. Peru

We use monthly data extending from March 1992 to February 2021, obtained from the central bank of Peru's website - all the data is in USD. For Peru, we could obtain the time series of commercial banks short-term foreign liquid liabilities, in addition to the time series we could obtain for the other countries in this study. This allowed us to compute GFA_LBS_N, which is equal to GFA_LBS net of those liabilities. In general, short-term liquid interbank liabilities are of minor importance in emerging markets banks as correspondent banks holding interbank deposits are mostly international banks based in developed economies. Short-term interbank liabilities of emerging and developing economies' banks are mostly made of long-term facilities that become due within the next year.

The regressions in Table 12 show that, for Peru, GFA_LBS_N has a stronger positive statistical connection with banks total deposits than GFA_LBS, which in turn has a stronger statistical connection with banks total deposits than the variation of the central bank's international reserves (IR_EX_GOLD). The statistical connection of banks total deposits in Peru with those three aggregates is both contemporaneous and one month lagged - this is mainly due to possible accounting lags. The sum of the contemporaneous and the first lag coefficients for GFA_LBS_N is equal to 0.56. We could not find a statistical connection between GFA_LBS_N and banks credit to the private non-bank sector in the case of Peru, which proves our point that the connection of dollar liquidity with banks credit to the non-bank private sector is not automatic as is the case with banks total deposits, but mainly depends on the existence of a demand for that credit. Finally, we found a very weak statistical connection of dollar liquidity (GFA_LBS_N) with USD denominated bank deposits, with a low coefficient of 0.09 and an adjusted R-squared for the regression of 0.039, supporting our point regarding the weak connection between both aggregates.

Finally, as shown by the evolution of the dollar multiplier in Figure 8, the dollar liquidity position of the Peruvian monetary system has always been strong with a dollar multiplier that slightly exceeded unity only during the period of economic and financial stress of 1999-2002.

Table 12 | Regressions Results for Peru

D(BK_TOTAL_DEP)	Coefficient	Prob.
C	151.4421***	0.0000
D(BK_TOTAL_DEP(-1))	-0.050785	0.3282
D(GFA_LBS_N)	0.362236***	0.0000
D(GFA_LBS_N(-1))	0.205489***	0.0000
Adj. R-squared	0.287094	
No. observations	348	
Sample (adj)	1992M03 2021M02	

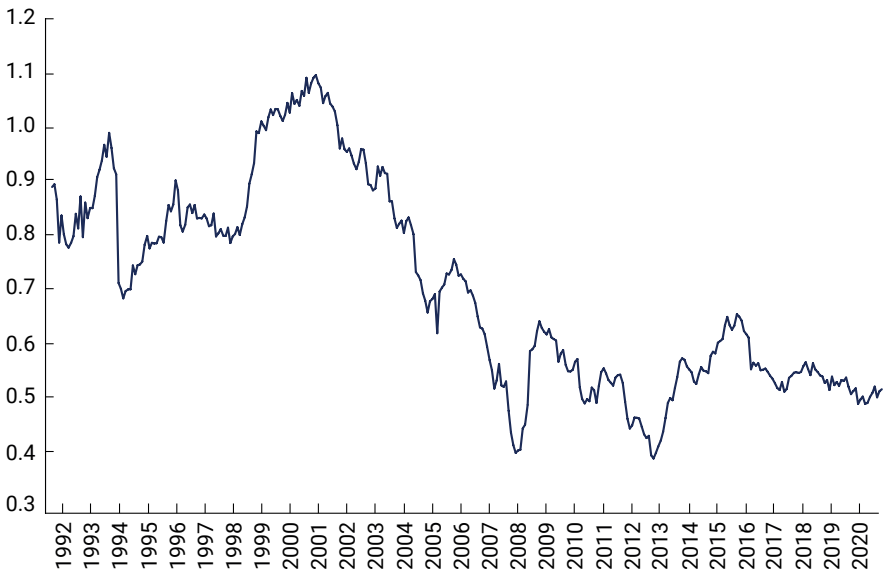
D(BK_TOTAL_DEP)	Coefficient	Prob.
C	147.8139***	0.0000
D(BK_TOTAL_DEP(-1))	-0.050843	0.3304
D(GFA_LBS)	0.337096***	0.0000
D(GFA_LBS(-1))	0.186567***	0.0000
Adj. R-squared	0.278889	
No. observations	348	
Sample (adj)	1992M03 2021M02	

D(BK_TOTAL_DEP)	Coefficient	Prob.
C	148.5493***	0.0000
D(BK_TOTAL_DEP(-1))	-0.028662	0.5837
D(IR_EX_GOLD)	0.335219***	0.0000
D(IR_EX_GOLD(-1))	0.177385***	0.0000
Adj. R-squared	0.263871	
No. observations	348	
Sample (adj)	1992M03 2021M02	

D(BK_DEP_USD)	Coefficient	Prob.
C	67.72144***	0.0046
D(BK_DEP_USD(-1))	0.125014***	0.0181
D(GFA_LBS_N)	0.089935***	0.0009
Adj. R-squared	0.039848	
No. observations	348	
Sample (adj)	1992M03 2021M02	

Note: ***p < 0.01; **p < 0.05; *p < 0.1.

Figure 8 | Dollar multiplier in Peru



Data source: BCRP website and authors' calculations

6. Conclusion

We aimed in this paper at filling a gap in the literature relating to dollarization by analyzing the main monetary mechanisms in dollarized economies. We focused on the liquidity dimension linked to financial dollarization, that is often overlooked in the literature. We stressed the importance of a strict liquidity risk management of banks in a dollarized economy, in the absence of a dollar lender of last resort. We shed light on the interconnection between balance of payments flows, money and credit in small open dollarized economies. The empirical study in the case of the small open dollarized economy of Lebanon confirmed the results of our analysis. We found positive short-run connections between our favored measure of dollar liquidity (the Gross Foreign Assets of the Locational Banks Sector aggregate) and total banks deposits, banks foreign assets and banks deposits at the central bank. We also found a lagged positive connection with credit to the private non-bank sector. This study also uncovered the preferences of Lebanese banks in the use they make of the dollar liquidity resulting from balance of payments flows. We tested our results empirically using data from two other major dollarized economies (Peru and Russia) to show that the monetary mechanisms we identified operate under any institutional context and exchange rate regime.

Our results stress the importance of managing the Gross Foreign Assets of the Locational Banks Sector aggregate by the monetary authorities of dollarized economies, because of its impact on monetary aggregates and credit, and ultimately on inflation, the exchange rate, and financial stability. Lebanon's ongoing crisis is a dollar liquidity crisis of the country's dollarized banking system. This induces a necessity to closely monitor the balance of payments bottom line. Large balance of payments surpluses (i.e., a rapid growth of GFA_LBS) inject excess liquidity and can lead to the overheating of the economy and potentially to financial crises. Large balance of payments deficits (i.e., a rapid decrease of GFA_LBS) drain dollar liquidity and can lead to a disruption of the economic activity. This monitoring can be achieved through the simultaneous management of capital flows and of the current account. However, policymakers have to bear in mind that net capital inflows and current account surpluses are not equal sources of dollar liquidity. While current account surpluses increase the net foreign assets of the economy, net capital inflows are liabilities that need to be reversed ultimately. This last observation suggests that persistent external imbalances (i.e. recurring current account deficits financed by capital inflows) would ultimately threaten the availability of dollar liquidity in dollarized economies as is currently the case in Lebanon, leading to a dollar liquidity crisis. Thus, dollarization provides an additional incentive for policymakers to avoid exchange rate overvaluation and large external deficits.

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Appendix

Table 13 | Variables description

Variable	Description
CURR_ACC	sum of the net current account and the net capital account of the balance of payments
CAP_FLOWS	net total capital flows computed as the sum of other investments, portfolio investments and direct investments
EO	errors and omissions component of the balance of payments
RES_CHANGE	change in the central bank's international reserves component of the balance of payments
PI	net portfolio investments component of capital flows
FDI	net foreign direct investments component of capital flows
OI	net other investments component of capital flows
BK_TOTAL_DEP	total deposits including resident and non-resident sight and term deposits at commercial banks both in LBP and USD
BK_DEP_USD	total USD denominated bank deposits at domestic commercial banks
DEP_CB	total amount of LBP and USD deposits of commercial banks at the central bank, including mandatory reserve requirements
CR_PRIV	total amount of commercial banks credit to the private non-bank sector both in LBP and USD
CR_PUBLIC	total amount of commercial banks credit to the Lebanese government both in LBP and USD, comprised mainly of LBP government bonds and bills and USD Eurobonds
BK_FOREIGN_ASSETS	total amount of foreign assets held by banks mainly in the form of USD deposits at foreign banks and foreign investment grade bonds
GFA_LBS	gross foreign assets of the locational banks sector (= IR_EX_GOLD + BK_FOREIGN_ASSETS)
FX_DEP / GFA_LBS	ratio of the sum of total residents' foreign currency deposits and total non-residents deposits in Lebanese commercial banks over GFA_LBS
FX_CR_PRIV / GFA_LBS	ratio of total foreign currency credit of Lebanese commercial banks to the private non-bank sector over GFA_LBS
IR_EX_GOLD	BdL international reserves excluding gold

Sustitución de monedas y efecto histéresis: una aplicación empírica para Argentina

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Resumen

En economías con grandes fluctuaciones cambiarias e inestabilidad macroeconómica, la sustitución de monedas es un fenómeno de alta importancia. Mediante el uso de una variable *ratchet*, que mide el efecto histéresis —irreversibilidad en la sustitución de monedas—, se estudia el caso argentino para 2003-2019. Para ello, se utilizó un modelo ARDL (Autorregresivo de Rezagos Distribuidos), con el cual se encontró que el efecto histéresis es persistente en el largo plazo. Lo anterior tiene implicancias en cuanto a la dificultad de implementar la política monetaria y respecto a la estabilidad de la demanda de dinero.

Clasificación JEL: C32, E41, E44.

Palabras clave: demanda de dinero, efecto histéresis, sustitución de monedas, variable *ratchet*.

Presentado: 11 de marzo de 2021 - *Aprobado*: 31 de enero de 2022

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Currency Substitution and the Hysteresis Effect: An Empirical Application for Argentina

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Abstract

In economies with large exchange rate fluctuations and macroeconomic instability, currency substitution is a highly important phenomenon. The Argentine case is studied through the inclusion of a ratchet variable, which accounts for the hysteresis effect —irreversibility in the currency substitution process—, for 2003-2019. To that end, an ARDL (Autorregresive Distributed Lag) model was used, where it was found that the hysteresis effect is persistent in the long run. This has implications to conduct monetary policy and regarding the stability of the demand for money.

JEL Classification: C32, E41, E44.

Keywords: currency substitution, demand for money, hysteresis effect, ratchet variable.

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1. Introducción

En economías emergentes con alta inestabilidad macroeconómica, ya sea por tasas de inflación elevadas y volátiles o por agudos escenarios de fluctuaciones cambiarias, los agentes pierden confianza en la moneda debido a que el costo de oportunidad de mantener dinero en moneda local se torna elevado e incierto. Los vaivenes de la economía argentina han llevado a que coexistan dinero doméstico y extranjero, lo que la ha convertido en una economía bimonetaria *de facto*.

Intuitivamente, lo que ocurre con estos períodos de grandes oscilaciones es lo que Guidotti y Rodríguez (1992) han llamado la inversa de la Ley de *Gresham*.[1] Contrario a lo que sucedía cuando el dinero poseía valor intrínseco, ahora la moneda fuerte es la que desplaza a la débil. En este sentido, argumentan que la dolarización no se da solamente por un aumento en la tasa de inflación, sino que es la inflación alta y sostenida en el tiempo la que fomenta la continua y gradual formación de posiciones en moneda extranjera.

En la misma línea, Savastano (1996) advierte que estos procesos no surgen (aunque sí son agravados) por fogonazos inflacionarios aislados, sino que se forman paulatinamente. El dinero va perdiendo en una secuencia asincrónica sus funciones de reserva de valor, unidad de cuenta y medio de pago. Usualmente, la función de reserva de valor es la primera en perderse, pero hace falta un prolongado periodo de elevada inflación, o incluso etapas hiperinflacionarias, para que la moneda local pierda el rol de unidad de cuenta y primordialmente la función de medio de pago (Calvo y Vegh, 1992; Heymann y Leijonhufvud, 1995). Cuando las propiedades del dinero se ven vulneradas casi en su mayoría, la economía corre peligro de que se instaure una irreversibilidad del proceso. Esto quiere decir que es sencillo huir del dinero local hacia el extranjero, pero existe persistencia en el uso de la moneda extranjera, no retornando a la moneda local.

Consecuentemente, una vez estabilizado el panorama macroeconómico y desaparecidos los incentivos a huir de la moneda débil, se registran niveles de dolarización constantes o en crecimiento, cuando debería esperarse que estos desciendan. A esta sustitución asimétrica entre monedas se la conoce como efecto histéresis y, siguiendo a Dornbusch, Sturzenegger y Wolf (1990), se instaura por la adaptación financiera desarrollada luego de periodos de alta inflación, en los que surgen nuevas instituciones e instrumentos financieros. Estos comúnmente se materializan en depósitos en moneda extranjera o arreglos informales entre agentes para intercambiar pesos por dólares, que disminuyen la demanda de dinero local para un nivel dado de tasas de interés nominales. En este sentido, desarrollar estos instrumentos involucra incurrir en un costo fijo de aprendizaje y, una vez hundidos estos costos, hay escasos estímulos a regresar a la moneda local cuando se estabiliza la economía.

En particular, los mecanismos adaptativos que subyacen tras la histéresis tienen múltiples aristas y pueden caracterizarse en (I) herramientas de cobertura nominal; (II) sustitución hacia activos

[1] La *Ley de Gresham* era particularmente importante cuando las monedas poseían valor intrínseco y postula que, si hay dos monedas en circulación, la moneda "mala" termina desplazando a la "buena". Se deduce de la observación que los agentes preferían huir rápido de la moneda "mala" utilizándola en las transacciones económicas.

externos, tales como depósitos en moneda extranjera o en cuentas en el exterior; (III) sustitución hacia activos físicos, como propiedades o mercancías o; (IV) sustitución hacia activos domésticos que devenguen intereses. En Argentina, el último comportamiento no tuvo un lugar relevante durante su historia por el manejo de tasas de interés que no llegaba a recompensar a los tenedores de instrumentos denominados en moneda local. Sin embargo, los primeros tres tuvieron un rol que ha ido variando con el paso de los años. Las primeras respuestas por parte de los agentes tuvieron que ver con comportamientos de cobertura nominal en alta inflación, los cuales son bien documentados por Frenkel (1989), y algunos de ellos son el acortamiento de los contratos salariales, de alquileres y otros servicios cuando aumenta la inflación para compensar la mayor incertidumbre, y el cambio en la formación de expectativas y decisiones de precios de oferentes. Como apuntan Gerchunoff y Rapetti (2016), tanto la sociedad como la economía argentina tienen conexiones financieras y comerciales con el mundo inimaginables respecto a décadas anteriores, donde a las tasas de interés negativas se suman la preferencia por ahorrar en activos externos y cambios en los patrones de consumo de las clases medias, que ahora pueden importar otro tipo de bienes y servicios. Así, con el paso de años de inestabilidad macroeconómica, los agentes añadieron los dos comportamientos restantes, convirtiendo los saldos disponibles en tenencias en moneda extranjera o en algún activo menos líquido pero dolarizado, como propiedades o bienes y servicios importados, tales como maquinarias o turismo internacional.

El objetivo del presente trabajo radica entonces en estudiar el grado de persistencia de la dolarización financiera en Argentina. En otras palabras, se indaga si existe efecto histéresis en la demanda de dinero en Argentina para el periodo que tiene lugar luego de la salida del régimen de convertibilidad hasta el día de hoy (2003-2019).

La elección del periodo de la muestra se basó en la intención de estudiar la post convertibilidad ya que, con la caída de dicho régimen, el funcionamiento del sistema monetario cambió, el Banco Central tuvo una reforma de su carta orgánica y se abandonó la convalidación de la dolarización de una parte importante de la estructura contractual. Así, si bien hay disponibilidad de datos para incorporar la convertibilidad al presente estudio, se optó por estudiar la dinámica de un ciclo renovado, en donde el sistema bancario partiese con niveles de dolarización bajos y donde no se mezclen dos regímenes monetarios diferentes.

El caso argentino posee una vasta cantidad de literatura que aborda el problema de la dolarización, siendo un proceso que comenzó en la mitad del siglo XX y que se intensificó a partir de los años setenta cuando el país entró en un régimen de alta inflación y comenzó a transitar crisis macrofinancieras. El trabajo de Fasano-Filho (1986), que mediante una estimación de demanda de dinero encuentra significativa la sustitución de monedas en Argentina para 1960-1976 (sobre todo a partir de 1970), y los valiosos aportes de Ramírez-Rojas (1985), Kamin y Ericsson (1993) y Dabus, Delbianco y Fioriti (2016), que pasan a estudiar si existe persistencia en la sustitución de monedas en la década de 1970 en el primer caso, en el periodo 1977-1993 en el segundo caso y en el período 1980-2013 en el tercero, permiten inferir que no es una novedad pensar que en Argentina pueda existir irreversibilidad en el proceso de dolarización (histéresis). Mediante un enfoque basado en selección óptima de cartera, Burdisso y Corso (2011) estudian la influencia de la incertidumbre

sobre la dolarización de los activos financieros en Argentina durante medio siglo, hallando que el "Rodrigazo" (1975) resultó ser un quiebre para la dolarización de los portafolios del sector privado y que entre 2003 y 2009 hay presencia de persistencia en el grado de dolarización de carteras. Ize y Levy Leyati (2003) demuestran para cinco países latinoamericanos, entre los que se encuentra Argentina, que las asignaciones del Portafolio de Mínima Varianza (MVP) son apropiadas para estimar la dolarización financiera a partir de la incertidumbre macroeconómica.

Valiéndose de las grandes contribuciones mencionadas en el párrafo previo, este trabajo se propone saldar algunas cuestiones no resueltas para el periodo iniciado post convertibilidad. En particular, la propuesta radica en estudiar el desempeño argentino con la reciente agudización de la inflación tras la crisis iniciada en el año 2018, además de investigar si existe histéresis no sólo en un sentido estrecho, sino también en un sentido amplio (medido a través del ratio CS_2, que se expondrá posteriormente). Profundizar esta línea de análisis se torna fundamental, debido a que permite deducir si existe aún espacio para la política monetaria en influenciar la asignación de divisas (*currency allocation*) del portafolio de las familias.[2]

Respetando la terminología propuesta por Calvo y Vegh (1992), en donde diferencian dolarización de sustitución de monedas, se debe tener presente que, mientras la dolarización refiere al proceso completo por el que el dinero doméstico va perdiendo las propiedades de reserva de valor, unidad de cuenta y medio de pago en último lugar, la sustitución de monedas es la última etapa de dicho proceso. De esta manera, la investigación sobre sustitución de monedas se desenvuelve en situaciones en las que la moneda local perdió en algún grado las propiedades de reserva de valor y unidad de cuenta, y se discute la existencia de problemas para funcionar correctamente como medio de pago.[3] El caso argentino se caracteriza por utilizar al dólar estadounidense fundamentalmente como reserva de valor y como unidad de cuenta en una fracción específica de la estructura contractual, asociada a mercados a los cuales se accede en grandes proporciones de riqueza, como lo es el mercado inmobiliario. Si bien Argentina presenta una elevada dolarización financiera, no se encuentra en la última fase del proceso de dolarización, en la que una moneda extranjera actúa de manera generalizada como medio de pago.

El inconveniente que se presenta para el estudio es la falta de una serie temporal lo suficientemente extensa sobre tenencias no bancarizadas en moneda extranjera.[4] De esta forma, se torna imposible subsanar las falencias que vienen presentándose desde trabajos anteriores y la manera de encarar el estudio continúa siendo mediante dos índices de sustitución de monedas, que en efecto son indicadores del grado de dolarización financiera: CS_1, que se calcula como el cociente entre depósitos a la vista y en caja de ahorros en moneda extranjera sobre el total de depósitos a

[2] El trabajo de Dabus *et al.* (2016) sólo encuentra significancia de las variables *ratchet,* aquellas que miden la histéresis, para el ratio CS_1 pero no para el CS_2. Esto evidencia que el efecto histéresis para la muestra trabajada sólo se mantenía en un sentido estrecho.

[3] No es excluyente el dólar estadounidense como divisa fuerte en estos procesos. Normalmente el dólar es a donde tienden a refugiarse los agentes, ya que funciona como divisa de cambio (*vehicle currency*). Esto es, como patrón de cambio en las transacciones internacionales (Us, 2003).

[4] Como se menciona más adelante, INDEC presenta en la posición de inversión internacional una estimación de las tenencias no financieras en moneda extranjera del sector privado, pero esta serie recién comienza en el año 2006 con estimaciones anuales y sólo desde el 2016 incorpora información trimestral.

la vista y en caja de ahorros en pesos y dólares; y CS_2, que es el cociente entre depósitos locales y en el extranjero de residentes (a la vista, en caja de ahorros y a plazo) en dólares, sobre el total de depósitos (a la vista, en caja de ahorros y a plazo) en pesos y dólares, que poseen residentes argentinos tanto en el país como en el exterior. Así, los índices miden el grado de dolarización de los depósitos, según sean más líquidos y realizables (CS_1) o a mayores plazos o se encuentren en el extranjero (CS_2). Esta especificación de los índices va en línea con la trabajada para Nigeria por Bawa, Otomosho y Doguwa (2015), en donde la definición del sentido estrecho o amplio de los índices se basa en la liquidez y facilidad de disponibilidad de los depósitos.

Es importante resaltar que existe un riesgo de subestimación del fenómeno estudiado, puesto que hay tenencias de moneda extranjera atesoradas por fuera del sistema financiero local, que no son captadas por los índices previamente expuestos. Este asunto no es trivial ya que, al analizar los datos de INDEC sobre la posición de inversión internacional de Argentina entre 2006 y 2019, se desprende que, de los activos financieros totales del sector privado, un 65% en promedio corresponden a tenencias de activos externos del sector.

En el Cuadro 1 se compara la evolución de las tenencias de activos externos del sector privado estimados por INDEC con los depósitos en moneda extranjera del sector privado en el sistema bancario local registrados por el BCRA desde el año 2006.

Cuadro 1 | Depósitos locales en moneda extranjera y activos externos totales del sector privado
En millones de dólares

Fecha	Depósitos en moneda extranjera (1)	Activos externos (2)	Ratio (1)/(2) %
2006	4.277	76.003	5,6%
2007	5.717	85.495	6,7%
2008	7.320	97.185	7,5%
2009	9.424	104.662	9,0%
2010	10.779	112.418	9,6%
2011	12.947	132.226	9,8%
2012	9.779	141.802	6,9%
2013	7.055	144.385	4,9%
2014	7.003	145.812	4,8%
2015	8.237	154.472	5,3%
2016	13.519	156.303	8,6%
2017	23.830	161.170	14,8%
2018	26.758	184.389	14,5%
2019	26.914	207.719	13,0%

Fuente: elaboración propia en base a BCRA e INDEC.

Aquí se puede observar que analizar la dolarización desde los pasivos bancarios refleja una porción reducida del fenómeno (en el mejor de los casos equivale a sólo un 14,8% de la totalidad de activos externos), y no permite realizar inferencias hacia la totalidad de la economía. Sin embargo, por la baja

frecuencia de los datos presentados por INDEC, donde la serie comienza en 2006 incorporando estadísticas anuales y sólo desde el 2016 con datos trimestrales, se optó por examinar el canal bancario de la dolarización en Argentina para garantizar una mejor estimación del modelo con una cantidad razonable de observaciones. De esta manera, queda para futuras investigaciones el estudio del fenómeno ampliando el foco más allá del canal bancario local, cuando se cuente con una mayor cantidad de observaciones que permitan un análisis econométrico adecuado.[5]

Con ayuda de la metodología desarrollada por Pesaran y Shin (1995) y, posteriormente, por Pesaran, Shin y Smith (2001), se aplicará el enfoque *bounds testing* para cointegración de variables y se utilizará un modelo Autorregresivo de Rezagos Distribuidos (ARDL) derivado de la especificación de Mongardini y Mueller (1999), que incluye una variable *ratchet* para capturar el efecto histéresis. Los datos que se utilizarán son de frecuencia mensual para Argentina durante 2003-2019.

El trabajo se estructura de la siguiente manera. La sección 2 narra un breve compendio de la economía argentina en el campo macroeconómico durante las últimas dos décadas. La sección 3 describe la metodología que se utilizará y los datos y variables empleados. La sección 4 examina los resultados empíricos y la sección 5 delinea algunas recomendaciones de política. Por último, en la sección 6 se presentan las conclusiones del trabajo.

2. Hechos estilizados en Argentina

En el período estudiado la economía argentina no tuvo un comportamiento uniforme. En particular, la periodización puede dividirse de dos maneras. Por un lado, en términos de crecimiento del producto, Argentina creció entre 2003 y 2011 un 59,75% a una tasa promedio del 6,15% anual; mientras que desde 2011 comienza un proceso de estancamiento, en el que el PIB ha tenido un crecimiento promedio anual del -0,29% entre 2012 y 2019.

Por otro lado, respecto a la estabilidad macroeconómica, desde el año 2007 comienzan a generarse presiones inflacionarias. La economía crecía en gran medida beneficiada por los altos precios de las *commodities* y un sector público con espacio para aumentar su tamaño tras la licuación de los ingresos y gastos de gobierno post crisis. Además, según Heymann y Ramos (2010) la configuración de precios relativos post crisis, con un tipo de cambio real alto y salarios reales bajos dio espacio a una sostenida recuperación del poder de compra en dólares de los salarios domésticos que reactivaba el mercado interno. La brecha del producto, que venía siendo fuertemente negativa luego de la crisis del 2001, para entonces se había cerrado.

De esta manera, el país recibía fuertes entradas de divisas por el comercio exterior y, desde el Banco Central de la República Argentina (BCRA), se instaló una política activa de acumulación de reservas, que llevó a las reservas internacionales de 11.000 millones de dólares en 2003 a un máximo de 50.000 en 2008 (Redrado, 2009). Como contrapartida de la acumulación, había un exceso monetario que iba lentamente traduciéndose en mayor inflación, a pesar de los intentos de

[5] Habiendo aclarado esto, trataremos los términos dolarización y sustitución de monedas como sinónimos durante el presente trabajo.

esterilización, mediante letras y notas (LEBAC y NOBAC). A partir de allí, y luego de cerca de 15 años sin problemas inflacionarios sostenidos, se instaló una cada vez más acentuada elevación del nivel de precios. Con el aumento de la inflación se tornó más arduo sostener el nivel de tipo de cambio real que había sido férreamente mantenido desde 2003.

En resumen, la economía argentina hasta el año 2011 funcionó en base a tres pilares fundamentales que son identificados por Damill, Frenkel y Rapetti (2015): (I) un tipo de cambio real competitivo y estable, (II) superávits gemelos en las cuentas fiscales y externas y (III) un gran y creciente *stock* de reservas internacionales.

A partir del 2011, la Argentina comenzó con un ciclo de estanflación que hasta el día de hoy perdura. Los superávits gemelos habían desaparecido, comenzaron a perderse reservas internacionales y los desbalances se cubrieron mayoritariamente vía emisión monetaria. Las presiones inflacionarias continuaron incrementándose a la vez que se deterioraba el plano cambiario en el que, a pesar de buscar corregirse con aisladas devaluaciones, nunca se alcanzaba el nivel previo de tipo de cambio real. Además, con la intensificación de la inflación, las tasas de interés reales pasaron a ser negativas. De esta manera, se lograba mantener el crédito barato y sostener los niveles de demanda agregada, pero, por otro lado, se perdían los incentivos para ahorrar en pesos.

Al mismo tiempo, a fines de 2011 se instauraron un conjunto de restricciones a la operatoria con moneda extranjera conocidas como "cepo cambiario", que buscaba frenar la pérdida continua de reservas y que se tradujo en una prima en el mercado negro de divisas del 60% en promedio en el año 2013. Las limitaciones para acceder a moneda extranjera de manera bancarizada provocaron una interrupción no genuina en la suba de los CS. De hecho, tanto el descenso en el ratio de depósitos respecto al *stock* de activos externos (ver el Cuadro 1) como la evolución de la prima en el mercado negro (ver el Cuadro 2) permiten deducir que en ningún momento cesó la demanda por dólares. La economía seguía incrementando su dolarización, aunque por fuera del sistema bancario.

Así, los incrementos de precios ya no eran sólo provocados por una economía funcionando en pleno empleo, sino también empezaron a responder a comportamientos inerciales e indexatorios, conducidos en gran parte por las expectativas de devaluación que generaba la brecha cambiaria. Si bien durante el periodo estudiado la indexación en Argentina estaba formalmente prohibida, casos como los del mercado inmobiliario, donde los agentes se adaptaron a confeccionar contratos de alquiler con precios escalonados que incorporaban expectativas de inflación, o el de acuerdos salariales revisados con mayor periodicidad y cláusulas gatillo, que se activaban siempre que la inflación alcanzara un determinado nivel, muestran que existía un mecanismo *de facto* que posibilitaba la propagación de los aumentos de precios. Esto no era algo novedoso en Argentina, que se mantuvo en un régimen de alta inflación durante gran parte de su historia moderna, a excepción de un oasis de una década de estabilidad de precios. Las crisis alteran las interpretaciones del pasado y las perspectivas formuladas a futuro, siendo usualmente invocadas por los mismos agentes para justificar comportamientos incluso años después de una crisis (Heymann, 2007). Dichos comportamientos adaptativos volvían a formar parte del funcionamiento y organización social.

Cuadro 2 | Indicadores macroeconómicos 2003-2019 [6]

Fecha	Crecimiento %	Inflación %	Res. Fiscal % PIB	Cta. Cte. % PIB	Reservas m. m. US$	Prima %
2003	8,80%	17,40%	-	6,20%	11.884	2,10%
2004	9,00%	5,20%	2,40%	1,90%	16.872	1,00%
2005	8,90%	8,70%	1,60%	2,50%	23.375	0,90%
2006	8,00%	8,30%	1,60%	2,80%	25.085	1,30%
2007	9,00%	16,10%	1,00%	2,10%	40.432	1,70%
2008	4,10%	23,80%	1,30%	1,50%	47.800	2,20%
2009	-5,90%	14,80%	-0,60%	2,20%	46.359	1,70%
2010	10,10%	25,90%	-0,20%	-0,40%	49.713	2,10%
2011	6,00%	23,90%	-1,40%	-1,00%	50.401	5,80%
2012	-1,00%	23,70%	-2,10%	-0,40%	46.149	26,20%
2013	2,40%	25,80%	-1,90%	-2,10%	37.547	60,50%
2014	-2,50%	42,70%	-2,40%	-1,60%	28.522	54,10%
2015	2,70%	26,60%	-5,10%	-2,70%	31.122	52,50%
2016	-2,10%	38,90%	-5,80%	-2,70%	32.226	3,40%
2017	2,80%	23,40%	-5,90%	-4,80%	49.371	3,70%
2018	-2,60%	35,40%	-5,00%	-5,20%	56.637	2,40%
2019	-2,10%	56,10%	-3,80%	-0,90%	59.886	6,30%

Fuente: elaboración propia en base a BCRA, FMI, INDEC, Ministerio de Economía y Direcciones Provinciales de Estadísticas de San Luis y Córdoba.

Para fines del periodo, se liberalizó el mercado de cambios y, tras una inicial tregua, los problemas cambiarios retornaron, aunque de diferente manera, con la crisis iniciada en 2018. El resultado de cuenta corriente del año 2017 fue de -4,8% del PIB y el déficit fiscal había llegado al 5,9% del PIB. Los grandes desequilibrios y el incumplimiento de un ambicioso plan de metas de inflación condujeron a una fuerte reversión de los flujos de capitales, que desató una sucesión de corridas cambiarias. La economía se vio inmersa en un *sudden stop*, principalmente porque el gobierno nacional financiaba la mayoría del desequilibrio fiscal mediante colocación de deuda externa.

Durante este período, existió una renovada fase de acumulación de reservas internacionales. Esta vez no provenían de superávits comerciales; pues ahora el Tesoro colocaba deuda en dólares e incurría gastos en pesos, para lo cual se engrosaban las reservas del BCRA a la vez que se emitía. En esta línea, en búsqueda de esterilizar lo emitido para financiar al Tesoro, se fijó una alta tasa de retorno a la principal herramienta de política monetaria (LEBAC y posteriormente LELIQ), en particular luego del *sudden stop* (Sturzenegger, 2019).

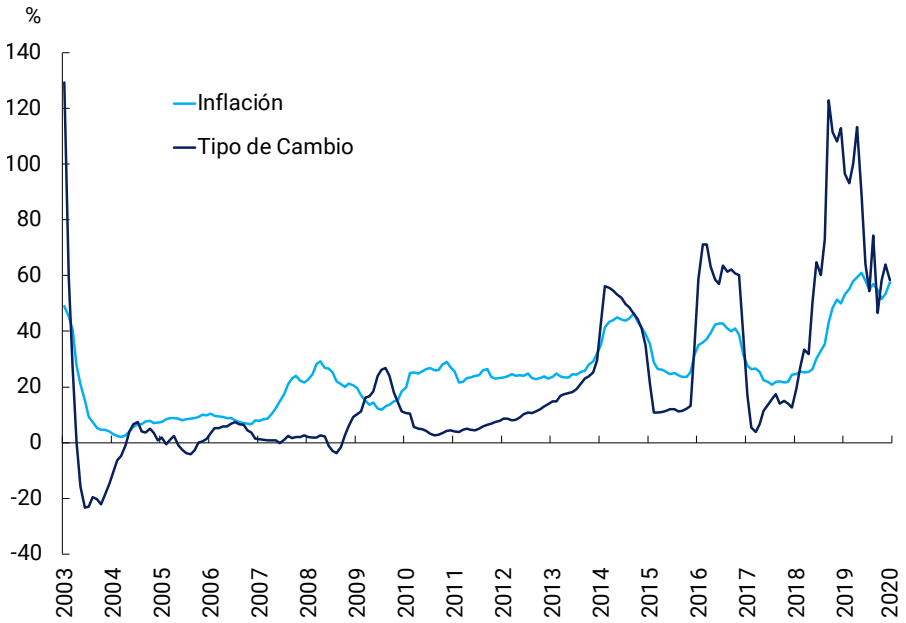
Si bien para 2019 había disminuido el déficit fiscal, aumentado los retornos reales a los activos en pesos y la economía se hallaba en una profunda recesión, factores por los que debería haberse

[6] "Inflación" medida como el cociente entre promedios anuales del IPC, "Res. Fiscal" refiere al resultado financiero del Sector Público Nacional base caja, "Cta. Cte." al resultado de cuenta corriente y "Prima" a la prima del mercado negro, definida como la brecha entre el tipo de cambio oficial y paralelo.

esperado un descenso de la inflación, los precios continuaron con su camino ascendente. Aquí fue trascendental el golpe final que recibe la demanda de dinero tras las elecciones presidenciales primarias, donde en un día el tipo de cambio aumentó un 25%.

Lo narrado tuvo sus efectos, como es de esperar, sobre los índices CS_1 y CS_2. En este sentido, la dinámica de la inflación y el tipo de cambio observada en el Gráfico 1 tuvo un impacto cada vez mayor en los índices de dolarización con el pasar de los años.

Gráfico 1 | Inflación y tipo de cambio oficial durante 2003-2019
En variaciones interanuales



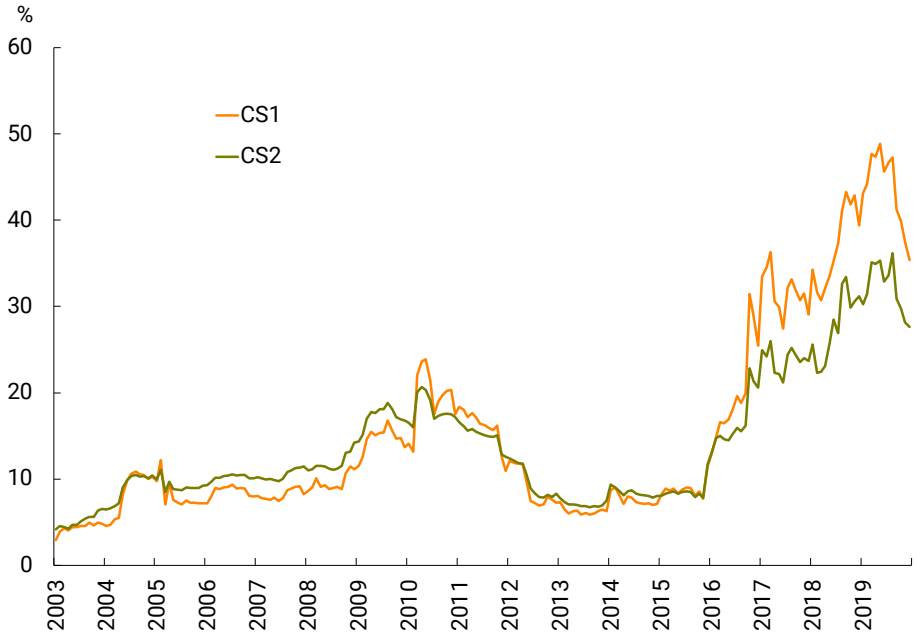
Fuente: elaboración propia en base a FMI y Direcciones Provinciales de Estadísticas de Córdoba y San Luis.

En el Gráfico 2 se observa el comportamiento de CS_1 y CS_2. Las mayores tasas de inflación y volatilidad del tipo de cambio se tradujeron en ratios CS cada vez más elevados, llegando el CS_1 a un pico máximo de 48,9% en mayo de 2019 y el CS_2 a uno de 36,2% en agosto de 2019.

Una aclaración importante a realizar sobre el comportamiento de los ratios CS, que adquiere mayor relevancia sobre el final de la muestra ya que fue un periodo en el que se observó una mayor variabilidad del tipo de cambio, es que existe una sobreestimación de la dolarización del sistema. Esto se debe a que hay un efecto contable de *shocks* devaluatorios sobre los cocientes, en donde una depreciación de la moneda local llevará a un aumento del numerador (depósitos en dólares) con respecto al denominador (depósitos totales), pero esto no significa que los agentes se encuentren asignando mayores flujos de ahorro a los depósitos en dólares que a depósitos en pesos. La manera de solucionar este inconveniente sería teniendo en consideración los flujos en pesos

destinados a depósitos en dólares. Sin embargo, computar esto requiere de información que no se encuentra disponible públicamente.[7]

Gráfico 2 | Índices CS_1 y CS_2



Fuente: elaboración propia en base a BCRA.

Debe nuevamente ser resaltado el comportamiento 2011-2015, en donde, como se advirtió, no existió una mejora radical en los *fundamentals* que permitiera pensar en una pausa de la dolarización; la demanda de moneda extranjera simplemente operaba por canales no oficiales. Cabe destacar, además, que por el suceso confiscatorio que ocurrió tras la salida de la convertibilidad, en donde se instaló un "corralito" a los depósitos bancarios y una pesificación asimétrica y forzosa, en Argentina el comportamiento de los depósitos en moneda extranjera puede tener un matiz algo llamativo tras una depreciación de la moneda. En lugar de aumentar los depósitos en dólares para proteger el poder adquisitivo, existe una gran cantidad de retiros de los depósitos en moneda extranjera por el temor a un suceso similar al vivido a fines del año 2001. Esto conduce a menores CS_1 y CS_2 aunque la sustitución de monedas posiblemente se haya intensificado, sólo que por fuera del sistema bancario. Estas aclaraciones son importantes de realizar puesto que revelan una conducta diferente a muchas economías emergentes. El camino sigue su recorrido, aunque por momentos con un proceder extra bancario, como se observó en el Cuadro 1, en donde entre 2011 y 2015 los activos externos no financieros del sector privado crecían mientras que los depósitos en moneda extranjera decrecían.

[7] Una alternativa que naturalmente podría considerarse es captar las variaciones de depósitos en cada denominación, en lugar de los *stocks*. No obstante, esto no termina de solucionar el problema, ya que un aumento de los depósitos en dólares, por ejemplo, no implica que se haya originado a partir de un depósito en pesos, que es la información que se requiere.

3. Aspectos metodológicos

3.1. Modelo econométrico

La generalidad de los estudios de sustitución de monedas utiliza un modelo estructural basado en una función de demanda de dinero que incorpora como variables explicativas diferenciales en las tasas de interés, depreciación de la moneda y/o expectativas inflacionarias. El supuesto que hay por detrás es que la demanda de dinero extranjero está guiada por la paridad descubierta de la tasa de interés (la diferencia entre el retorno real a la moneda local y extranjera). Para medir la irreversibilidad del proceso se incorpora una variable *ratchet*, que captura el efecto histéresis.

Seguiremos la especificación de Mongardini y Mueller (1999), aunque con ciertas modificaciones. Se evaluará un modelo dinámico uniecuacional para cada índice CS. Así, cada ratio es explicado en función de sus propios rezagos, del diferencial de tasas de interés, de la variación del tipo de cambio y de la variable *ratchet*. Además, se estudia la inclusión de una variable *dummy* que capture el factor político existente en los años de elecciones presidenciales.[8] El modelo ARDL (Autorregresivo de Rezagos Distribuidos) puede resumirse así:

$$CS_{i_t} = \beta_0 + \beta_1 CS_{i_{t-1-L_1}} + \beta_2 TC_{t-L_2} + \beta_3 Int_{t-L_3} + \beta_4 Rat_{i_{t-L_4}} + \beta_5 \Psi_t + \mu_t \qquad i = 1{,}2 \qquad (1)$$

Donde: CS_1 se define como el ratio de sustitución de monedas en sentido estrecho (depósitos más líquidos); CS_2 es el índice de sustitución de monedas en sentido amplio (añade depósitos a plazo y en el extranjero); TC representa las variaciones en el tipo de cambio; Int es el diferencial entre la tasa de interés pasiva en pesos y en dólares en el sistema bancario local; Rat es la variable *ratchet*, que no es más que una serie concatenada de cada último máximo que tiene el índice CS; y, por último, Ψ es una variable *dummy* que busca captar el efecto de las elecciones presidenciales.

3.2. Datos y variables

Las fuentes de datos son el Banco Central de la República Argentina (BCRA) y el Fondo Monetario Internacional (FMI).

Respecto a las variables, para TC se utiliza la variación mensual del tipo de cambio nominal promedio mensual mayorista. Cabe destacar que no se realizaron ajustes para incorporar el tipo de cambio paralelo durante el cepo cambiario (2011-2015), ya que los ratios CS analizados miden solamente el conducto bancario, al cual se accedía mediante el tipo de cambio oficial. Int sigue la corrección propuesta por Dabus *et al*. (2016), que, ante la ausencia de una serie homogénea de bonos domésticos comparables a los *US Treasury Bills*, utilizan el *spread* existente entre las remuneraciones a los depósitos en pesos y en dólares. Para este trabajo, Int es la variación mensual de

[8] Una definición apropiada del efecto político para estos modelos es la elaborada por Ortiz (1983). Define al riesgo político como el riesgo adicional de depreciación cambiaria devenido del posible cambio en el régimen fiscal tras las elecciones o de modificaciones en regulaciones respecto a las tenencias de depósitos en dólares.

la diferencia entre la tasa BADLAR privada en pesos y en dólares.[9] Ψ asume el valor 1 en el mes en que tienen lugar las elecciones presidenciales y los dos meses anteriores y posteriores, 0 en caso contrario. Rat tiene la siguiente especificación:

$$Rat_{i_t} = \begin{cases} CS_{i_t} & t = 1 \\ MAX\left(Rat_{i_{t-1}}, CS_{i_t}\right) & t \geq 2 \end{cases} \quad (2)$$

Para la construcción del índice CS_1 se utilizaron los depósitos en cuentas corrientes y a la vista, y depósitos en caja de ahorros, en pesos y en dólares. En cuanto a CS_2, se añaden a los anteriores los depósitos a plazo fijo y otros menos líquidos, y los depósitos de residentes en el extranjero. Así:

$$CS_1 = \frac{CCD + CAD}{CC + CA} \quad CS_2 = \frac{CCD + CAD + PFD + DED}{CC + CA + PF + DE} \quad (3)$$

Donde: CC son depósitos en cuenta corriente, CA son depósitos en caja de ahorros, PF son depósitos a plazo fijo y DE son depósitos en el extranjero; en pesos y en dólares. Cuando se añade D se trata de depósitos solamente en dólares. La fuente de datos de los diferentes tipos de depósitos es el Banco Central de la República Argentina (BCRA).

Al igual que Dabus *et al*. (2016), no se realizará la transformación logarítmica a CS que utilizan Mongardini y Mueller (1999), por problemas de autocorrelación.

3.3. Metodología

Previo al procedimiento econométrico, se debe comenzar por comprobar las propiedades de estacionariedad de las series. Para esto se realizarán las pruebas de raíces unitarias ADF (Augmented Dickey-Fuller) y PP (Phillips-Perron), para cada una de las series mencionadas anteriormente.

Una vez resuelto este paso, adoptaremos el enfoque *bounds testing* (o prueba de umbrales) para cointegración y el procedimiento ARDL (Autorregresivo de Rezagos Distribuidos) para modelos de corrección de error propuesto por Pesaran y Shin (1995) y extendido por Pesaran *et al*. (2001). Las ventajas de utilizar este método radican en que, comparado al enfoque basado en estudiar los residuos de Engle y Granger y al basado en máxima verosimilitud de Johansen y Juselius, no se requiere el mismo orden de integración de las variables en la ecuación a estimar, aunque éstas no pueden ser integradas de orden dos o superior (Samreth y Sok, 2018). Entonces, el procedimiento puede ser aplicado incluso cuando existe una mezcla de variables I(0) e I(1).

La representación de corrección del error de la ecuación (1), que incorpora los efectos de corto plazo y de largo plazo de las variables independientes, es especificada de la siguiente manera:

[9] La tasa BADLAR es una tasa variable calculada de manera diaria por el BCRA, que representa la tasa de interés pagada por los bancos a los depósitos a plazo fijo de 30 a 35 días, de más de un millón de pesos o dólares, según corresponda. Existe la tasa BADLAR pública y privada, según se trate de entidades bancarias públicas o privadas.

$$\Delta(CS_{i_t}) = \delta_0 + \sum_{j=1}^{L_1} \delta_{1j}\Delta\left(CS_{i_{t-j}}\right) + \sum_{j=0}^{L_2} \delta_{2j}\Delta(TC_{t-j}) + \sum_{j=0}^{L_3} \delta_{3j}\Delta(Int_{t-j}) + \sum_{j=0}^{L_4} \delta_{4j}\Delta\left(Rat_{i_{t-j}}\right) + \delta_5\Delta(\Psi_t) + \lambda_1 CS_{i_{t-1}} + \lambda_2 TC_{t-1} + \lambda_3 Int_{t-1} + \lambda_4 Rat_{i_{t-1}} + \lambda_5 \Psi_{t-1} + \varepsilon_t \quad (4)$$

Donde: δ_{sj} son los coeficientes de corto plazo; λ_s son los parámetros de largo plazo del modelo; ε_t es el error y Δ representa el operador de primeras diferencias. Además, L_s representa el orden óptimo de rezagos determinados para cada variable según el criterio de información de Akaike (AIC).

El enfoque *bounds testing* para cointegración en modelos ARDL de Pesaran et al. (2001) requiere testear estadísticamente la existencia de relaciones de largo plazo entre las variables explicativas. En particular, se prueba la hipótesis nula de no cointegración o no relación de largo plazo entre las variables en niveles de la Ecuación (4), $H_0\colon \lambda_s = 0$ contra la hipótesis alternativa $H_1\colon \lambda_s \neq 0$. La prueba estadística es implementada mediante un test F no estándar para significatividad conjunta, que se contrasta con los valores críticos provistos por Pesaran *et al.* (2001). Aquí, si el estadístico es mayor al umbral crítico superior, para un nivel de significancia dado, la hipótesis nula es rechazada. Por lo tanto, hay evidencia que sugiere que existen relaciones de largo plazo (cointegración) entre las variables explicativas. Viceversa si el estadístico es menor que el umbral crítico inferior. Por último, si el estadístico se encuentra entre los umbrales críticos, entonces el resultado es inconcluso. Una vez establecidas las relaciones de cointegración, se debe especificar un modelo de corrección de error de la siguiente manera:

$$\Delta(CS_{i_t}) = \gamma_0 + \sum_{j=1}^{L_1} \gamma_{1j}\Delta\left(CS_{i_{t-j}}\right) + \sum_{j=0}^{L_2} \gamma_{2j}\Delta(TC_{t-j}) + \sum_{j=0}^{L_3} \gamma_{3j}\Delta(Int_{t-j}) + \sum_{j=0}^{L_4} \gamma_{4j}\Delta\left(Rat_{i_{t-j}}\right) + \gamma_5\Delta(\Psi_t) + \rho EC_{t-1} + v_t \quad (5)$$

Donde: ρ es el parámetro de ajuste, que mide la velocidad a la que el equilibrio es restablecido luego de un *shock* de corto plazo; EC_{t-1} es el término de corrección del error y no es más que los residuos de la ecuación de largo plazo (1); y v_t son los residuos.[10]

Entonces, mientras que en (5) se hallan los resultados de la estimación de corto plazo para el modelo ARDL seleccionado; la ecuación estimada de largo plazo será:

[10] El término de corrección del error se define entonces de la siguiente manera, $EC = CS_{i_t} - \eta_0 - \eta_1 CS_{i_{t-1-L_1}} - \eta_2 TC_{t-L_2} - \eta_3 Int_{t-L_3} - \eta_4 Rat_{i_{t-L_4}} - \eta_5 \Psi_t$.

$$\widehat{CS}_{i_t} = \hat{\eta}_0 + \hat{\eta}_1 CS_{i_{t-1-L_1}} + \hat{\eta}_2 TC_{t-L_2} + \hat{\eta}_3 Int_{t-L_3} + \hat{\eta}_4 Rat_{i_{t-L_4}} + \hat{\eta}_5 \Psi_t \qquad i = 1,2 \qquad (6)$$

Donde: $\widehat{CS}_{i_t}$ son los valores predichos del ratio CS, y $\hat{\eta}_s$ son los coeficientes estimados de η_s.

4. Evidencia empírica

4.1.Test de raíces unitarias

Se comenzó por estudiar las propiedades de estacionariedad de las series, mediante test de raíces unitarias. Fueron empleados las pruebas Augmented Dickey-Fuller (ADF) y Phillips-Perron (PP).

El Cuadro 3 muestra los resultados de las pruebas estimadas, en las que puede observarse que la hipótesis nula de existencia de raíz unitaria no puede rechazarse para CS_1, CS_2, Rat_1 y Rat_2, a niveles de confianza del 95% o mayores. Al realizarse las pruebas para las variables en primeras diferencias, en todos los casos se rechaza la hipótesis nula, concluyendo que estas son I(1).

Cuadro 3 | Test de raíces unitarias

Variables	Niveles		Primeras diferencias		Conclusión
	ADF	PP	ADF	PP	
$\mathbf{CS_1}$	-1,5777	-1,5135	-4,5546***	-15,2270***	I (1)
$\mathbf{CS_2}$	-1,5148	-1,4322	-5,4164***	-15,2520***	I (1)
TC	-5,3157***	-10,7280***	-9,0286***	-23,5170***	I (0)
Int	-5,7643***	-11,5830***	-10,5760***	-26,9960***	I (0)
$\mathbf{Rat_1}$	-1,3368	-0,9855	-5,2151***	-11,7520***	I (1)
$\mathbf{Rat_2}$	-1,5739	-1,1311	-4,7918***	-12,9620***	I (1)

Nota: * indica nivel de significancia al 10%, ** al 5% y *** al 1%.

Por otro lado, tanto TC como Int son variables estacionarias en niveles, bajo las dos pruebas utilizadas. Al repetirse las pruebas para las variables en primeras diferencias, el rechazo a la hipótesis nula se torna más fuerte.

Estos resultados evidencian la necesidad de utilizar la metodología propuesta en la sección anterior, que es especialmente útil cuando se cuenta con un conjunto de variables I(0) e I(1), aunque puede utilizarse de todas maneras si se contase con la totalidad de variables I(1).

4.2. *Bounds test* para cointegración de variables

Conociendo el orden de integración de las variables, se estimó el modelo descripto en la Ecuación (1) a partir de su representación de corrección del error de la Ecuación (4), con la diferencia que se excluyó el intercepto. Esto se realizó con el propósito de encontrar, si hubieren, relaciones de largo plazo entre las variables explicativas y los índices CS_{i}.

Para tal sentido, se realizó la prueba *bounds test* para modelos ARDL bajo la hipótesis nula de no cointegración de las variables. Al ser un test de significatividad conjunta, si se rechaza la hipótesis nula existe evidencia que sugiere que los coeficientes de las variables rezagadas son diferentes de cero y, por lo tanto, se concluye que existe cointegración.

Tal como se observa en el Cuadro 4, cuando se incluyen las variables *ratchet*, ya sea para el ratio CS_1 o CS_2, existe relación de largo plazo entre las variables. El estadístico F es de 5,2360 y 3,7730 para el ratio CS_1 y CS_2, respectivamente. Al ser mayores que el umbral superior (3,48), en ambos modelos hay cointegración a un nivel de significancia del 5%.

Cuadro 4 | *Bounds test* para cointegración o relación de largo plazo entre las variables

Variables	Estadístico F	Valores críticos		Conclusión
		Umbral inferior	Umbral superior	
$\mathbf{CS_1,\ TC,\ Int,\ Rat_1}$	5,2360	2,26	3,48	Cointegración
$\mathbf{CS_2,\ TC,\ Int,\ Rat_2}$	3,7730	2,26	3,48	Cointegración

Nota: valores críticos obtenidos de Pesaran et al. (2001). Tabla CI(i), Caso I. Nivel de significancia del 5%.

En el caso del primer modelo se puede concluir que existe cointegración incluso con una significancia del 1%, ya que el umbral superior en dicho caso es 4,44.

Resumiendo, hay evidencia de relaciones de largo plazo entre las variables bajo las dos especificaciones que se tendrán en cuenta, aunque cuando se incluyen depósitos menos líquidos (CS_2), esta relación parece menos fuerte.

4.3. Resultados de estimaciones

El Cuadro 5 muestra la relación entre las variables estudiadas. Los resultados se obtuvieron luego de estimar el modelo enunciado en las ecuaciones (5) y (6), que permiten dilucidar los efectos de corto plazo y de largo plazo de las variables explicativas sobre los ratios a estudiar. Mientras que el panel superior muestra los resultados de corto plazo, el panel inferior presenta los resultados obtenidos para el largo plazo.

Bajo el criterio de información de Akaike, se obtuvo la cantidad óptima de rezagos a incluir para cada variable, que resultó en un modelo ARDL (2,2,0,1) para el índice CS_1, y un modelo ARDL (1,1,0,1) para CS_2, donde las variables son CS_i, TC, Int y Rat_i, respectivamente.

Se estimaron los modelos con y sin intercepto. Como bajo todas las especificaciones la constante añadida no tenía significancia estadística tanto en el corto como en el largo plazo, se optó por excluirla.

A grandes rasgos, cuando son estadísticamente significativas, las variables se comportan con el signo esperado. Además, el mayor poder explicativo parece venir dado por el tipo de cambio y la variable *ratchet,* teniendo evidencia mixta la variable *dummy* incorporada. Por último, el diferencial de tasas de interés no parece ser significativo en ninguno de los dos modelos.

Respecto al primer modelo (CS_1), los resultados de corto plazo indican que la variable dependiente rezagada un periodo es significativa estadísticamente y de signo negativo. Por lo tanto, es de esperar que un incremento en el ratio CS sea seguido de un aumento menor en los periodos posteriores. Esto resalta la naturaleza convergente que existe en el proceso.

Cuadro 5 | Resultados bajo el procedimiento ARDL

Variable	CS_1 ARDL (2,2,0,1)		Variable	CS_2 ARDL (1,1,0,1)	
	Coeficiente	p-value		Coeficiente	p-value
Corto plazo: representación de corrección del error					
$\Delta(\mathbf{CS_1}(-1))$	-0,1786	0,001	-	-	-
$\Delta(\mathbf{TC})$	0,0981	0,000	$\Delta(\mathrm{TC})$	0,1040	0,000
$\Delta(\mathbf{TC}(-1))$	-0,0458	0,081	-	-	-
$\Delta(\mathbf{Int})$	-0,0018	0,729	$\Delta(\mathrm{Int})$	-0,0025	0,434
$\Delta(\mathbf{Rat_1})$	1,5716	0,000	$\Delta(\mathrm{Rat_2})$	1,6363	0,000
$\Delta(\mathbf{\Psi})$	-0,0060	0,044	$\Delta(\Psi)$	-0,0022	0,231
$\mathbf{EC_{t-1}}$	-0,0460	0,004	$\mathrm{EC_{t-1}}$	-0,0425	0,002
$\mathbf{R^2}$	0,5341	-	$\mathrm{R^2}$	0,5794	-
Durbin-Watson	1,9397	-	Durbin-Watson	1,8637	-
Prueba F	36,6855	0,000	Prueba F	66,8253	0,000
Observaciones	201	-	Observaciones	201	-
Largo plazo: coeficientes estimados					
$\mathbf{TC}$	2,6723	0,032	TC	0,2360	0,621
$\mathbf{Int}$	-0,0384	0,730	Int	-0,0596	0,446
$\boldsymbol{Rat_1}$	0,3805	0,024	Rat_2	0,5811	0,000
$\mathbf{\Psi}$	-0,1317	0,094	Ψ	-0,0530	0,260

Al mismo tiempo, el tipo de cambio y la variable *ratchet* son significativos y de signo positivo. Lo anterior sugiere que variaciones positivas del tipo de cambio llevan a menor confianza en la moneda doméstica y un aumento en la dolarización, esto en connivencia con persistencia de la preferencia por moneda extranjera (cuando existe una mejora en los *fundamentals* en el corto plazo, los agentes no desarman sus tenencias en dólares).

Dos resultados llamativos pueden agregarse de la dinámica de corto plazo para el primer modelo: la significatividad de la variable *dummy* que captura el efecto de las elecciones presidenciales sobre los índices, y el nulo poder explicativo que tiene el diferencial de tasas de interés. El signo de la variable que mide el factor político es negativo, permitiendo deducir que durante estos meses hay un ajuste de corto plazo que se materializa con retiros de depósitos en moneda extranjera, en lugar de aumentar la dolarización por vía bancaria.

Considerando el largo plazo, sólo son estadísticamente significativas a un nivel de significancia del 5% el tipo de cambio y la variable *ratchet*. Si se fuese más flexible en el análisis también podría

considerarse el factor político como importante. No obstante, la variable *dummy* se diseñó e incorporó pensando en un potencial esclarecimiento del corto plazo, dado que es un ajuste de portafolios meramente especulativo.

Aquí, tanto el tipo de cambio como la variable que modela la histéresis tienen signo positivo. Se puede concluir que existe irreversibilidad en la sustitución de monedas en Argentina para la muestra considerada en un sentido estrecho (midiendo ratios que consideran depósitos a la vista y en cuenta corriente, es decir, más líquidos), lo que permite aseverar que los agentes no ajustan sus portafolios en el largo plazo cuando los *fundamentals* de la economía mejoran, manteniéndose posicionados en la moneda extranjera.

Los resultados destacables del segundo modelo (CS_2) son, en gran medida, similares a los del modelo anterior. Nuevamente, se destaca que el diferencial de tasas de interés no agrega poder explicativo. Esto puede deberse a que uno de los supuestos primordiales para que la condición de paridad descubierta de tasas de interés actúe es que haya un libre acceso al mercado de cambios. En otras palabras, se requiere que las personas puedan acceder libremente a adquirir una moneda extranjera para así integrar un depósito en dicha denominación y poder arbitrar el diferencial de tasas, y en parte de la muestra considerada este supuesto no se cumple.

Al corto plazo, tipo de cambio y la variable *ratchet* son positivos y significativos tal como antes, pero ahora el riesgo político parece no tener impacto. Este hecho era esperable dado que la medida CS_2 incorpora depósitos que son muy poco líquidos y difíciles de sustituirse en el corto plazo. Al tratarse de depósitos en el exterior o a plazo fijo, es difícil que los agentes puedan reaccionar rápido ante algún evento político.

En cuanto al largo plazo, si bien pierde significancia el tipo de cambio aparece el efecto histéresis como estadísticamente significativo y con signo positivo. Este es un hallazgo importante, ya que existe evidencia que indica que la irreversibilidad no sólo se mantiene bajo un análisis estrecho sino también en un sentido amplio. Lo anterior tiene fuertes implicancias de política monetaria, y torna aún más desafiante todo intento que trate de realizarse por revertir esta situación, debido a que los canales convencionales por los que opera se encuentran debilitados.

Por último, es de vital importancia destacar que en ambos modelos el término de corrección del error es estadísticamente significativo y negativo, proporcionando evidencia a favor de la relación de largo plazo entre las variables estudiadas, y de la convergencia del modelo. En esta línea, EC es importante ya que es el parámetro de ajuste y mide la velocidad en la que cada modelo vuelve al equilibrio si se le introduce un *shock* de corto plazo. No parecen registrarse grandes diferencias en la velocidad de ajuste, que en efecto es baja, dado que el primer modelo ajusta en un mes un 4,60% de la divergencia del periodo previo, mientras que el segundo un 4,25%. Este dilatado ajuste puede deberse a que en gran parte de la muestra existieron controles cambiarios que limitan la operatoria en moneda extranjera mediante cupos mensuales de acceso a divisas extranjeras o declaraciones juradas para acceder al mercado de cambios. Consecuentemente, se retrasa la capacidad de los agentes para ajustar sus tenencias de manera inmediata, debilitando la velocidad de ajuste del modelo.

Resumiendo, se encontró una fuerte irreversibilidad en la dolarización financiera en Argentina para el periodo 2003-2019. El efecto histéresis presente en Argentina, tanto en un sentido estrecho como amplio, es y será un desafío para el BCRA a la hora de decidir sus políticas. Además, el efecto del tipo de cambio es significativo en la mayoría de los casos y los factores políticos parecen tener preponderancia en el corto plazo.

No debe dejarse de mencionar que existen, por un lado, problemas de subestimación de la sustitución de monedas. Gran parte del proceso se desenvuelve por fuera del sistema bancario y será menester de futuras investigaciones encontrar una vía, sin acudir a supuestos demasiado restrictivos, para estimar modelos que incorporen el resto de los activos externos no financieros que mantienen los residentes. Al mismo tiempo, los ratios de dolarización utilizados exhiben, como se mencionó previamente, un efecto contable de *shocks* devaluatorios que sobreestiman la verdadera medida de dolarización bancaria ante variaciones en el tipo de cambio.

5. Implicancias de política económica

El fenómeno analizado en el trabajo es entendido en la literatura como el resultado de largos períodos inflacionarios con inestabilidad cambiaria, es decir, de desequilibrios macroeconómicos. Pero su importancia se deviene no solamente de ser la consecuencia visible de años de deterioro de la moneda local, sino que además del enorme desafío que representa para la política económica.

En este sentido, la sustitución de monedas es un síntoma que aparece tras extensas fases de inestabilidad. Sin embargo, al mismo tiempo, genera conflictos *a posteriori*, reduciendo la efectividad de las políticas.

En base a Clements y Schwarz (1993), las consecuencias de mantener un alto grado de dolarización en la economía pueden resumirse en que: exacerba el impacto inflacionario de los desbalances fiscales financiados con emisión monetaria, pequeños cambios en el nivel de sustitución de monedas pueden impactar en la variabilidad de la tasa de inflación, y existe menor capacidad de la autoridad monetaria para actuar como prestamista de última instancia, lo que aumenta la vulnerabilidad del sector bancario.

Pepić *et al*. (2015) añaden el debilitamiento de la autoridad central para conducir la política monetaria vía tasa de interés y, por el lado de la política cambiaria, señalan los potenciales desajustes (*mismatches*) en los que entra una economía altamente dolarizada por depender fuertemente de los movimientos del tipo de cambio, que pueden llevar a inestabilidad en el sector financiero.[11] En esta línea, Ülke (2016) apunta que un alto CS aumenta el efecto del *pass-through*.

Estas últimas consecuencias de mantener altos grados de dolarización no aplican a la economía argentina post convertibilidad ya que, como aprendizaje de la crisis, se implementaron una batería

[11] Calvo & Reinhart (2002) argumentan que esta es una de las razones por las que muchos países tienen temor a dejar flotante el tipo de cambio (*"fear of floating"*) y, a pesar de anunciar esquemas cambiarios flexibles, terminan implementando regímenes de flotación administrada.

de regulaciones prudenciales para evitar la existencia de descalces de monedas (o *currency mismatches*) en donde se segmentó la intermediación en moneda extranjera de la intermediación en moneda local dentro del sistema bancario. Ejemplos de estas medidas fueron la implementación de requerimientos mínimos de capital, que los deudores de crédito en moneda extranjera generen ingresos en la misma moneda, que los depósitos en dólares sólo se apliquen a créditos en dólares, el fortalecimiento de los mercados de futuros, entre otros. Por consiguiente, los episodios de depreciación cambiaria, que en ausencia de regulación llevarían a situaciones de d*efault* de empresas y familias por el deterioro de sus balances, no se tradujeron en problemas financieros. No obstante, aunque en presencia de regulaciones macroprudenciales la dolarización de la hoja de balance bancaria no se traduce en descalces de monedas, sí compromete la efectividad de los instrumentos de política monetaria sobre los mecanismos de transmisión, ya sea por la imposibilidad de ejercer los efectos deseados sobre la liquidez o sobre el rendimiento.

Por último, mediante una aplicación teórica de la regla de Ramsey, Sturzenegger (1997) identifica serios efectos redistributivos cuando se opera bajo sustitución de monedas. Introduciendo heterogeneidad entre agentes demuestra que aquellos de mayor productividad (de mayor ingreso) salen beneficiados, mientras que los menos productivos (y más pobres) terminan perjudicados.

Entonces, en economías altamente dolarizadas la naturaleza del banco central se altera y no persigue una política monetaria en sentido estricto. Se limita a constituir cuantas reservas internacionales pueda y mantener el financiamiento al déficit fiscal bajo control. Por esta razón, la estabilidad macroeconómica deja de estar al alcance de la autoridad monetaria y queda relegada a la voluntad que tenga el gobierno de respetar su restricción presupuestaria intertemporal.

Diversos trabajos han debatido sobre si debe fomentarse la dolarización (ver Alesina y Barro, 2001; Berg y Borensztein, 2000; Calvo y Vegh, 1992; De Nicoló, Honohan y Ize, 2003). El argumento radica en que ir hacia una dolarización completa (dar curso legal al dólar estadounidense o adoptar un régimen de convertibilidad) establece un compromiso institucional muy fuerte que gozará de la credibilidad suficiente para disminuir la inflación.

No obstante, deben considerarse algunos inconvenientes al respecto. En primer lugar, existe un problema intertemporal: nada asegura hasta cuando se mantendrá este marco, complicando la salida del régimen. En segundo lugar, y no menos importante, al abandonar la independencia monetaria se pierde la posibilidad de actuar antes *shocks* externos, se comprometen fuertemente las funciones de prestamista de última instancia, a la vez que, si no se corrige el déficit fiscal, se incurrirá en endeudamiento al cual las economías emergentes muestran alta intolerancia.[12] Sintetizando, esta estrategia es, en el mejor de los casos, riesgosa.

Aunque no sea el objetivo del trabajo estudiar la resolución del problema detalladamente, pueden trazarse algunos lineamientos de política a grandes rasgos. Dado que aquí se busca estudiar un

[12] Si el endeudamiento es interno, puede haber *crowding-out* (el gobierno desplaza a los privados de la posibilidad de financiarse). Se empeoran los portafolios bancarios y hay posibilidades de corridas bancarias y colapso del sistema financiero. Si el endeudamiento es externo, las economías en desarrollo muestran un nivel de intolerancia elevado. Esto es, para bajos niveles de deuda comienzan a tener problemas macroeconómicos.

fenómeno empírico, es imperioso que las posibles soluciones sean realistas y políticamente viables. Es por este motivo que la alternativa que emerge como la más disruptiva —implementar una relación de convertibilidad peso-dólar, o adoptar el dólar estadounidense como moneda de curso legal— sea desechada desde un principio. Sin dudas que la desventaja de un esquema *hard peg* respecto a la dificultad de salir del mismo una vez instaurado es verdaderamente importante en Argentina y generaría fuertes tensiones implementarlo, fundamentalmente por la crisis que tuvo lugar en 2001 tras la salida de la convertibilidad.

Es así como llegamos al escenario que aparece como el más parsimonioso y tiene que ver con lo que en principio parece trivial: construir una moneda fuerte generando fuertes desincentivos a la demanda de moneda extranjera. Este enfoque de dos carriles es ampliamente respaldado por diversos autores de economías emergentes, conscientes de las fuertes restricciones que existen para generar grandes cambios institucionales de *shock*.

En este sentido, al no atar de manos al gobierno resulta aún más desafiante asumir un plan de largo plazo que tenga como mandamiento supremo consolidar la moneda nacional. A pesar de este inconveniente, las experiencias internacionales, y en particular latinoamericanas, de fortalecimiento de la moneda local han sido en su mayoría basadas en largos caminos de políticas sostenibles en el tiempo, que pudieron calmar las expectativas devaluatorias al mismo tiempo que controlaron no sólo las altas tasas de aumentos de precios, sino también la alta variabilidad en las mismas. En particular, Neanidis y Savva (2006) estiman la significancia de la volatilidad del ratio CS previo y de la tasa de inflación sobre el ratio CS actual encontrando en ambos casos que las variables son estadísticamente significativas, sugiriendo que no sólo es importante controlar los niveles de estas variables, sino también sus oscilaciones.

Es preciso comprender que en términos de política económica hay dos grandes fases a afrontar. En un primer momento se debe emprender un plan de estabilización que logre aplacar las expectativas y cumpla con dominar la inflación. Pero aquí no termina la tarea para los *policy-makers,* puesto que debe resolverse el problema del alto nivel de dolarización de la economía, que es el que termina complicando los conductos de la política monetaria, como se expuso anteriormente.

En base a lo expuesto y siguiendo a Morales (2003), al ser la dolarización completa un camino arriesgado, y que el extremo opuesto (un régimen de metas de inflación estricto) complicaría la evolución de los ratios de CS ante cualquier evento cambiario (por tener como piedra angular la necesidad de un tipo de cambio flexible), la solución más efectiva consiste en generar mecanismos *market-friendly* sostenidos en el tiempo para ir reduciendo la dolarización gradualmente. La permanencia en un mismo régimen monetario también es importante, debido a que facilita la formación de expectativas alineadas a la de la autoridad monetaria. Al mismo tiempo, como señalan D'Amato, Garegnani y Sotes Paladino (2007), sucesivos cambios en el régimen monetario llevan a persistencia en las tasas de inflación, dificultando el camino hacia la estabilización de la macroeconomía.

En el plano monetario, si bien es aconsejable que la tasa de interés real sea positiva, no se considera una herramienta que deba ser utilizada por sí sola y de manera activa, ya que la tasa de interés

real necesaria para disminuir elevados niveles de dolarización puede ser una demasiado alta con respecto a aquella que genere una asignación eficiente de los recursos domésticos, generando consecuencias negativas sobre la inversión y el producto (Tanzi y Blejer, 1982). De la misma manera, aumentar los encajes bancarios a los depósitos en moneda extranjera funciona para garantizar la sostenibilidad del sistema bancario y disminuir las posiciones de crédito en moneda extranjera, pero hace poco por detener la formación de activos en dólares estadounidenses. Como alternativas más atractivas surgen favorecer los mercados de futuros o depósitos en moneda local que sean del tipo *dollar-linked*, debido a que permiten disminuir la incertidumbre por perspectivas alcistas en el plano cambiario, al mismo tiempo que se operan en pesos y no en dólares. Este tipo de instrumentos cuentan con la ventaja que liberan presión sobre las reservas internacionales, disminuyen los costos de transacción y aumentan la liquidez bancaria.

Respecto al plano cambiario, no es aconsejable perseguir un esquema *crawling-peg* (devaluaciones pequeñas y continuas) porque consolida las expectativas ascendentes. Al mismo tiempo, un programa de metas de inflación estricto con tipo de cambio totalmente liberado no surge como una alternativa atractiva debido a que, si bien absorbe *shocks* externos, puede traer alta volatilidad cambiaria, como ya se mencionó. En este aspecto, es deseable un esquema de flotación administrada, que apunte a mantener un tipo de cambio competitivo y estable. La importancia de esto radica en que no sólo facilita el crecimiento económico, sino que promueve un entorno macroeconómico estable, ya que típicamente genera superávits de cuenta corriente y facilita la acumulación de reservas internacionales. Por la estructura tributaria al comercio exterior en Argentina, un tipo de cambio competitivo y estable además favorece a las cuentas fiscales ya que aumenta la recaudación de impuestos en exportaciones primarias, aumentando la independencia monetaria (Damill *et al*., 2015) A lo anterior se suma que un tipo de cambio real por encima del de equilibrio es al mismo tiempo una política macroprudencial, ya que disminuye la probabilidad de *sudden stops* y crisis (Rapetti, 2016).

De la mano con las herramientas mencionadas es fundamental desarrollar un mercado de capitales local profundo para lograr encauzar el ahorro privado tanto a empresas como al gobierno en pesos (inicialmente apelando a instrumentos *dollar-linked*). Actualmente en Argentina, éste funciona como una institución de escasa capacidad para sustentar el financiamiento privado y público, a la vez que el poco volumen se opera mayoritariamente en dólares. Savastano (1996) postula que economías con mercados financieros bien desarrollados permiten ofrecer un conjunto de instrumentos líquidos y de buen rendimiento que preservan el portafolio, lo que explica en alguna medida por qué los agentes no necesitan huir a otra moneda.

Respecto a la confección de políticas orientadas al mercado, éstas no involucran lo mismo que emprender un plan de liberalización financiera. En este aspecto, Guidotti y Rodríguez (1992) sostienen que liberar restricciones sobre actividades financieras puede recrudecer la sustitución de monedas incluso sin que exista un aumento en la tasa de inflación, por disminuir los costos de transacción de utilizar otra moneda. Análogamente, Savastano (1991) apunta que eliminar restricciones a los movimientos de capitales puede incrementar la formación de depósitos en moneda extranjera al ingresar al país, acentuando la sustitución de monedas. Esto se explica porque las eliminaciones de restricciones a los flujos de capitales pueden no estar acompañadas de un

entorno macroeconómico saludable, lo que provoca entradas de capitales pero que se mantienen en moneda extranjera por los riesgos existentes.

Aguirre y Blanco (2016) estudian si la interacción entre la política monetaria, intervenciones en el mercado de cambios y reglas prudenciales ayuda a amortiguar las fluctuaciones macroeconómicas de manera significativa entre 2003 y 2011 en Argentina. Encuentran que no sólo son relaciones complementarias (Agenor y Pereira da Silva, 2013) sino que son sinérgicas. Esto quiere decir que contar con un amplio conjuntos de instrumentos facilita a la autoridad monetaria a mitigar la volatilidad. Así, se refuerza lo expuesto que la dolarización financiera debe ser enfrentada con un conjunto de medidas que, como condición necesaria, estabilicen la macroeconomía, y, en segundo lugar, incentiven a retornar a activos denominados en moneda local.

En resumen, desde una perspectiva de hacedor de política, los lineamientos recomendados consisten en políticas graduales con rasgos *market-friendly*, que combinen una política económica marcada por independencia monetaria, política cambiaria consistente en el tiempo, medidas prudenciales y equilibrios fiscales sostenidos. Una política monetaria contractiva aislada vía tasa de interés es insuficiente cuando la dolarización es alta, por ello se requiere de un conjunto de señales gubernamentales perdurables que reencaminen las expectativas hacia la dirección correcta.

6. Conclusiones

Motivado por la crisis iniciada en el año 2018, donde desde entonces el plano monetario-cambiario se ha tornado central para la mayoría de los argentinos, se estudió el fenómeno de la dolarización y el efecto histéresis para el lapso que inicia en el posterior reordenamiento institucional tras la salida de la convertibilidad, hasta el año 2019.

Los resultados obtenidos empíricamente defienden la inclusión del tipo de cambio y de la variable *ratchet* como principales factores explicativos del fenómeno, además del factor político en el corto plazo. El diferencial de tasas de interés no añadió explicatividad al modelo estudiado.

Si bien el trabajo no se propone debatir a fondo la cuestión vinculada al diseño de política económica bajo este tipo de fenómeno, algunos lineamientos fueron trazados. Esto se debe a que la principal implicancia negativa que tiene la presencia de histéresis en el grado de dolarización de una economía es la inviabilidad de implementación de algunas políticas o la mayor dificultad para aplicar otras, en el mejor de los casos.

Concluyendo, años de experiencia inflacionaria y problemas cambiarios inducen a los agentes a huir de la moneda local y refugiarse en una moneda más segura. La naturaleza duradera de este proceso se debe resolver con soluciones sostenidas en el tiempo, que reflejen coherencia monetaria-fiscal para no originar sucesivos conflictos cambiarios. Esto se debe encarar con profunda seriedad: en Argentina los agentes ya no sólo no ajustan sus tenencias por mejoras en los *fundamentals* en el corto plazo (Dabus *et al*. 2016), sino que hay evidencia que sugiere que tampoco lo realizan ante mejoras en el largo plazo.

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Reassessing Sticky Price Models through the Lens of Scraped Price Data

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Abstract

What micro facts of price changes should be considered in the incorporation of price rigidities into macro models? To answer this, I exploit a novel micro data set obtained with web scraping techniques, containing daily prices of eight retailers from six countries with heterogeneous macroeconomic conditions. I find that: (1) There is a relation between the main statistics (related to the size and frequency of price adjustment) and the inflation rate of a country; (2) The distribution of the size of price changes has a relatively small, yet nontrivial mass around zero; (3) Familiar products from the same manufacturer have greater similarity in the timing and magnitude of price adjustment than heterogeneous products. I show that incorporating a three-dimensional cost – composed by a general cost, a product-specific cost, and a cost curtail for price changes in familiar products– makes an otherwise standard menu cost model reproduce these facts.

JEL Classification: C81, D22, E31, E52.

Keywords: price rigidities, menu costs, monetary policy, sticky prices, web scraping.

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Reevaluación de los modelos de precios rígidos usando datos de precios obtenidos mediante *web scraping*

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Resumen

¿Qué hechos microeconómicos de los cambios de precios deben considerarse en la incorporación de rigideces de precios en los modelos macroeconómicos? Para responder a esto, aprovecho un nuevo conjunto de microdatos obtenidos con técnicas de *web scraping*, que contiene los precios diarios de ocho minoristas de seis países con condiciones macroeconómicas heterogéneas. Encuentro que: (1) existe una relación entre los principales estadísticos (relacionados con la magnitud y la frecuencia del ajuste de precios) y la tasa de inflación de un país; (2) la distribución de la magnitud de los cambios de precios tiene una masa relativamente pequeña, aunque no trivial, alrededor de cero; (3) los productos de la misma familia del mismo fabricante tienen mayor similitud en el momento y la magnitud del ajuste de precios que los productos heterogéneos. Muestro que la incorporación de un costo tridimensional –compuesto por un costo general, un costo específico del producto y una reducción de costos por cambios de precio en productos de la misma familia– hace que un modelo de costos de menú estándar reproduzca estos hechos.

Clasificación JEL: C81, D22, E31, E52.

Palabras clave: costos de menú, política monetaria, precios rígidos, rigidez de precios, *web scraping*.

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1. Introduction

Firms' price setting behavior plays a central role in modern macroeconomics. Without nominal rigidities limiting firms' capacity to adjust prices, macro models would not display monetary non-neutrality. Moreover, strikingly different aggregate implications are predicted by macro models depending on the degree of price stickiness: more flexible prices enlarge the immediate response of the price level to money supply innovations and therefore weaken the real effect of monetary policy.

Most of the macroeconomic literature introduces Calvo (1983) time dependent pricing as the cause of nominal price rigidity, which provides tractability and simplifies the characterization of models that aim to answer questions related to components of the general equilibrium that are not directly associated to the firms' price-setting behavior. However, the inconsistency of Calvo pricing predictions with the micro data of price changes motivated several recent papers to give close attention to the source of nominal price rigidity. Most of these papers found that state dependent pricing –where the timing of firms' price adjusting decision is endogenous of their profit maximization problem, such as menu cost models– performs better in matching the micro price facts, emerging a still active debate about the correct modelling of price stickiness and its aggregate implications for macro models (*e.g.* Golosov and Lucas, 2007; Klenow and Kryvtsov, 2008; Nakamura and Steinsson, 2008, 2010; Midrigan, 2011; Alvarez and Lippi, 2014, 2020; Kehoe and Midrigan, 2015; Alvarez, Le Bihan, and Lippi, 2016; and Alvarez, Lippi, and Paciello, 2018).

In this paper, I follow up on this discussion by providing new evidence about firms' price-setting behavior and formalizing my findings in a menu cost model. With this motivation, I exploit a new micro daily data set, which I collected with web scraping techniques from eight large multichannel consumer-goods retailers, operating in six different countries with heterogeneous macroeconomic conditions.

In the empirical part of this study, I present the salient facts observed in the data, compare them with analogous results documented in earlier papers that use traditional data sources, and discuss the implications of my findings for the characterization of nominal rigidities. The three main novel findings of this part are the following: (1) There is a relation between the main statistics (related to the size and frequency of price adjustment) and the inflation rate of a country; (2) The distribution of the size of price changes has a relatively small, yet nontrivial mass around zero; (3) Familiar products from the same manufacturer have greater similarity in the timing and magnitude of price adjustment than utterly different products.

I begin focusing on the main statistics that drew interest in previous studies of price stickiness, such as the distribution and timing of price changes, and the degree of synchronization of adjustments across products of the same firm. I show that some statistics found in my data differ from previously documented values, which is partly caused by the presence of measurement errors in traditional data sets (namely CPI and scanner data) as suggested in Cavallo (2018). I also investigate the relationship between the main facts of price changes and inflation rate, which is an advantage of the use of scraped data, since it allows me to compare data from different countries collected for similar retailers and with the same process. I show that a higher inflation rate is associated with a larger

average size of price adjustments, a larger share of price changes that are increases, and with a lower duration of price spells.

Following, I study the behavior of temporary price changes (sales). Temporary changes represent, on average across retailers, 73% of all price changes in my data set, which is compatible with other studies that also report a very large share of sales (Midrigan, 2011; Kehoe and Midrigan, 2015). The large number of temporary changes is the reason why the treatment of sales is a crucial matter in the modelling of price stickiness: should we consider sales in the same way as regular price changes; differentiate regular and temporary adjustments as two different types of price changes; or exclude temporary changes and instead focus only on regular? Or, in words of Nakamura and Steinsson (2008), "is a price change just a price change?".

I provide new evidence against the relevance of sales for the degree of price stickiness in an economy. I show that most sales return to their previous value after a short period and that there is a high concentration of the duration and magnitudes of sales in a very few values of these statistics. The fact that temporary price changes automatically revert to previous value after a given period hints that retailers do not use them as a response to new macroeconomic information as they do with regular changes. This is also aligned with the idea that temporary changes are typically pre-established with substantial anticipation and defined by each retailer's marketing strategy.

Moreover, I show that many of the distributions of the size of price changes have a low density around zero, which causes a simultaneous near bimodality and normality. Also using scraped data, Cavallo (2018) reports a similar finding, which contrasts with those obtained from traditional data sources. Importantly, the shape of the distribution also differs from the predictions of the two standard pure menu cost types of models. These models predict either a clearly bimodal shape with no changes around the threshold given by the cost that has to be paid for each price that is changed (Golosov and Lucas, 2007); or a bell-shaped distribution with a large mass around zero, thanks to the presence of economies of scope in price adjustment (the firm pays only one fixed menu cost to change any number of prices) that makes it optimal to change every price that differs from its optimum no matter how small is that gap (Midrigan, 2011). An immediate relevant implication of this finding is that a model that matches the micro data must display a selection effect of monetary policy that lies between a very strong one, such as that of Golosov and Lucas (2007), and a weak one, such as that of Midrigan (2011).

Finally, I show that while there is a low synchronization of adjustment across products within a store, the synchronization of changes in familiar products is higher than in heterogeneous products.[1] Additionally, I find that the sizes of price changes of familiar products that adjust in the same period are identical in many of the cases. The retailers in my data set, and many other consumer-goods multiproduct firms, sell numerous similar products from the same manufacturer. Hence, whether the price series of familiar products follow parallel patterns is a relevant detail to account for when integrating menu costs in macro models. In particular, I suggest that in order to

[1] I define a family of products as those groups of similar products obtained from the same manufacturer by the consumer-goods firm (for example, Coke Light 375ml, Coke Light 600ml, and Coke Light 1500ml).

reproduce this fact from the data, menu cost models with any type of product-specific cost of adjustment have to incorporate a cost curtail when a firm changes multiple familiar products.

The theoretical part of this paper builds on the main facts of price changes that I find in the micro data. I set up, calibrate, and solve the partial equilibrium of an extension of the Midrigan (2011) multiproduct menu cost model, with only regular price changes. The fundamental deviation of the model from standard price-setting theories of price adjustment is the introduction of a multidimensional cost of price adjustment.

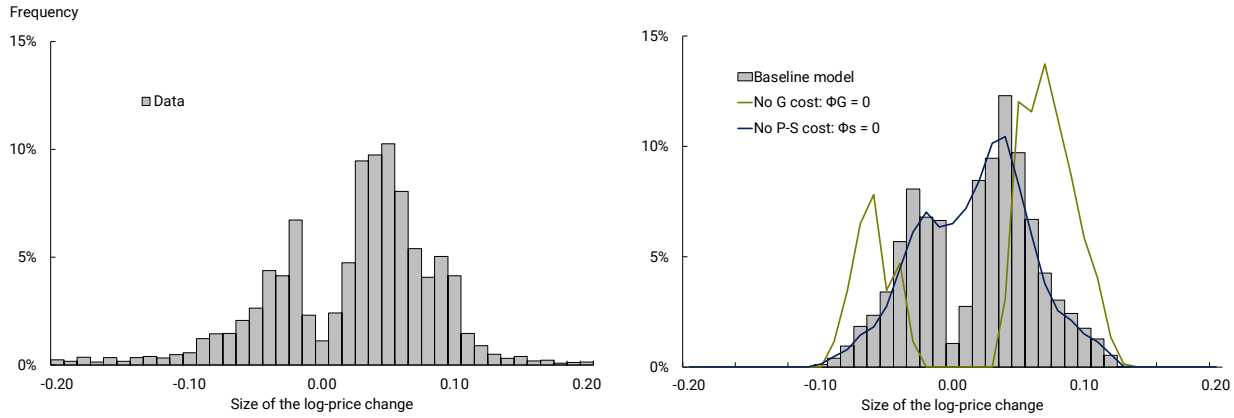
First, the firm faces a "general" cost, φ^G, that must be paid once and for all for changing any number of prices in a period and it is independent of the number of changed prices. This cost is analogous to the one paid for regular price changes in the Midrigan model, leading to economies of scope in price adjustment.

The second cost of price adjustment is a "product-specific" cost, φ^S, paid for every price that is changed. This product-specific cost rationalizes the fact that, unaffected by the number of changes, the marginal change is always costly and hence prevents my model to generate a large number of small price changes and perfect synchronization in price adjustment. Finally, the firm receives a cost curtail, φ^C, when it changes familiar products' prices. This implies that the model features a high degree of economies of scope in price adjustment of similar products.

For the solution of the model, I calibrate the key parameters with the same value for all the countries available in my data, as I try to match the patterns found in the micro facts across countries, instead of making the model fit the facts of each country. I show that incorporating only one country-specific variable —the inflation rate— the model reproduces many of the facts I document, including the relationship between inflation and the main statistics, and the relatively low yet nontrivial number of small price changes.

Lastly, my model encompasses as two special cases the standard versions of unidimensional cost of regular price adjustment. A model with only product-specific menu costs (a multiproduct version of Golosov and Lucas (2007)) generates a bimodal distribution of the size of price changes, with null changes between the positive and negative threshold given by the size of the cost. To reproduce this type of model, $\varphi^G = 0$ in my calibration. Contrarily, a model where the firm must pay only one general cost to change any number of regular prices (*à la* Midrigan (2011) excluding temporary changes) predicts a bell-shaped distribution of the size of price changes, with a large mass around zero. To reproduce this type of model, I set $\varphi^S = 0$ in my calibration. As Figure 1 shows, the baseline case of my model reproduces the key features of the distribution from the data in a better way than the two special cases with unidimensional menu costs. This suggests the necessity of incorporating a general and a product-specific cost of price adjustment to make an otherwise standard menu cost model fit the micro facts of price changes.

Figure 1 | Data and model simulations for the Netherlands



Note: The left-panel of the figure plots the distribution of the size of log-price changes found in daily data from a large retailer from the Netherlands. The right-panel plots the predicted distribution of price changes of the baseline case of the model I set up in this paper and of two special cases of it, one with only a general menu cost and the other with only a product-specific menu cost of price adjustment.

1.1. Relation to the literature on the microfoundations of nominal rigidities

This paper relates to a strand of the literature that investigates the sources of nominal rigidities and their role in macroeconomic models. Over the past decade and a half, and thanks to the availability of new micro data sets of prices, several papers exploited these new sources aiming to provide a better understanding of the characteristics of firm's price setting behavior. Bils and Klenow (2004) seminal paper is a cornerstone in this literature since they were the firsts in using data underlying the consumer price index from the United States (CPI data) to present evidence on price stickiness, taking advantage of a much broader set of information (both in terms of the number of products and products categories) than earlier papers which tended to focus on the evolution of the price of a narrow set of products, raising concerns about the representativeness of the results.

After Bils and Klenow (2004) there was a surge in the discussion on the microfoundation of price rigidities. Three early influential papers are Dhyne *et al*. (2006), Klenow and Kryvtsov (2008), and Nakamura and Steinsson (2008). They use official monthly CPI data from the U.S. and from different countries of the euro area and document the main facts and characteristics of price changes.

These facts quickly became a benchmark and inspired the modelling and calibration of a new generation of sticky price models, started by Golosov and Lucas (2007) (GL). Building on their model, Midrigan (2011) presents a menu cost model that matches some aspects of the distribution of price changes found in the micro data that conflict with the predictions of GL. His model generates a large amount of small, as well as large price changes, which fits the weekly scanner price data he exploits (electronic records of transactions that firms collect as part of the operation of their businesses), and contrasts the distribution predicted by GL, which is bimodal with no changes inside an inaction band around zero. The implications of these two models are notably different: while the GL model predicts near money neutrality, in the Midrigan model a weak selection

effect causes a weaker response of aggregate prices to monetary shocks, resulting in real effects of monetary policy closer to those of the Calvo model and five times greater than in GL.

Two key attributes of the set-up of Midrigan (2011) are the assumption of a fat-tailed distribution of cost shocks, generating large price changes; and the combination of multiproduct firms and a single menu cost that is paid for changing any number of prices, which leads to economies of scope in price adjustment and a consequent large number of small price changes. The assumptions of multiproduct firms and economies of scope in price adjustment were widely incorporated in the debate on the microfoundations of price-setting and became a component of many recent contributions to the price stickiness literature, such as Alvarez and Lippi (2014), Kehoe and Midrigan (2015), Alvarez *et al*. (2016) and Karadi and Reiff (2019).

In Section 4 I set up a menu cost model that features multiproduct firms and some degree of economies of scope in price changes as well. The key departure from a standard sticky-price model is the incorporation of a three-dimension cost of price adjustment. The design of the menu cost in my model is similar to that of Bonomo *et al*. (2020), whose menu cost is composed of a general cost paid once for change any amount of products, and a product-specific cost paid for every additional changed price. I introduce a third component of the menu cost: a cost curtail when the prices of familiar products are changed in the same period. To the best of my knowledge, this is the first paper presenting a menu cost model aimed at matching the salient facts of price changes observed in daily data from a set of countries with heterogeneous macroeconomic conditions.

This paper is also inspired by Cavallo and Rigobon (2016) and Cavallo (2018) and contributes to the growing literature closing the gap between Big Data and Economics. For their Billion Prices Project (BPP), they created a micro data set obtaining online prices on a daily frequency using a web scraping method. Despite the many advantages of scraped daily price data,[2] the number of papers that use it is yet relatively scarce because of its limited availability. Some studies that exploit data sources with daily frequency are Alvarez *et al*. (2016), who use data from BPP to assess measurement errors in CPI and scanner data and to compare the estimates of some key statistics of price changes with those found in traditional data sources; Alvarez *et al*. (2018), who find evidence in favor of the existence of strictly positive menu costs in the relatively low fraction of small price changes observed in the BPP data; and Bonomo *et al*. (2020), who set up a menu cost model that matches the degree of partial synchronization of price changes that they find in a daily-frequency data set with prices of a large number of retail stores from Israel.

2. Data

For most of this paper, I use a data set of prices obtained from supermarkets' e-commerce sites with web-scraping techniques. Starting in August 2019, I collected scraped price data from a set of companies from different business industries. As of June 2020, my project comprises data from supermarkets, fashion retailers, airlines, travel agencies, and energy companies from 12 countries, obtaining more than 100.000 price points every day. In addition, I made the data I collected freely

[2] Section 2.1 comments on the advantages and limitations of this new type of data source.

available for non-profit research projects, becoming the first free data source of online prices from different industries.

I created a program that scraps several online retailers and obtains the price of the products they sell. My software's automated task is to navigate the different websites, search for products, obtain the main characteristics (*e.g.*, name, category, price, among others), and store it in an output file. The program is coded in Python language, though web scraping can also be done in other languages, such as R or C#. In addition to the standard packages used for data analysis, I use the libraries Selenium and BeautifulSoup. Selenium is a tool that allows the software to open a web browser, navigate and interact with it imitating human behavior. With BeautifulSoup I extract the data from the websites.

The process is as follows. I provide my program with a file containing a list of URLs of the websites I want it to scrap (the input file). Using Selenium, I access each URL, which ideally will have a list or grid of products. Websites' underlying codes are written using HTML. Then, using the Inspect tool of each website, I analyze the HTML code to find the tags of the desired elements I want to obtain. Using BeautifulSoup to parse the HTML code of each URL, I identify each of those elements, and extract the text from the website code, and I store the data in my output file, which I then append to my data set. I repeat this process for each URL in the input file.

2.1. Advantages and limitations of scraped data

Previous studies analyzing the microfoundations of price stickiness mainly use two types of data sources, namely CPI data (price data underlying official consumer price indexes) and scanner price data (electronic records of transactions that establishments collect as part of the operation of their businesses). Table 1 (obtained from Cavallo, 2018) provides a comprehensive comparison of these two alternative sources and scraped price data.

A first major advantage of scraped data is its daily frequency. While the CPI and scanner price data sets have a frequency of one month and one week respectively, a daily frequency has several advantages as it captures all the changes in prices: missing the intraweek evolution of prices could represent a relevant loss in the objective of studying their dynamics, especially in countries with high inflation rates where price changes are more frequent, as I show in Section 3.

Second, having daily scraped data is an effective way of avoiding measurement bias. Cavallo (2018) shows that using CPI or scanner price data to study price stickiness typically comes at the cost of measurement errors. He also documents the impact that this issue has on the estimates of widely accepted statistics in the price rigidity literature, such the duration of price changes and their distributions, and the estimates of the slope of the hazard function of price changes. The sources of this bias are the imputation of missing prices in CPI data; and the measurement of prices in scanner data, which is done by calculating the average price of a product in a week weighted by sales, overestimating the number of price changes and underestimating their size.

Table 1 | Alternative data sources

	Scraped Data	CPI Data	Scanner Data
Data Frequency	Daily	Monthly	Weekly
All products in retailer	Yes	No	No
Uncensored price spells	Yes	No	Yes
Comparable data across countries	Yes	Limited	Limited
Real-time availability	Yes	No	No
Product categories covered	Few	Many	Few
Retailers covered	Few	Many	Few
Quantities sold	No	No	Yes

Source: Table 1 from Cavallo (2018).

Moreover, my data set captures better the development of temporary price changes than other traditional sources. The main statistics of price changes vary to a great extent if temporary price adjustments are included in the data, typically enlarging the average size and lowering the frequency of price changes. Hence, distinguishing between short-lived temporary changes and regular price changes has relevant implications for the aggregate predictions of sticky price models. While it is possible to detect sales in the CPI and scanner price data sets using techniques such as the HP filter or recognizing a "V" behavior in the time series of the price of a certain product (a sudden drop returning quickly to the previous trend), those techniques are not exempt from errors. Instead, web-scraping methods allow to directly recognize sales as they are signaled by the retailer on the website. Additionally, traditional data sets only recognize discounts as changes in the listed price, while I also capture other types of sales that do not necessarily affect the listed price, such as "buy 2 pay 1" or "25% discount in the second unit".

Finally, another advantage is in terms of scope. Web-scraping allows an easy incorporation of new data from a new retailer from almost every country in the world with the same collection criteria, making information from different countries comparable. Thus, I can capture the high-frequency dynamics of countries with different inflation rates, levels of market concentration and other economic determinants of the price adjustment decisions, which could later serve to account for the heterogeneity in price-setting behavior across countries: arguably, the time, size and type of price changes are not the same for all countries under all states of their economies.

A limitation of scraped data compared to CPI data is that the former covers only a limited number of product categories. The scraped data I use for this paper covers between 17% and 26% of the CPI categories' expenditure basket weights, depending on the country. A shortcoming of my data compared to scanner data is that the latter also contains the amounts sold for each product. While having that information is be very valuable for certain types of analysis (for example, concerning elasticities), the lack of quantities does not affect the analysis I do in this paper.

2.2. Description of the data

My data set has more than 5 million daily prices from eight retailers of six different countries. All the retailers are large multi-channel firms selling full grocery lines and department store products. The data includes prices of supermarkets from the Netherlands, United Kingdom, Brazil, Chile, and Turkey, all among the top 3 in their national market shares. There are three supermarkets from Argentina, all among the top 5 in the Argentine market share.

I started collecting scraped prices from the Argentine supermarkets in August 2019 and subsequently added other firms, thus my data set covers non-identical time spans for the different retailers. Table 2 provides relevant details of each retailer data set.

I give missing values a similar treatment to the one used in Cavallo (2018), who fills the missing prices carrying forward the last recorded value until a new price is available. My treatment of missing prices is stricter because I drop from my sample all the products whose price is not reported more than a specific threshold of periods, which I set to 20% of the total number of observed periods for each retailer.

Table 2 | Description of the data

Country	Netherlands	UK	Chile	Brazil	Turkey	Argentina
1. Retailers	1	1	1	1	1	3
2. Observations (thousands)	1,838	112	359	388	105	3,329
3. Products	20,044	929	1,619	2,239	2,495	14,213
4. Categories	56	12	39	11	53	161
5. Start month	11:2019	02:2020	11:2019	11:2019	04:2020	08:2019
6. End month	06:2020	06:2020	06:2020	06:2020	06:2020	06:2020
8. Explicitly flag sales on the website	Yes	Yes	No	No	Yes	Yes (2)

The number of observations does not include missing values.

3. Empirics

In this section, I exploit my scraped data set to document the major salient facts of price adjustment, in order to provide a microeconomic foundation for the sticky price model I discuss later in this paper. Table 3 presents the main statistics for each retailer in my data set.

Table 3 | Description of the data

Country	Netherlands	UK	Chile	Brazil	Turkey	Argentina		
						Firm 1	Firm 2	Firm 3
Inflation rate (annual)	2.6%	1.7%	2.8%	3.7%	15.2%	53.5%	53.5%	53.5%
1. Mean	1.70	7.74	1.75	2.33	2.72	4.36	4.35	4.65
2. Median	3.15	3.92	3.06	3.52	5.72	5.88	5.89	6.79
3. 25th percentile	-2.65	-9.53	-9.44	-5.21	-8.07	-1.38	-1.42	-6.77
4. 75th percentile	5.75	28.76	11.20	7.83	12.52	13.35	9.83	11.36
5. Standard deviation	6.58	27.07	18.29	10.12	16.86	16.57	8.68	12.19
6. Absolute mean	5.57	21.97	13.61	9.12	13.66	12.98	8.28	10.99
7. Absolute median	4.69	18.23	10.11	6.83	11.12	10.15	7.85	8.55
8. Absolute 25th percentile	2.92	6.46	4.19	3.44	6.27	5.29	4.50	6.77
9. Absolute 75th percentile	7.31	32.54	18.92	12.44	18.27	17.17	10.46	13.78
10. Absolute standard deviation	3.89	17.59	12.15	7.37	10.61	11.17	5.08	7.02
11. Frequency	0.002	0.003	0.009	0.010	0.011	0.027	0.019	0.020
12. Implied duration	407	305	140	116	91	37	52	49
13. Share of price increases	0.632	0.611	0.631	0.639	0.651	0.671	0.716	0.680
14. Fraction < |1%|	3.54%	1.37%	1.61%	4.08%	2.06%	6.73%	3.50%	0.77%
15. Fraction > |5%|	44.62%	81.88%	72.24%	65.59%	82.01%	74.89%	70.44%	91.86%
16. Skewness	-1.035	0.204	-0.012	-0.149	-0.461	-0.264	-0.583	-0.327
17. Excess kurtosis	1.567	0.431	-0.302	3.212	0.476	1.612	0.030	-0.017

Notes: The size of price changes is estimated as 100 times the log difference of prices. The implied duration of price spells is expressed in days. The kurtosis of the distribution of price changes is estimated using standardized price changes at the category level. The excess kurtosis is calculated as 3-kurtosis.

3.1. Size of price changes

3.1.1. Magnitude

The mean (median) absolute size of log-price changes ranges from 5.57 (4.69) to 21.97 (18.23) across different retailers.[3] One can easily observe, however, that the statistics obtained from the retailer from the United Kingdom notably differ from the other retailers. Without considering this case, the range narrows to [5.57, 13.66] ([4.69, 11.12] for the median). The case of the retailer from the U.K. represents a good case of the heterogeneity of price changes across different stores documented by Klenow and Malin (2010).

The ample range of the magnitude reflects notably different dispersions in the distributions of price changes in my sample, which is consistent with the diverseness documented in earlier papers using alternative data sources. For example, Midrigan (2011) finds an average absolute size of regular prices of 11.0 in a weekly scanner price data set from the U.S. Other studies, using CPI data, report a mean of 14.0 in the U.S. (Klenow and Kryvtsov, 2008), and a mean of 15.4 in the euro area

[3] Unless noted otherwise, when I refer to the (log) size of price changes I mean 100 times the log difference of prices, or formally $100 * \ln(P_t/P_{t-1})$, which approximates to the percentage change for close values and has the advantage of symmetry. This is the approach broadly taken in the literature.

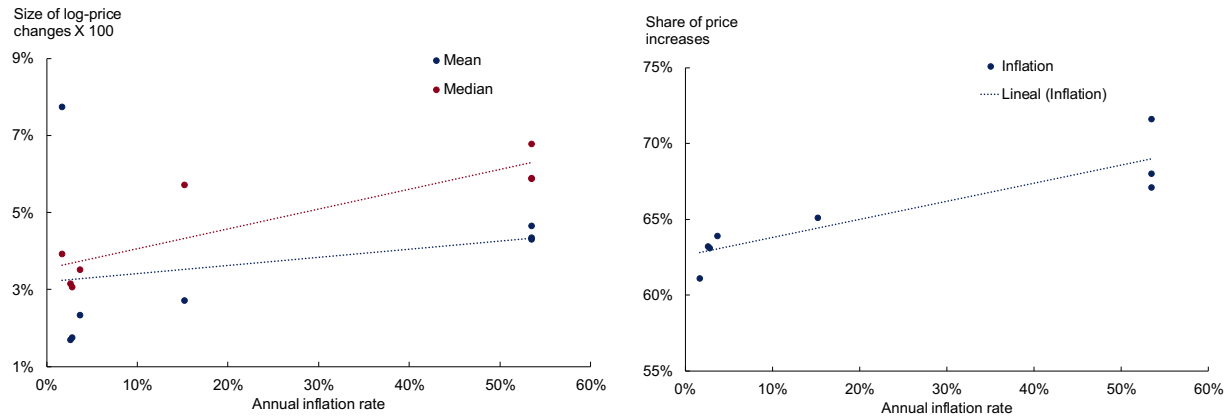
(Dhyne *et al*., 2006). In an extensive daily price data set from many food stores in Israel, Bonomo *et al*. (2020) report an average absolute size of price changes equal to 20.8.

It does not appear to exist a clear link between the absolute size of price changes in a retailer and the inflation rate of the country where the firm operates, nor with the variance of inflation. Instead, this link seems to exist when analyzing the first moment of the distribution considering both the size and sign of price adjustments, *i.e.* without taking the absolute value (rows 1-2 in table 3). The average size of price changes ranges from 1.70 to 6.79. The range of the median size of price changes also narrows to [3.06, 6.79]. Panel (a) of Figure 2 plots the mean and median size of price changes and the annual inflation rate for the countries analyzed, showing a positive relation between the growth rate of the price level and the size of price changes.

3.1.2. Share of price increases and decreases

The coexistence of a small average size of price changes with an appreciably larger average absolute size of price changes is explained by a substantial share of price decreases in my sample. The percentage of price changes that are increases ranges from 61.1% to 71.6%. This statistic coincides with the estimates from previous studies, which fluctuate around two thirds. Moreover, it also appears to exist a link between the share of prices that are increases and the inflation rate, as shown in panel (b) of Figure 2.

Figure 2 | Inflation rate and key statistics of the size of price changes



(a) Inflation rate and the average size of price changes (b) Inflation rate and share of price increases

Note: Each scatter plot represents a different retailer. The dotted lines are the plots of the best-fit linear relations between inflation rate and the different variables, and it is only added for illustration purposes. Note that the slope of this line for the relation between inflation and the mean size of price changes is flattened by the strikingly larger mean of the retailer from the UK.

These two facts contribute to the debate on the relevance of the shocks from different nature (*i.e.* aggregate and idiosyncratic) in models with nominal rigidities. On the one hand, very common price declines assign a relevant role to idiosyncratic shocks (Klenow and Malin, 2010) in driving prices away from their optimum; on the other, the novel fact revealing a positive relation between the share of price increases and inflation rate gives evidence in favor of an important role of aggregate conditions in driving price changes.

Table 3 also reports the skewness and (excess) kurtosis of the distribution of the size of price changes. The skewness is negative in all the cases except for the retailer from the UK. Two of the retailers show a moderately negative skew (between -0.5 and slightly below -1) and in the remaining cases (apart from the UK) the distributions are fairly symmetrical yet left-skewed. This statistic has received null-to-little attention in previous papers despite providing a helpful conceptual insight of the distribution of price changes. A negative skewness requires a larger mode than the median and the mean of the distribution. With positive mean and median, this implies that the mode of the size of price adjustment is positive and located relatively far from zero (compared to the first moment in the distribution); and, concretely, contradicts models that predict a unimodal bell-shaped distribution centered in zero.

The values of the excess kurtosis range between -0.3 and 3.2 –recall, as a reference, that the excess kurtosis of the normal distribution is 0. I estimate this statistic over the standardized log-size of price changes at the category level to prevent biased values arising from the heterogeneity across categories.[4] To obtain the standardized price change I simply subtract the mean price change of each product' category and divide by the category's standard deviation of the size of changes.

This statistic has received attention in recent papers studying the microfacts of price changes and their aggregate implications for monetary non-neutrality. Alvarez *et al*. (2016) find that the kurtosis of the size of price changes can be a sufficient statistic describing the real effects of monetary policy.[5] They show that in a wide variety of models, the kurtosis embodies the selection effect of monetary policy. The selection effect indicates that those prices that are adjusted when a firm revises them are those that are far from their optimum. A strong selection effect, such as that of the Golosov and Lucas (2007) model, indicates that price adjustments will be on average large, causing a strong response of the aggregate price level and a consequent high degree of monetary neutrality, even if the size of the monetary shock is small. Such a model displays a strongly bimodal distribution of price changes and the smallest value of excess kurtosis, which is -2. On the other extreme, in a standard Calvo model, prices adjust independently of their distance from the optimum, hence the selection effect is null, and the real effects of monetary policy are relatively large. Such a model features a peaked distribution, with a large mass of small as well as large price changes, resulting in a high excess kurtosis equal to 3.

Importantly, the excess kurtosis in my data is brought down by the low density of price changes around zero, which creates a "hole" in otherwise unimodal distributions. This feature of the data is not present in traditional data sources because of the limitations mentioned in section 2.1: time averages in scanner data and cell-relative imputation in CPI data tend to overestimate the number of small price changes. Cavallo (2018) quantifies this issue, showing that the overestimation increases the excess kurtosis from 0.96 in online data to 2.45 in CPI data.

[4] The estimated kurtosis of a population composed of different elements with different variances is larger than that of each element.
[5] Their characterization of the kurtosis as a sufficient statistic remains valid on economies with zero or low inflation.

3.2. Frequency and duration of price changes

Table 3 (rows 11-12) also reports the median frequency with which prices change and the implied duration (in days) for each price spell. I compute the frequency of price adjustment as the number of price changes divided by the number of observed prices per product. This measure is then aggregated to the category level as the mean frequency of all the products from each category.

Formally, I obtain the mean frequency for each category k as:

$$f_k = \frac{\sum_{i=1}^{T}\sum_{i=1}^{N}\varphi_{i,k;t}}{\sum_{i=1}^{T}\sum_{i=1}^{N}\mathbf{P}_{i,k;t}} \; with \; \varphi_{i,k;t} = \begin{cases} 1. if \; P_{i,k;t} \neq P_{i,k;t-1} \forall i \in 1,N \wedge \forall t \in 1,T \\ 0, otherwise \end{cases}$$

where T is the number of periods (days), N the number of products, k an index for each category, and $\mathbf{P}_{i,k;t} = 1$ for every price observation.[6] Then, the median frequency of a retailer is $f = median(f_1, f_2, \dots, f_k)$. The daily hazard rate of price changes is $\lambda = -\log(1-f)$. Therefore, defining the median implied duration (in days), d, as the inverse of the hazard rate of price changes gives:

$$d = \frac{1}{log(1-f)} \qquad (1)$$

The range of the implied durations in my data is notably wide. The shorter duration is 37 days, for a retailer from Argentina, while the longer duration is more than one year (407 days), for the retailer from the Netherlands. These differences in the implied durations and frequencies are not a particularity of my data: previous studies have also documented very heterogeneous values for these statistics.[7] Besides potential differences in calculation methods, the estimations of the implied duration are subject to many sources of heterogeneity, such as the different types and number of goods each retailer sells, types of stores, and the role that sales play for each retailer's pricing strategy. The wide ranges of implied durations at the category level reported in Table 4 illustrate the disparity across different types of products found in my data set.

Table 4 | Heterogeneity of price changes at the category and product level

Country	Netherlands	UK	Chile	Brazil	Turkey	Argentina		
						Firm 1	Firm 2	Firm 3
1. Range of durations across categories	[215; 1125]	[113; 1296]	[21; 695]	[47; 568]	[13; 964]	[8; 123]	[27; 99]	[27; 239]
2. Products whose prices remained unchanged	53%	57%	15%	44%	54%	1%	0%	7%

Note: The range of durations across categories for a retailer defined as the shorter and longer durations for different categories within a firm.

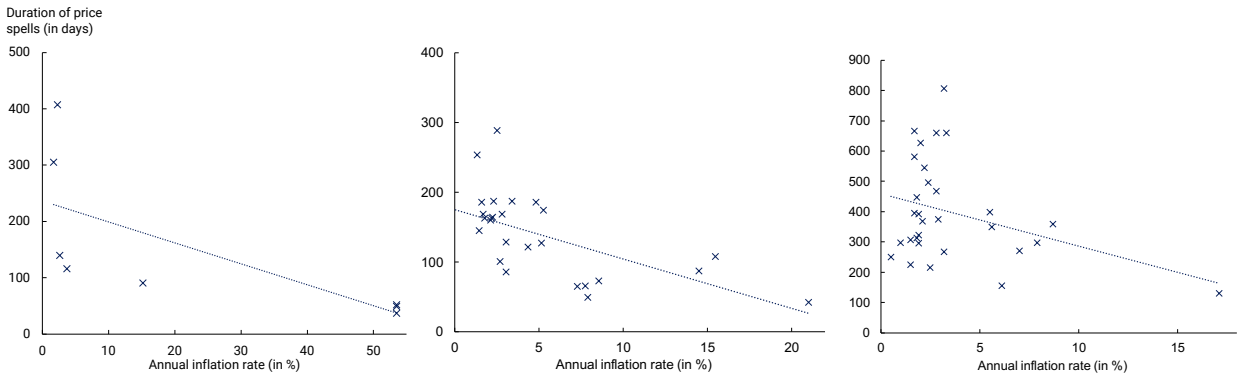
[6] Since every product in my data has a price for each observed day, $\sum_{k=1}^{K}\sum_{t=1}^{T}\sum_{i=1}^{N} P_{i,k;t}\,\varphi_{i,k;t} = TN$.

[7] An interesting example of this is the difference in the reported durations by Nakamura and Steinsson (2008) and Klenow and Kryvtsov (2008) who, using the same CPI data set from the U.S. collected by the Bureau of Labor Statistics, found a median duration (in months) of 11.0 and 7.2, respectively. The time span of Nakamura and Steinsson's study is 1988:01-2005:12, while that of Klenow and Kryvtsov's is 1988:02-2005:01

Relevant insights can be obtained from the duration of price spells. First, it indicates different degrees of price stickiness across countries. In Argentina, the country with the higher inflation rate of my sample during the covered period (with an average monthly inflation rate of three percent), prices take on average one and a half month to change. On the other extreme, for the retailer from the Netherlands —the country with greater price stickiness in my data— the expected duration of a price spell is of 13.4 months.

Analyzing the entire sample, it seems to exist a link between the inflation rate and the duration of price spells. Economic reasoning suggests that if macroeconomic conditions have a predominant role in driving the deviations from the optimal price, —assuming the same degree of homogeneity between products and stores— the duration of price spells is expected to be higher with a lower rate of inflation, *ceteris paribus*, both in a cross-section and time-series analysis. Indeed, the duration of price spells is notably longer in countries with lower inflation than in countries with higher inflation in my data; yet —as with the previously commented connections between inflation and price change statistics— a causal relation should not be suggested without caution of missing unobserved factors, particularly because of the heterogeneity in goods and store types mentioned above. Figure 3 plots the inflation rate and the implied duration of price changes of the firms in my data (panel a), previous findings using CPI data surveyed by Alvarez (2008) (panel b), and the values provided by Table 9 in Cavallo (2018) using scraped daily data for 31 countries (panel c).

Figure 3 | Inflation rate and duration of price spells



(a) Data (b) Alvarez (2008) (c) Cavallo (2018)

3.3. The behavior of temporary price changes

A segment of the recent debate on price stickiness concerns the treatment of temporary price changes, or sales. The central point of the discussion concerns the relevance and the role that is assigned to temporary changes in the estimation and modelling of price rigidities in macro models. Proponents of not considering temporary price changes as influential to the estimations of price stickiness argue that sales are orthogonal to macroeconomic conditions, as they are unresponsive to macro shocks (Nakamura and Steinsson, 2008). If this was the case, then sales do not contribute to the adjustment of aggregate inflation to aggregate shocks, and hence it is appropriate to exclude them when modelling price stickiness. Another rationalization for excluding sales as determinants

of price stickiness is that price discounts are typically pre-established with substantial anticipation and defined by each retailer's business strategy –which includes a special budget for discounts–, and that these strategies (price plans) are sticky, and unresponsive to new macroeconomic information (Mankiw and Reis, 2002; Burstein, 2006; and Anderson *et al*., 2017).

Contrarily, other papers defend the inclusion of sales in sticky price models arguing in favor of the existence of sale-type responses from firms to changes in the aggregate macroeconomic conditions (*e.g*. Bils and Klenow, 2004; and Klenow and Kryvtsov, 2008). Moreover, Klenow and Willis (2007) suggest that temporary price changes are in fact a source of macro price flexibility and provide evidence, using CPI data from the U.S., of significant correlation between the size of sales and the accumulated inflation since the last price change.

On the theoretical side, the role of sales in menu costs models is also a subject of debate, as different implications for their impact on price flexibility are obtained depending on (i) the manner they are formally incorporated into the models, and (ii) the underlying economic rationale that characterizes the decision rule resulting in a temporary change. Kehoe and Midrigan (2015) describe a model where the retailer faces a (relatively large) menu cost for adjusting regular prices and a (relatively small) menu cost for incurring into a temporary change that automatically reverts to the regular price after one period. They find that even though prices change more frequently when temporary price changes are included, their temporary nature and the fact that they automatically revert to the previous level leaves the aggregate price stickiness unaffected by the presence of temporary changes. Alternatively, Alvarez and Lippi (2020) set up a model where firms choose a price plan, defined as a set of two prices $P = \{P^L, P^H\}$, allowing the firm two move between any of the prices in the set without paying a cost (instead, a menu cost must be paid when the firm chooses another price plan). By permitting many free price reversals within a price plan and not requiring a price to automatically return to its previous value their model displays a higher flexibility of the aggregate price level relative to standard menu cost models.

3.3.1. Return to the previous value

A key assumption in Kehoe and Midrigan (2015) to obtain the result that sales are not a relevant measure for price flexibility is that temporary price changes automatically return to the previous value after a certain period. Hence, two relevant statistics to assess the validity of this assumption are the percentage of discounts that return to the same regular price where they departed and the concentration in the duration of sales. Table 5 shows these statistics, obtained only for the retailers that explicitly flag their sales in their websites to avoid measurement errors arising from sales-detecting algorithms.

The statistics are compatible with the assumption of Kehoe and Midrigan (2015). The number of returning-sales account for a large share of the total number of discounts (row 1). The percentage of different retailers ranges from 78% to 95%, with a mean of 85%. Also, the duration of price changes appears to be highly concentrated. The 5 durations that concentrate a larger number of sales account for more than half of all the temporary price changes of all the retailers (row 3).

Table 5 | Facts about sales

Country	Netherlands	UK	Turkey	Argentina	
				Firm 2	Firm 3
1. Share of sales returning to previous value	95%	93%	78%	80%	81%
2. Concentration in the top 3 durations	41%	52%	45%	37%	50%
3. Concentration in the top 5 durations	52%	65%	56%	53%	65%
4. Concentration in the top 3 abs. magnitudes	74%	31%	42%	62%	62%
5. Concentration in the top 5 abs. magnitudes	79%	42%	53%	74%	79%

3.3.2. Concentration in the magnitude of price discounts

Another common feature of sales across different retailers is that their size is typically concentrated in a few specific values. Rows 4-5 in Table 5 and Figure 7 in Appendix A.2 present this fact. This fact can be explained by two hypotheses on how firms decide to implement a temporary price change in which, importantly for the discussion on whether considering or not sales in sticky price models, temporary price changes do not contribute to aggregate price flexibility. First, the size concentration is consistent with the idea that firms have a pre-established pricing plan of sales arranged with the producers of the products, with a special budget for discounts, and with an important role of the marketing area of each retailer in the decisions concerning price discounts. The concentration of sales' sizes fits this premise since a customary discount is easier to execute (and requires less efforts devoted to the analysis of the optimal price), and because it is also more appealing for marketing communication attracting irrational consumers' behavior (for example, - 15% or "pay 6 get 7" instead of -13.48%, even if the latter was the rational agents profit maximizing discount). I label these types of changes as marketing changes.

Second, the concentration in the size of sales is also consistent with the idea of a relatively small physical cost of temporarily changing a price from Kehoe and Midrigan (2015). Let me consider an economy combining small costs of making temporary price changes and the presence of marketing changes. I also assume, consistently with the evidence presented above, that sales return to their previous value after their life-period. This economy would also display a concentration of sales in small amounts of sizes because of the marketing changes. However, these temporary price changes would not be responses to changes in macroeconomic conditions since firms would prefer to do a regular (rather than a temporary) price change after a permanent aggregate shock because of their temporary nature and the fact that they automatically revert to the previous level.

3.4 Shape of the distribution of the size of price changes

One of the major salient characteristics of the distribution of the size of price changes observed in the scraped price data is the relative scarcity, yet nontrivial presence, of small price adjustments.

Table 3 reports the percentage of price changes with a size lower than 1% in absolute terms, which ranges between 0.8% and 6.7% across retailers.

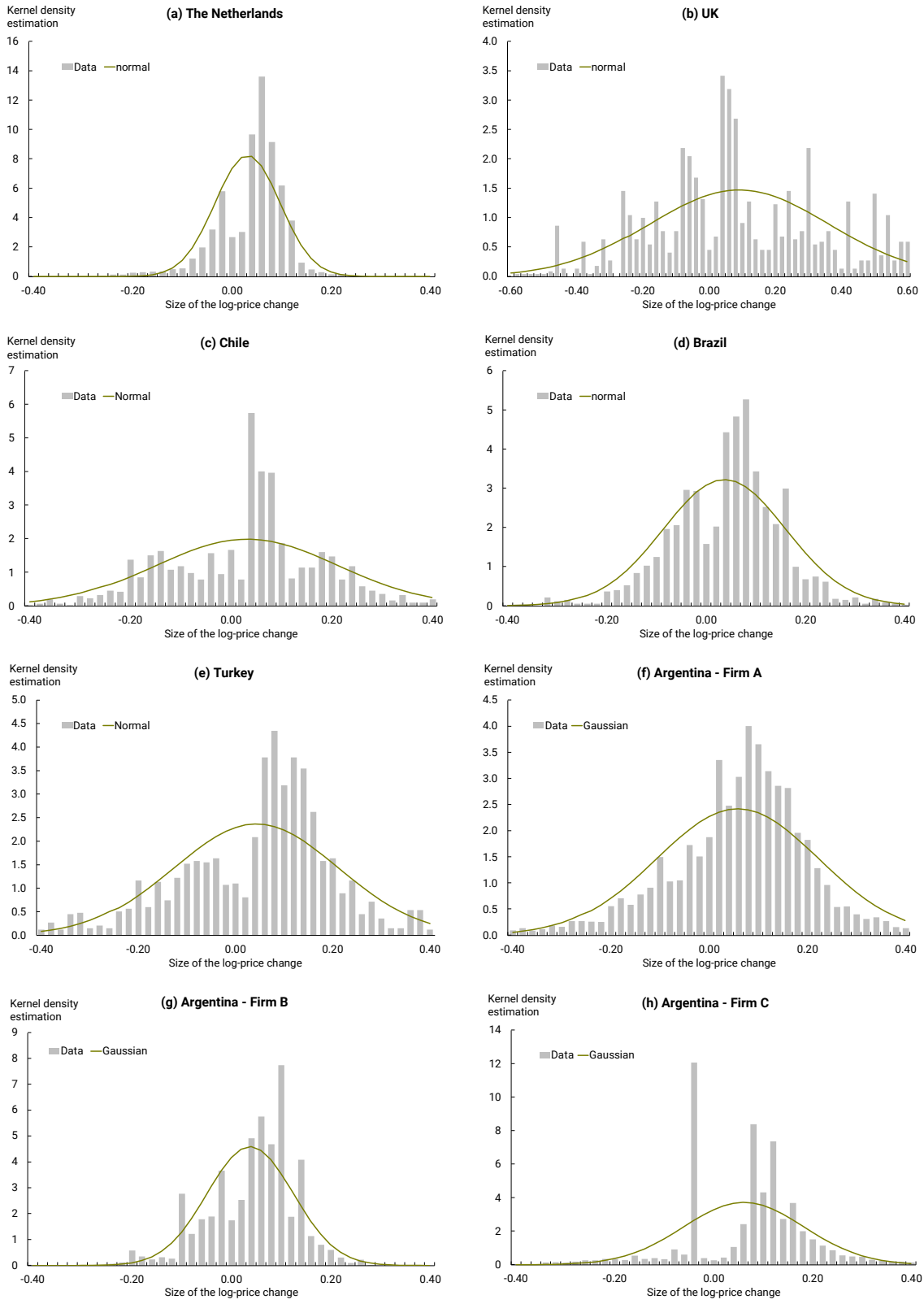
Figure 4 plots a histogram of the distribution of the size of regular price changes for all the retailers in my data set. In all cases, there is a "hole" around zero reflected as a larger mass of price changes in the range (1%; 2%] and (-1%; -2%] than (0%; 1%] and (0%; -1%], respectively. Moreover, Figure 8 in Appendix A.2 shows the cumulative distribution function of the absolute size of price changes for the same retailers and compares them with the cumulative distribution function of a Gaussian distribution matching the mean and standard deviation in each case, for illustrative purposes. In all cases except for Argentina's Firm A, the Gaussian distribution has a larger accumulated density than the data in values smaller than |3%|.

This fact represents a key difference between the usage of traditional micro data sources and scraped data for the assessment of sticky price models. Traditional data sources present a larger share of small price changes. Moreover, the relative scarcity of small changes found in my data is consistent with previous papers using scraped data (Cavallo and Rigobon, 2016; and Cavallo, 2018).[8] In fact, Cavallo (2018) shows that the surfeit of small price changes found in CPI and scanner data is a consequence of measurement errors and imputation of missing prices.

This feature from the data gives rise to an important benchmark for the embodiment of menu costs in sticky price models. A standard single product menu cost model such as that of Golosov and Lucas (2007) generates a bimodal distribution of the size of price changes with a band of inaction around zero dependent on the magnitude of the menu cost, therefore failing to generate small price changes at all. Contrarily, introducing multiproduct firms but keeping a unique cost that must be paid for adjusting any amount of regular prices as in Midrigan (2011) generates a relatively large mass of price changes around zero. Intuitively, a firm will find it optimal to change all its prices that differ by any amount from its optimal value once it has paid the adjustment cost. In Section 4, I combine both approaches in a multidimensional-menu-cost model that can reproduce the low density of the distribution around zero.

[8] Figure 11 in Appendix A.2, plots the distribution of price changes as obtained in the Billion Prices Project from Cavallo and Rigobon (2016), also exhibiting a "hole" around 0%.

Figure 4 | Histograms of price changes distribution



Note: The y-axis corresponds to the kernel density estimation (KDE) of each distribution –plotted in blue lines– which is a non-parametric smoothing method of obtaining a probability distribution.

3.5. Synchronization of price changes of familiar products

It is very common to find similar items produced by the same manufacturer in the catalog of consumer-goods retailers. For example, a supermarket may sell different sizes and flavors of the same beverage brand, an electronic store may have different models of the same line of laptop computers, and a fashion department store may sell the same pair of jeans in different colors.

Whether the time series of the prices of similar products have akin dynamics (*i.e.* if they share the timing and the size of price changes) is, therefore, a relevant question for the study of price stickiness. Consider an extreme case where familiar products have equal demands and their costs (paid by the retailer to the manufacturer) have identical dynamics. Also consider two alternative data of price changes, at a given period after an aggregate shock, from the same multiproduct retailer. One has 10 identical price changes, all of familiar products, and the other has 8 price changes of heterogeneous products, with an identical average size of price changes than the data with 10 price changes. A standard approach to the study of price flexibility would consider all price changes the same way, and therefore estimate a higher degree of price flexibility in the data with the 10 changes. However, one may also argue that the fact that the familiar products share the same dynamics of price changes reduces those 10-price series to only one; and, hence, that in the case with 8 adjustments the shock prompted more changes than in the case with 10.[9]

To investigate the similarities in the price series of familiar products, I analyze the timing and magnitude of their changes. I use the Levenshtein ratio as the metric to flag a family of products in my data.[10] The ratio is constructed upon the Levenshtein distance of the products' names, which measures the minimal number of changes (insertions, deletions, or substitutions of characters) necessary to transform one string into another (Schulz and Stoyan, 2002).

I set 0.75 as the threshold value for the Levenshtein ratio that defines a family of products: those set of products whose names have a ratio higher than 0.75 with all the elements of the set are then considered a family. Then, I take a random date for the retailers in my sample and analyze whether the timing and the magnitude of price changes of similar products are the same or not.

Table 6 reports some relevant statistics. Conditional on at least one product from a family adjusting its price in a period, the probability of a change in the price of a product from the same family is 0.24, denoting a greater degree of synchronization of price changes in similar products than in heterogeneous products (the unconditional probability is 0.02). Moreover, when different products from the same family adjust their prices in the same period, the size (in percentage points) of the change is identical in 71% of the cases. An immediate interpretation of this fact is that these

[9] Naturally, this illustration is highly simplistic. A complete examination requires incorporating other components to the analysis, such as consumption basket weights. However, everything else the same, the affirmation that changes in familiar products' prices with identical demands and costs imply less price flexibility than changes in heterogeneous products' prices remains valid.

[10] Appendix A.1 contains a formal derivation of the Levenshtein ratio and provides some illustrations of its value for different products.

familiar products are subject to resembling idiosyncratic shocks driving deviations from their optimal prices.

Table 6 | Similarities in the time series of familiar products' prices

1. Unconditional probability of a price change	0.02
2. Probability of a change, conditional on at least a change in the product's family in the same period	0.24
3. Probability of two adjustments in the same family being equal in the same period	0.71

Note: The statistics were obtained for random dates from the retailers from Argentina and Turkey.

4. Model

In this section I set up a tractable partial equilibrium model in which a multiproduct firm decides whether to adjust or not its prices. The firm perfectly observes the state of the economy in every period and has perfect information about the optimal price of each of its products. The model builds on a version without temporary changes of the model in Midrigan (2011), incorporating a multi-dimensional structure of the cost paid by the firm for changing prices. I also show that my model encompasses as special cases the two standard types of pure menu cost models: a Golosov-Lucas-type model with no economies of scope, and a Midrigan-type model with perfect economies of scope in price adjustment.

The model is compatible with the economic rationale of price setting decision of the firms and it is able to reproduce features observed in the scraped price data that standard menu costs models are not able to match. As I commented earlier, in the Golosov-Lucas model, single product firms face a fixed cost for adjusting their prices and decide to change a price when the loss from inaction surpasses the threshold determined by the menu cost. Since firms sell only one product, the aggregate distribution of the size of price changes in their model is characterized by a band of inaction around zero bounded by two "peaks" at the positive and negative threshold values. The issue of null small price changes was sorted out by Midrigan (2011) with a model featuring multiproduct firms that pay a fixed menu cost for changing any number of prices at a certain period. When a firm faces a single cost, independent of the number of prices it adjusts, it will find it optimal to change all the products' prices that differ from its optimum –conditional on changing at least one price– no matter how small the price gap is. Then, multiproduct (single) menu cost models predict a distribution of price changes with a relatively high concentration around zero and, therefore, also fail to generate the shape of the distribution of price changes observed in the data, with a relatively low amount of small price changes.[11]

I begin defining the typical problems of the representative household and firm. Later, I characterize the decision rule of the firm facing the multi-dimensional menu cost, which is the major novelty of my model. I postulate that a model that matches the main characteristics of the distribution of

[11] The characterization of the different shocks (their distribution, specifically) plays a relevant role in the predicted distribution of price changes of these models. However, the relatively large mass around zero is present in models with typically assumed distributions of shocks, such as Gaussian or Poisson.

price changes observed in the data has to present (i) a relatively large physical cost paid only once in every period the firm changes any price; (ii) a relatively small physical cost paid for every price that is adjusted; and (iii) a "waiver" of the small cost when another familiar product's price is changed in the same period. In the remainder of this section, I compute the partial equilibrium of the firm's problem, which I solve in section 5, showing that introducing this novel menu cost in an otherwise standard multiproduct menu cost model makes my model fit many of the salient features from the data.

4.1. Environment

Households. The economy contains a continuum of households with a total mass normalized to unity. The representative household maximizes her utility over consumption and time devoted to labor employment given by:

$$\max_{C_{i,z;t},L_t,B_t} E_0 \sum_{t=0}^{\infty} \beta^t U(C_t, L_t) \tag{2}$$

where β denotes the household's discount factor, C_t denotes a composite consumption good in period t compounded of imperfectly substitutable goods, and L_t denotes labor.

The household's budget constraint is defined as:

$$\int_0^1 \sum_{i=1}^{N} P_{i,z;t} C_{i,z;t} dz + B_t \leq (1 + R_{t-1}) B_{t-1} + W_t L_t + \Pi_t \tag{3}$$

where $C_{i,z;\,t}$ indicates the household's consumption of good i produced by firm z in period t and $P_{i,z;\,t}$ its price. B_t is the number of one-period non-contingent bonds with nominal price equal to one held in period t that pay a nominal interest rate of R in period $t+1$. W_t is the nominal wage received for the time devoted to labor and Π_t is the nominal profit received from the household's participation in firms' ownership.

Consumption is nested into two aggregators

$$C_t = \left(\frac{1}{N} \sum_{i=1}^{N} C_{i;t}^{\frac{\theta-1}{\theta}} \right)^{\frac{\theta}{\theta-1}}, C_{i;t} = \left(\int_0^1 A_{i,z;t} C_{i,z;t}^{\frac{\gamma-1}{\gamma}} dz \right)^{\frac{\gamma}{\gamma-1}} \tag{4}$$

Where z is an index over retailers, i an index over goods, C_t is an aggregator of consumption over different goods and $C_{i;\,t}$ is an aggregator over consumption of good i purchased from different firms. γ is the elasticity of substitution across retailers and θ is the elasticity of substitution across goods. $A_{i,z;\,t}$ is the quality of the good i sold by firm z. Higher $A_{i,z;\,t}$ increases the marginal utility of

consumption for that good while it also makes that good more costly to produce, as I show in the characterization of the firm's problem.

The behavior of the representative consumer may be regarded as the outcome of a two-stage utility maximization procedure. In the first and second stage the household optimally makes consumption decisions over products and over retailers, respectively. The resulting model is a nested version of the standard constant elasticity of substitution Dixit–Stiglitz formulation.

In the first stage the household's decision problem is:

$$\min_{C_{i;t}} \sum_{i=1}^{N} P_{i;t} C_{i;t} \;\; subject\ to\ C_t \leq \left(\frac{1}{N} \sum_{i=1}^{N} C_{i;t}^{\frac{\theta-1}{\theta}} \right)^{\frac{\theta}{\theta-1}}$$

which gives the demand:

$$C_{i;t} = \left(\frac{P_{i;t}}{P_t} \right)^{-\theta} C_t \tag{5}$$

In the second stage the household's decision problem is:

$$\min_{C_{i,z;t}} \int_0^1 P_{i,z;t} C_{i,z;t} dz \quad subject\ to \quad C_{i;t} \leq \left(\int_0^1 \left(A_{i,z;t} C_{i,z;t} \right)^{\frac{\gamma-1}{\gamma}} dz \right)^{\frac{\gamma}{\gamma-1}}$$

Which gives the demand:

$$C_{i,z;t} = \left(\frac{P_{i,z;t}}{P_{i;t}} \right)^{-\gamma} A_{i,z;t}^{\gamma-1} C_{i;t} \tag{6}$$

Combining equations 5 and 6 yields the demand for good i produced by firm z:

$$C_{i,z;t} = A_{i,z;t}^{\gamma-1} \left(\frac{P_{i,z;t}}{P_{i;t}} \right)^{-\gamma} \left(\frac{P_{i;t}}{P_t} \right)^{-\theta} C_t \tag{7}$$

Where:

$$P_t = \left(\frac{1}{N} \sum_{i=1}^{N} P_{i;t}^{1-\theta} \right)^{\frac{1}{1-\theta}} \quad and \quad P_{i;t} = \left(\int_0^1 A_{i,z;t}^{\gamma-1} P_{i,z;t}^{1-\gamma} dz \right)^{\frac{1}{1-\gamma}}$$

are the minimum expenditure necessary to buy a unit of the final consumption good C_t and the price index for good i, respectively.

Firms. The economy also contains a continuum of identical monopolistically competitive multiproduct firms indexed by $z \in [0, 1]$ that hire labor competitively from households and produce N different goods, indexed by i, according to the following technology:

$$Y_{i,z;t} = \frac{1}{A_{i,z;t}} L_{i,z;t} ,$$

where $L_{i,z;t}$ is firm z's demand for labor for producing good i. Note that an extra unit of product quality $A_{i,z;t}$ requires $1/A_{i,z;t}$ more units of labor to produce the same amount of output.

The level of quality of product i sold by firm z follows an exogenous AR(1) process:

$$log(A_{i,z;t}) = \rho_A log(A_{i,z;t-1}) + \zeta^A_{i,z;t}$$

where $\zeta^A_{i,z;t}$ denotes an i.i.d. normally distributed idiosyncratic quality shock with mean zero and variance σ^2.

Firms take wages and the demand for their products as given and set the prices $\{P_{i,z;\,t}\}_{i=1}^N$ that maximize their profits. After setting their set of prices they meet the demand at their posted prices.

Firm z's nominal profit absent nominal rigidities is:

$$\Pi_{z;t}(\{P_{i,z;t}\}_{i=1}^N, W_t, \{A_{i,z;t}\}_{i=1}^N \{Y_{i,z;t}\}_{i=1}^N) = \frac{1}{N} \sum_{i=1}^{N} (\underbrace{P_{i,z;t}}_{unit\ price} - \underbrace{W_t A_{i,z;t}}_{marginal\ cost}) Y_{i,z;t} \quad (8)$$

Without capital in the model $Y_{i,z;t} = C_{i,z;t}$. Aggregate demand is therefore given by $Y_t = C_t$. Combining this last equality, equation 7, and equation 8 gives the frictionless profit:

$$\Pi_{z;t} = \sum_{i=1}^{N} (P_{i,z;t} - W_t A_{i,z;t}) A_{i,z;t}^{\gamma-1} \left(\frac{P_{i,z;t}}{P_{i;t}}\right)^{-\gamma} \left(\frac{P_{i;t}}{P_t}\right)^{-\theta} Y_t \quad (9)$$

Solving the first order condition of the problem yields the optimal frictionless price for product i sold by firm z.

$$[P_{i,z;t}]: Y_t A_{i,z;t}^{\gamma-1} \left(\frac{P_{i,z;t}}{P_{i;t}}\right)^{-\gamma} \left(\frac{P_{i;t}}{P_t}\right)^{-\theta} (A_{i,z;t}\gamma W_t - \gamma P_{i,z;t} + P_{i,z;t}) = 0$$

$$P^*_{i,z;t} = \mu^* A_{i,z;t} W_t \quad (10)$$

Where $\mu^* = \frac{\gamma}{\gamma-1}$ is the steady state frictionless markup over the marginal cost that maximizes the firm's profit. The effective markup for good i is defined as: $\mu_{i,z;t} = \mu^* \frac{P_{i,z;t}}{P^*_{i,z;t}}$.

Firm z's nominal profit and nominal revenue can then be expressed in terms of the markup $\mu_{i,z;t}$:

$$\Pi_{z;t} = \sum_{i=1}^{N} \left(\mu_{i,z;t} - 1\right) \mu_{i,z;t}^{-\gamma} W_t^{1-\gamma} P_{i;t}^{\gamma-\theta} P_t^{\theta} Y_t \,, \tag{11}$$

$$R_{z;t} = \sum_{i=1}^{N} \mu_{i,z;t}^{1-\gamma} \, W_t^{1-\gamma} P_{i;t}^{\gamma-\theta} P_t^{\theta} Y_t \;\;, \tag{12}$$

Monetary Policy. I assume that the monetary authority targets a path for nominal spending,

$$\int_0^1 \sum_{i=1}^{N} P_{i,z;t} C_{i,z;t} dz = P_t C_t = M_t$$

making nominal spending follow a random walk with a drift in logs process:

$$log(M_t) = \eta + log(M_{t-1}) + \zeta_t^M \,, \zeta_{i,z;t}^M \sim N(0, \sigma_M^2).$$

Finally, I follow Midrigan (2011) and assume linear disutility in labor and set the utility weight of labor relative to market consumption equal to one, which gives households preferences of the form $U(C_t, L_t) = log(C_t) - L_t$. This assumption involves Hansen (1985) and Rogerson (1988) conditions on indivisibility of labor and agents choosing employment probabilities by trading lotteries. Importantly, this characterization of the households' preferences makes the nominal wage proportional to the nominal aggregate demand and thus to the nominal money stock, ensuring a one-for-one pass-through from monetary shocks to firms' marginal cost and therefore to the optimal price of a product, which will affect the firms' price gap.

4.2. Decision rule

The fundamental deviation of my model from standard price-setting theories of price adjustment is the introduction of a three-dimensional physical cost of price adjustment. In every period, a firm that decides to adjust its prices pays three types of menu costs. First, the firm faces a "general" cost, φ^G, that must be paid once and for all for changing any amount of prices and it is independent of the number of changed prices, which is analogous to the one in Midrigan (2011) that leads to economies of scope in price adjustment of regular prices. I imagine this cost to be associated to organizational aspects of the firm's structure, such as printing new catalogues or price lists; communication to

salespeople and costumers; approval of the changes; acquiring from a third-party costly information necessary to evaluate the best price; and decision-making time of employees.[12]

The second cost of price adjustment is a "product-specific" cost, φ^S, for every price that is changed. This product-specific cost rationalizes the fact that, unaffected by the number of changes, the marginal change is always costly (also constant in this model) and hence will prevent my model to generate a large number of small prices and perfect synchronization in price changes. The introduction of this cost is intuitive: even in online retailers that do not have to pay the physical cost of price tags, modifying an extra price requires devoting extra resources to the analysis and application of the change.[13]

Finally, the firm receives a cost curtail when it changes two or more familiar products, which hints that my model features a higher degree of economies of scope in price adjustment of similar products than of unfamiliar products.[14] To exemplify this idea, consider the case of a multiproduct supermarket that is adjusting some of its prices. This assumption implies that the cost of changing the price of "Coke Light 600ml" and "Coke Light 1500ml" is lower than the cost of adjusting the price of "Coke Light 600ml" and "Aromatic candle 200grs". Also, this cost curtail can be interpreted as an implicit introduction of asymmetric informational costs in my model: arguably, the cost of acquiring information about the optimal price of two familiar products from the same manufacturer is lower than that of acquiring information related to two utterly different products.

To illustrate this, consider the case of a firm that sells three products, with products $i \in \{2, 3\}$ being familiar products. Then, the three-dimensional cost of price adjustment faced in period *t* by such firm is defined as:

$$\Phi_t = \begin{cases} 0 & if\ P_{i,z;t} = P_{i,z;t-1} \forall i \in \{1,2,3\} \\ \phi^G + \phi_1^S & if\ P_{i,z;t} = P_{i,z;t-1} \forall i \in \{2,3\}\ and\ P_{1,z;t} \neq P_{1,z;t-1} \\ \phi^G + \phi_2^S & if\ P_{i,z;t} = P_{i,z;t-1} \forall i \in \{1,3\}\ and\ P_{2,z;t} \neq P_{2,z;t-1} \\ \phi^G + \phi_3^S & if\ P_{i,z;t} = P_{i,z;t-1} \forall i \in \{1,2\}\ and\ P_{3,z;t} \neq P_{3,z;t-1} \\ \phi^G + \phi_1^S + \phi_2^S & if\ P_{i,z;t} \neq P_{i,z;t-1} \forall i \in \{1,2\}\ and\ P_{3,z;t} = P_{3,z;t-1} \\ \phi^G + \phi_1^S + \phi_3^S & if\ P_{i,z;t} \neq P_{i,z;t-1} \forall i \in \{1,3\}\ and\ P_{2,z;t} = P_{2,z;t-1} \\ \phi^G + \phi_2^S + \phi_3^S - \sum_{i=2}^{3} \phi_i^C & if\ P_{i,z;t} \neq P_{i,z;t-1} \forall i \in \{2,3\}\ and\ P_{1,z;t} = P_{1,z;t-1} \\ \phi^G + \sum_{i=1}^{3} \phi_i^S - \sum_{i=2}^{3} \phi_i^C & if\ P_{i,z;t} \neq P_{i,z;t-1} \forall i \in \{1,2,3\} \end{cases} \quad (13)$$

[12] Zbaracki et al. (2004) comment on the existence of "managerial thinking" costs and suggest that these costs are substantially larger than the traditional physical costs of price adjustment.

[13] Yang (2019) rationalizes a product-specific cost setting up a model of rational inattentive producers that face a cost for acquiring product-specific (in addition to aggregate) information about the optimal price.

[14] In section 3.5, I formally define my characterization of familiar products and provide evidence in support of the idea of a cost waiver.

4.3. Solving the partial equilibrium

To compute the partial equilibrium of the model I follow Yang (2019) who expresses the costs of unoptimal price in a quadratic form by doing a second order Taylor approximation of the profit function given by equation 11 around the steady state frictionless markup $\gamma/(\gamma-1)$, a la Rotemberg (1987). Then:

$$\Pi(\{\mu_{i;t}\}_{i=1}^{N} \approx \Pi(\mu^*) + \underbrace{\sum_{i=1}^{N} \frac{\partial \Pi_t}{\partial \mu_{i;t}}\Big|_{\{\mu_{i;t}=\mu^*\}_{i=1}^{N}} (\mu_{i;t} - \mu^*)}_{=0} + \frac{1}{2}\sum_{i=1}^{N} \frac{\partial^2 \Pi_t}{\partial \mu_{i;t}^2}\Big|_{\{\mu_{i;t}=\mu^*\}_{i=1}^{N}} (\mu_{i;t} - \mu^*)^2$$

$$\Pi(\{\mu_{i;t}\}_{i=1}^{N} \approx \Pi(\mu^*) + \frac{1}{2}\sum_{i=1}^{N} \frac{\partial^2 \Pi_t}{\partial \mu_{i;t}^2}\Big|_{\{\mu_{i;t}=\mu^*\}_{i=1}^{N}} \left(\frac{\mu_{i;t} - \mu^*}{\mu^*}\right)^2 (\mu^*)^2$$

$$\Pi(\{\mu_{i;t}\}_{i=1}^{N} \approx \Pi(\mu^*) + \frac{1}{2}\sum_{i=1}^{N} \frac{\partial^2 \Pi_t}{\partial \mu_{i;t}^2}\Big|_{\{\mu_{i;t}=\mu^*\}_{i=1}^{N}} (\hat{\mu}_{i;t})^2 (\mu^*)^2 \tag{14}$$

Where $\hat{\mu}_{i;t} = log(\mu_{i;t}/\mu^*)$ is the markup gap (log-deviation from the steady state markup). The expected losses from deviations from the optimal prices can be expressed as:

$$\mathcal{L} = \mathbb{E}\left[\Pi\left(\{\mu_{i;t}\}_{i=1}^{N}\right) - \Pi(\mu^*)\right]$$

Note that absent menu costs, the firm would choose in each period a price for all its product such that the markup gap is 0, $\{\mu_{i;t}\}_{i=1}^{N} = \mu^*$. However, in presence of nominal rigidities arising from costs of price adjustment, the firm's problem becomes to choose the set of prices that minimizes the expected losses given by (as a fraction of total revenue):

$$\mathcal{L} = \mathbb{E}\left[\frac{\Pi\left(\{\mu_{i;t}\}_{i=1}^{N}\right) - \Pi(\mu^*) - \phi_t}{R(\mu^*)}\right] \tag{15}$$

Where ϕ_t is the multidimensional menu cost, as defined in equation 13. Combining equations 14 and 15 and multiplying the first by $\Pi(\mu^*)/\Pi(\mu^*)$ gives:

$$\mathcal{L} = \mathbb{E}\left[\frac{1}{2}\frac{\Pi(\mu^*)}{R(\mu^*)}\frac{\sum_{i=1}^{N} \frac{\partial^2 \Pi_t}{\partial \mu_{i;t}^2}\Big|_{\{\mu_{i;t}=\mu^*\}_{i=1}^{N}} (\hat{\mu}_{i;t})^2 (\mu^*)^2}{\Pi(\mu^*)} - \tilde{\Phi}_t\right] \tag{16}$$

Where $\tilde{\Phi}_t = \phi_t / R(\mu^*)$ is the multidimensional menu cost as a fraction of steady state revenues.

Moreover, since:

$\Pi(\mu^*) = \sum_{i=1}^{N}(\mu^* - 1)\,(\mu^*)^{-\gamma} W_t^{1-\gamma} P_{i;t}^{\gamma-\theta} P_t^{\theta} Y_t$,

$R(\mu^*) = \sum_{i=1}^{N}(\mu^*)^{1-\gamma} W_t^{1-\gamma} P_{i;t}^{\gamma-\theta} P_t^{\theta} Y_t$, and

$$\left.\frac{\partial^2 \Pi_t}{\partial \mu_{i;t}^2}\right|_{\{\mu_{i;t}=\mu^*\}_{i=1}^{N}} = -\gamma(\mu^*)^{-\gamma-2} W_t^{1-\gamma} P_{i;t}^{\gamma-\theta} P_t^{\theta} Y_t \,,$$

equation 16 can be expressed as:

$$\mathcal{L} = \mathbb{E}\left[-\gamma \frac{1}{2} \frac{\sum_{i=1}^{N}(\mu^* - 1)(\mu^*)^{-\gamma} W_t^{1-\gamma} P_{i;t}^{\gamma-\theta} P_t^{\theta} Y_t}{\sum_{i=1}^{N}(\mu^*)^{1-\gamma} W_t^{1-\gamma} P_{i;t}^{\gamma-\theta} P_t^{\theta} Y_t} \frac{\sum_{i=1}^{N}(\mu^*)^{-\gamma} W_t^{1-\gamma} P_{i;t}^{\gamma-\theta} P_t^{\theta} Y_t (\hat{\mu}_{i;t})^2}{\sum_{i=1}^{N}(\mu^* - 1)(\mu^*)^{-\gamma} W_t^{1-\gamma} P_{i;t}^{\gamma-\theta} P_t^{\theta} Y_t} - \widetilde{\Phi}_t\right]$$

Operating and cancelling terms:

$$\mathcal{L} = \mathbb{E}\left[-\gamma \frac{1}{2} \frac{1}{\mu^*} \frac{\sum_{i=1}^{N} P_{i;t}^{\gamma-\theta} (\hat{\mu}_{i,z;t})^2}{\sum_{i=1}^{N} P_{i;t}^{\gamma-\theta}} - \widetilde{\Phi}_t\right]$$

Note than from the definition of $\hat{\mu}_{i,z;t}$:

$$\hat{\mu}_{i,z;t} = log(\mu_{i,z;t}) - log(\mu^*) = log(P_{i,z;t}) - log(P_{i,z;t}^*) = p_{i,z;t} - p_{i,z;t}^*$$

Then the loss function is:

$$\mathcal{L} = \mathbb{E}\left[-\gamma \frac{1}{2} \frac{1}{\mu^*} \frac{\sum_{i=1}^{N} P_{i;t}^{\gamma-\theta} (p_{i,z;t} - p_{i,z;t}^*)^2}{\sum_{i=1}^{N} P_{i;t}^{\gamma-\theta}} - \widetilde{\Phi}_t\right] \tag{17}$$

Lastly, I make three extra assumptions. First, I follow Yang (2019) and assume that the elasticity of substitution between goods equals the elasticity of substitution between firms: $\theta = \gamma$. This assumption simplifies the computational solution and makes the model more tractable, and its influence is little given the minor role that the elasticity of substitution across goods plays in this model.[15] Second, I assume that familiar products share the same cost curtail, $\tilde{\phi}^C$, and product-specific cost of adjustment, $\tilde{\phi}^S$; and that the cost curtail for changing n products from the same family in the same period is $\tilde{\phi}^C = (n-1)\tilde{\phi}^S]/n$ per changed price, which is equivalent to assuming that the firm has to pay only one product-specific cost per family of products and receives a cost waiver of the other $n-1$ product-specific costs. For instance, this suggests that a supermarket that changes the price of "Coke Light 375ml", "Coke Light 600ml", and "Coke Light 1500ml" only

[15] Concretely, this assumption implies that the elasticities of substitution between "Coke Light 600ml" and "Coke Light 1500ml", and between "Coke Light 600ml" and "Aromatic candle wooden vanilla scented 200gr" are the same, and that their value is also identical to the elasticity of substitution between two different stores.

pays one product-specific cost. Finally, I assume that familiar products are subject to the same idiosyncratic quality shocks. These last two assumptions imply that whenever a product departs from its optimal price, all the products of the same family will also do so; and that when a firm takes a price-adjustment decision its policy will be the same for all the products of the same family (*i.e.* either change all the prices or not change any price) generating perfect economies of scope in price adjustment of familiar products.

Then, firm z's problem can be written as:

$$\max_{\{p_{1,z;t}\}_{i=1}^{N}} \mathbb{E}\left[\sum_{t=0}^{\infty} \beta^t \left(-\gamma \frac{1}{2}\frac{1}{\mu^*}\sum_{i=1}^{N}\left(p_{i,z;t} - p_{i,z;t}^*\right)^2\right) - \widetilde{\Phi}_t\right] \tag{18}$$

For concreteness and clarity, I consider a firm that sells $N = 3$ products with products $i \in \{2, 3\}$ being from the same family. The assumptions above imply that the firms' decisions over the prices of $i \in \{2, 3\}$ are identical: in every period it changes either both prices or none of them. Moreover, they imply that $\tilde{\phi}_2^S = \tilde{\phi}_3^S$; and that the cost curtails received when changing both familiar products' prices are $\tilde{\phi}_2^C = \tilde{\phi}_3^C = \frac{1}{2}\tilde{\phi}_2^S = \frac{1}{2}\tilde{\phi}_3^S$. As a result, when the firm changes the prices of the two familiar products (and, say, leaves the price of product i = 1 unchanged), it pays $\widetilde{\Phi} = \tilde{\phi}^G + \tilde{\phi}_2^S + \tilde{\phi}_3^S - \tilde{\phi}_2^C - \tilde{\phi}_3^C = \tilde{\phi}^G + \tilde{\phi}_2^S$, leaving no role for $\tilde{\phi}_3^S$.

Let $V^{C,C,C}(P_{i,z;t-1}, A_{i,z;t}, M_t)$, $V^{C,N,N}(P_{i,z;t-1}, A_{i,z;t}, M_t)$, $V^{N,C,C}(P_{i,z;t-1}, A_{i,z;t}, M_t)$, and $V^{N,N,N}(P_{i,z;t-1}, A_{i,z;t}, M_t)$ denote the firm's value of (i) adjusting all its prices, (ii) adjusting the price of the product $i = 1$ and leaving the other prices unchanged, (iii) adjusting the price of the products $i = 2, 3$ and leaving the price of product $i = 1$, and (iv) leaving all prices unchanged. Letting $V = max\{V^{C,C,C}, V^{C,N,N}, V^{N,C,C}, V^{N,N,N}\}$ be the envelope of these four options, the recursive formulation of the firm's problem is characterized by the following system:

$$\begin{aligned} V^{C,C,C}(\{P_{i,z;t-1}\}_{i=1}^{3}, \{A_{i,z;t}\}_{i=1}^{3}, M_t \\ = \max_{\{p_{1,z;t}, p_{2,z;t}, p_{3,z;t}\}} \Big(-\gamma \frac{1}{2}\frac{1}{\mu^*}\sum_{i=1}^{3}\left(p_{i,z;t} - p_{i,z;t}^*\right)^2 - \tilde{\phi}^G - \tilde{\phi}_1^S - \tilde{\phi}_2^S \\ + \beta \mathbb{E}_t\left[V\{P_{i,z;t}\}_{i=1}^{3}, \{A_{i,z;t+1}\}_{i=1}^{3}, M_{t+1}\right]\Big) \end{aligned}$$

$$V^{C,N,N}\left(\{P_{i,z;t-1}\}_{i=1}^{3},\{A_{i,z;t}\}_{i=1}^{3},M_t\right) = \max_{\{p_{1,z;t}\}}\left(-\gamma\frac{1}{2}\frac{1}{\mu^*}\sum_{i=1}^{3}\left(p_{i,z;t}-p_{i,z;t}^*\right)^2-\tilde{\phi}^G-\tilde{\phi}_1^S + \beta\mathbb{E}_t\left[V\{P_{i,z;t}\}_{i=1}^{3},\{A_{i,z;t+1}\}_{i=1}^{3},M_{t+1}\right]\right) \quad (19)$$

$$V^{N,C,C}\left(\{P_{i,z;t-1}\}_{i=1}^{3},\{A_{i,z;t}\}_{i=1}^{3},M_t\right) = \max_{\{p_{2,z;t},p_{3,z;t}\}}\left(-\gamma\frac{1}{2}\frac{1}{\mu^*}\sum_{i=1}^{3}\left(p_{i,z;t}-p_{i,z;t}^*\right)^2-\tilde{\phi}^G-\tilde{\phi}_2^S + \beta\mathbb{E}_t\left[V\{P_{i,z;t}\}_{i=1}^{3},\{A_{i,z;t+1}\}_{i=1}^{3},M_{t+1}\right]\right)$$

$$V^{N,N,N}\left(\{P_{i,z;t-1}\}_{i=1}^{3},\{A_{i,z;t}\}_{i=1}^{3},M_t\right) = \left(-\gamma\frac{1}{2}\frac{1}{\mu^*}\sum_{i=1}^{3}\left(p_{i,z;t}-p_{i,z;t}^*\right)^2+\beta\mathbb{E}_t\left[V\{P_{i,z;t}\}_{i=1}^{3},\{A_{i,z;t+1}\}_{i=1}^{3},M_{t+1}\right]\right)$$

5. Quantitative solution and simulation result

5.1. Computational procedures

I solve the recursive problem given above maintaining the nature of the firm (it sells $N=3$ products with products $i\in\{2,3\}$ being from the same family). To do so, I adapt to my model the procedure of Nakamura and Steinsson (2010), who solve a single-product menu cost model with a value function iteration method. The main difference with their solution is that the state in my problem is of a higher dimension because of the multiproduct nature of the firms in it.

In Section 4.3 I assumed that familiar products have identical processes for their quality $A_{i,z}$. This implies that their optimal prices are the same as well (see equation 10), and thus those familiar products have an identical markup gap in every period. Then, I can transform the three-products model into a two-products model in the numerical solution, by treating the two familiar products as one unique product with a two times greater slope of the loss function.

As the value of state variables (the quality and the inherited price) of the familiar products is the same, I can drop a set of $\{A_{i,z;t},P_{i,z;t}\}$ from the state vector. This simplifies the computational burden to a great extent. Indeed, there are four state variables in the problem, which define the prior price gaps of the firm: two posted prices inherited from the last period and two qualities. I solve the firms' problem and the value functions, and obtain the optimal policy function using the algorithm described hereunder:

- Choose a relative error tolerance level, τ.
- Discretize the state space by constructing a grid for the inherited prices and the qualities: $p^i=\{p_1^i,p_2^i,p_3^i,\ldots,p_{np}^i\}_{i=1}^2$, and $a^i=\{a_1^i,a_2^i,a_3^i,\ldots,a_{na}^i\}_{i=1}^2$.

- Make an initial guess of the termination value function, $V^{(0)}$. This is a $(n_p^2 x n_a^2)$-matrix. I choose the mean expected loss from inaction as the initial guess.

- Function iteration: use the Bellman equation for the firm's problem to iterate on the expected value of the different value functions and update the termination value $V^{(1)}$.

- Compute the distance between the previous and the updated value as:

  $$d = \frac{\beta}{1-\beta}\left[max(V^{(1)} - V^{(0)}) - min(V^{(1)} - V^{(0)}\right]$$

- If the distance is within the error tolerance, $d \leq \tau$, the value function has converged, and one can obtain a numerical estimate of the termination value. If $d > \tau$, return to step (4), replacing the initial guess with the updated value, $V^{(0)} = V^{(1)}$. Repeat steps (4)-(6) until the value function has converged.

- Once the value function has converged, take expectations of the termination value using the transition probabilities of the prices and qualities due to inflation and idiosyncratic shocks, respectively. To obtain the transition probabilities of states I use Tauchen (1986) approximation method for autoregressive processes.

- Obtain (i) the numerical estimate of the value, and (ii) the policy function, defined –for each state– as the optimal decision (CC, CN, NC, NN) and the optimal price choice in case of price adjustment.

5.2. Calibration and parametrization

Table 7 presents the calibrated and assigned parameters used in this study. For comparison purposes with previous studies, I choose a period-length of one month for my solution. I set a monthly discount factor of $\beta = 0.96^{1/12}$ which implies an annualized real interest rate of 0.04. I set the elasticity of substitution across firms to $\gamma = 4$ resulting in an implied frictionless markup of one third, in line with Nakamura and Steinsson (2010) and Alvarez *et al*. (2018). This value is within the range of those estimates reported by the industrial organization literature (*e.g*. Berry *et al*., 1995; and Nevo, 2001) and lies in between the values used by Golosov and Lucas (2007), $\gamma = 7$, and Midrigan (2011), $\gamma = 3$. The elasticity of substitution across firms directly affects the slope of the loss function, thus a greater γ generates a higher frequency of price changes in the model everything else constant.

I set the drift of the random walk process of money supply, η, to equal the monthly inflation rate of each of the countries of my analysis and calibrate the standard deviation of monetary shocks to be directly proportional to the inflation rate, as $\sigma_M = 1.7\eta$. Finally, I follow Nakamura and Steinsson (2010) and set the speed of mean reversion of the product qualities equal to $\rho = 0.7$, and I calibrate the standard deviation of the idiosyncratic quality shocks σ_{A_1} and σ_{A_2} as 0.05225 and 0.07250

respectively.[16] The choice of different variances of the idiosyncratic shocks is supported by the multiproduct nature of the firm. Setting distinct values for this parameter makes the processes of the two optimal prices differ, and thus prevents my model from being a multi-(identical)-product model.

Table 7 | Calibrated and assigned parameters

Parameter	
1. Subjective discount factor, β	$0.96^{1/12}$
2. Elasticity of substitution across firms, γ	4
3. Implied frictionless markup, μ^*	1.33
4. Drift of the random walk process of money supply, η	
The Netherlands	0.0021
United Kingdom	0.0015
Chile	0.0023
Brazil	0.0030
Turkey	0.0094
Argentina	0.0271
5. Standard deviation of monetary policy shocks, σ_M	1.7η
6. Speed of mean reversion of the product qualities, ρ	0.7
7. Standard deviation of the idiosyncratic quality shocks	
Of product 1, σ_{A1}	0.05225
Of product 2, σ_{A2}	0.07250
8. General cost of price adjustment as a fraction of revenue, ϕ^G	6×10^{-3}
9. Specific cost of price adjustment as a fraction of revenue, ϕ^S	1×10^{-4}

The size of the costs of adjustment are the key parameters that remain to be calibrated. As it is typically done in the sticky prices' literature, I calibrate their value to allow the model to fit the microprice facts documented in Section 3. Concretely, I target the key aspects of the distribution of price changes, such as the average size, the share of price adjustments that are increases, and the fraction of small price changes. I do not set different values of the costs of adjustment for each country to match the main statistics of all the distributions of price changes, but instead I find the values of φ^G and φ^S that perform better in reproducing the main patterns of price changes across different countries. Hence, the only country-specific parameter in my solution is given by the inflation rate. Naturally, this aim for generality in my solution comes at the cost of more precision, but as I show in the following subsection, my general model performs good in matching the main facts of price changes. The values I set for the menu costs as a fraction of the firms' revenues are $\tilde{\phi}^G = 0.0060$ and $\tilde{\phi}^S = 0.0001$.[17]

[16] Nakamura and Steinsson (2010) set this parameter to make their model match their data and obtain a value of $\sigma_A = 0.0425$.

[17] The calibration of the menu cost parameter in previous papers tends to be dissimilar, partly depending on the micro facts the different models aim to match. For example, Midrigan (2011) sets the value of the cost (analogous to $\tilde{\phi}^G$ in his model) relative to the steady state revenue to 0.018. The cost of changing prices in Yang (2019) has a similar role as that of the Midrigan model, and it is set equal to 0.0342 in a two-products model. Karadi and Reiff (2019) calibrate the menu cost as 2.4% of steady state revenues, paid with a 6.25% probability, so the overall menu cost in their random menu cost model is 0.0015.

5.3. Simulation results

I give to the tolerance parameter τ a value equal to 0.1% of the mean value from inaction. Moreover, I set the size of the grids for each price and each quality to 150 and 30 points, respectively, which implies that initially the firm's problem has more than 20 million alternative states.[18] I simulate the solution 30 times for each country. Table 8 lists the values of the main statistics of price changes of the model and compares them with those found in the daily scraped data as presented in section 3.

Incorporating only one country-specific variable –the inflation rate– the model reproduces many of the facts previously documented. Both the mean and the median size of price adjustment are positively correlated with inflation, and the values for those statistics are close to those found in the data. The two cases with higher figure deviations between the simulation and the data are those from the United Kingdom and Argentina. As commented in Section 3, the main statistics of price changes in the data of the retailer from the United Kingdom notably differ from those of the other countries (and especially from countries with similar macroeconomic conditions, who have smaller and less dispersed price changes than the rest of the sample), and those differences cannot be explained by any aggregate country-specific variable. On the other hand, the discrepancies between the simulation and the data from Argentina arise because of the considerably higher inflation rate compared to the other countries in my sample. This reflects the generality-precision trade-off mentioned above: the parametrization of the model that best fits the distribution of low, mid and high-inflation countries overestimates the departures from the optimal price p^* arising from high inflation.

Table 8 | The model's partial equilibrium predictions against the data

Country	Netherlands		UK		Chile		Brazil		Turkey		Argentina	
	Data	Simul.	Data	Simul.	Data	Simul.	Data	Simul.	Data	Simul.	Data*	Simul
1. Mean	1.70	1.32	7.74	1.21	1.75	1.35	2.33	1.58	2.72	2.70	4.43	6.15
2. Median	3.15	1.73	3.92	1.69	3.06	1.81	3.52	1.98	5.72	2.82	6.19	6.34
3. 25th perc.	-2.65	-1.92	-9.53	-1.82	-9.44	-1.92	-5.21	-1.95	-8.07	-2.28	-3.19	-3.22
4. 75th perc.	5.75	4.09	28.76	3.81	11.20	4.22	7.83	4.83	12.52	7.00	11.51	14.96
5. Std. Dev.	6.58	4.02	27.07	3.81	18.29	4.11	10.12	4.37	16.86	7.20	12.48	15.50
6. Share of increases	0.63	0.63	0.61	0.62	0.63	0.63	0.64	0.64	0.65	0.64	0.69	0.67
7. Fraction of	3.6%	5.0%	1.4%	5.9%	1.6%	4.2%	4.1%	4.0%	2.1%	3.3%	3.7%	2.5%
$\lvert \Delta p \rvert < 1\%$	(3.2%)		(4.9%)		(3.5%)		(4.1%)		(1.9%)		(2.8%)	
8. Skewness	-1.04	-0.01	0.20	-0.1	-0.01	-0.17	-0.15	-0.19	-0.46	-0.08	-0.39	-0.13
9. Excess kurtosis	1.57	-0.69	0.43	-0.70	-0.30	-0.68	3.21	-0.56	0.48	-0.58	0.54	-0.19

Notes: The size of price changes is estimated as 100 times the log difference of prices. The excess kurtosis is calculated as 3-kurtosis. *The values for Argentina are obtained as the average of each statistic across the three retailers.

The predicted share of price increases also matches satisfactorily the data. The correlation between this statistic and inflation has a positive sign, and the values range from 62% to 67% which is also consistent with previous values reported in the literature.

[18] Recall that the size of each state vector is n_p^2 and n_a^2 for prices and quantities, respectively.

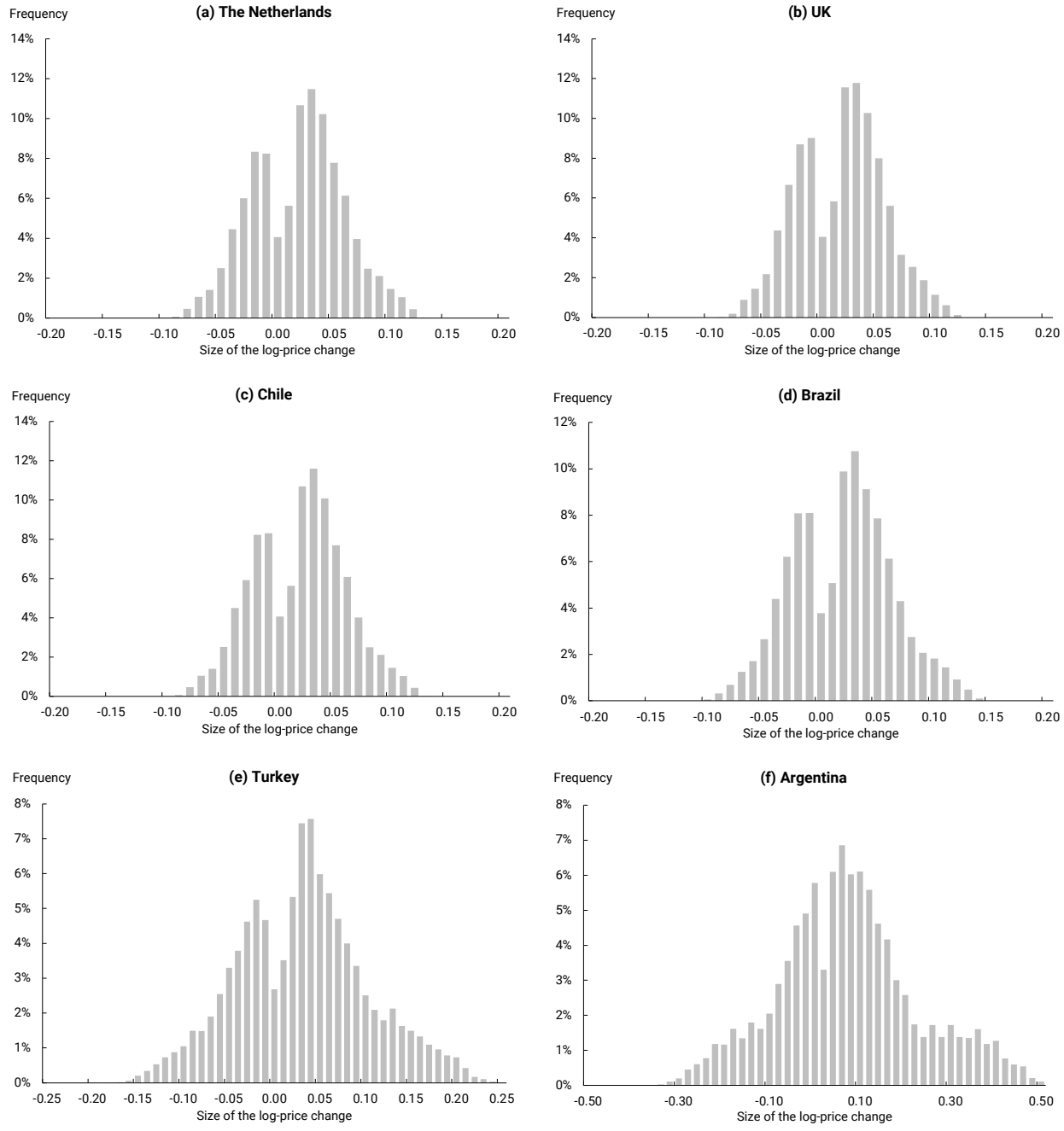
Moreover, the model fails to match two statistics from the data: the dispersion of the size of price changes and the frequency of price adjustment. When it comes to the dispersion, the model predicts a greater standard deviation of price changes for higher inflation rates, since the optimal price p^* depends directly on the supply of money, which is calibrated as the rate of inflation in my numerical solution.[19] As a result, the calibration of the model that best fits the data under- estimates the standard deviation of price changes of countries with low and medium inflation to prevent generating unrealistically large absolute price changes for Argentina. There are at least two potential solutions to this issue. The first one requires a characterization of the model where the pass-through from monetary policy to the optimal price is different than the 1-for-1 relation I introduce. The second one involves the introduction of Poisson shocks, instead of Gaussian, to the process driving optimal prices. This is the strategy followed by Midrigan (2011) to generate a fat-tailed distribution with highly dispersed price changes.

In addition, the predicted frequency of steady-state price changes is higher than the one in the data. The reason for this is that in the solution the firm receives many prices that are sufficiently far from their optimal values to be changed. In spite of this shortcoming, the negative relation between inflation and duration of price spells exhibited in Figure 3 is also present in the predictions of my model.[20]

Finally, I focus on the relatively low, yet nontrivial, number of small price changes found in the data. Recall that this is one of the novel facts of price changes that is not present in traditional microdata sources, and that it is one of the grounds for introducing a multi-dimensional cost of price adjustment in the model. Row 8 in Table 8 compares the predictions of the model with the statistics obtained in the data and includes between brackets those values reported in Cavallo (2018) for robustness checks. The model produces a fraction of small price adjustments (measured as the fraction of log-price changes smaller than 0.01 in absolute terms) that is close to that observed in the data, and lies in between the predictions from the two extreme cases of menu-cost models that predict no small price changes (*e.g.* a multiproduct version of the Golosov-Lucas model), or a relatively large mass of small price changes (*e.g.* a Midrigan-type economy). This feature of the model is also depicted in Figure 5, which shows that the predicted distribution of price changes has a dip of the density around zero, like that of Figure 4.

[19] The lower dispersion of price changes obtained from the model is manifested in a lower standard deviation than that observed in the data. This also results in lower absolute values of the first and third quartiles; and it is pictured in Figure 5 which has less dispersed distributions than Figure 4.
[20] Recall the negative relation between the frequency of price changes and the implied duration of price spells, given by equation 1.

Figure 5 | Histograms of price changes distribution for the model simulation



5.3.1. Alternative calibrations for the menu cost

The model encompasses the two extreme cases of unidimensional cost of regular price change. A model with only product-specific costs of price adjustment (a multiproduct version of Golosov and Lucas, 2007) generates a bimodal distribution of the size of price changes, with null changes between the positive and negative threshold given by the size of the cost. To reproduce this type of model, I set $\phi^G = 0$ in my calibration. Contrarily, a model where the firm must pay only one

general cost to change any number of regular prices (*à la* Midrigan, 2011; excluding temporary changes) predicts a relatively high density around zero. To reproduce this type of model, I set $\phi^S = 0$ in my calibration. Figure 1 in Section 1 compares the predictions of both special cases of the model with the data from the Netherlands ($\mu = 0.002$).

The selection effect related to the size of price changes in the baseline case of the model lies between that of the two standard menu cost models. In a Golosov-Lucas economy (with $\phi^G = 0$), those firms that adjust a price in a period are those whose price is a great distance away from its optimal value, denoting a strong selection effect. Then, when a monetary shock takes place (even a small one), prices that were close to the inaction threshold will adjust by a large amount, resulting in a large response of the aggregate level to monetary innovations and a large degree of price flexibility in such economy. Contrarily, by allowing for economies of scope in price adjustment, the selection effect in a Midrigan economy (with $\phi^S = 0$) is considerably smaller. A multiproduct firm will incur in a large number of small price changes as a response to deviations from their optimal values arising from a monetary shock. As a result, the aggregate response of the price level will be smaller than in the Golosov-Lucas case, generating greater real effects of monetary shocks.

In their formalization of the relevance of the selection effect for the degree of monetary non-neutrality, Alvarez *et al*. (2016) give a central role to the kurtosis of price changes. They find that the kurtosis of the steady-state distribution of price changes is a sufficient statistic for the cumulative real effects of monetary shocks: for a given frequency of price adjustment, a higher kurtosis results in larger cumulative output effects of monetary policy, measured as the area under the impulse response function.

In the Golosov-Lucas model the distribution of price changes has the smallest value of (excess) kurtosis, which is -2, as all the price changes are concentrated around very large and very small values. The extreme case of my model where $\phi^G = 0$ yields a distribution with a larger, yet small, excess kurtosis of -1.2. The reason for the difference is that even in the extreme case my model generates a slightly higher steady-state dispersion than the Golosov-Lucas model. On the other hand, Midrigan (2011) model without temporary changes has an excess kurtosis close to 0 (-0.3 in the version of my model with $\phi^S = 0$). The benchmark model I set up in this paper has an excess kurtosis of between —0.7 and —0.2, varying across countries (see row 10 in Table 8). This results in a predicted larger real effect of monetary shocks than in a Golosov-Lucas economy, and smaller than in a Midrigan economy, according to Alvarez-Lippi-Le Bihan sufficient statistic approach.[21]

6. Conclusion

Firms' price-setting behavior plays a crucial role in the New Keynesian framework: without firms' capacity to adjust prices being limited these models would not display monetary non-neutrality, which is a widely accepted feature in the macroeconomic literature. Moreover, a majority of papers incorporates Calvo (1983) pricing as the source of price rigidity, partly because of its tractability.

[21] The characterization of the kurtosis as a sufficient statistic remains valid on economies with zero or low inflation in the Alvarez-Lippi-Le Bihan framework.

Thanks to the recent emergence of new micro price data sets, there was an advancement in the debate on price stickiness, with various papers documenting the main facts of price changes and studying different alternatives to Calvo pricing. Many of them found that state-dependent pricing – where the timing of firms' price adjusting decision is endogenous of their profit maximization problem, such as menu cost models– performs better in matching these micro facts. However, these data sources (namely CPI and scanner price data) are not free from limitations, mainly caused by measurement and imputation errors (as showed by Cavallo, 2018), generally giving rise to an overestimation of small price changes and an underestimation of the duration of price spells.

In this paper, I follow up on this discussion by making use of a new micro price daily data set that I collected with web scraping techniques. I provide new evidence about firms' price-setting behavior and formalize my main findings in a menu cost model. I present three novel facts about price changes. First, there is a relation between the main statistics and the inflation rate of a country. Concretely, higher inflation rates are typically associated with a larger average size of price changes, with a larger share of price increases, and with a lower duration of price spells. Second, the distribution of the size of price changes has a relatively small, yet nontrivial mass around zero, which differs from the shape of the distribution found in alternative data sources and also from that predicted by the benchmark menu cost models from Golosov and Lucas (2007) and Midrigan (2011). And third, familiar products from the same manufacturer have greater similarity in the timing and magnitude of price adjustment than heterogeneous products, which suggests the necessity of a special treatment for familiar products in the incorporation of price rigidities in a multiproduct firm environment. I show that incorporating a three-dimensional cost –composed by a general cost, a product-specific cost, and a cost curtail for price changes in familiar products– makes an otherwise standard menu cost model reproduce these facts.

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Appendix

A.1. Derivation of the Levenshtein ratio

$$lev_{v,w}(i,j)\begin{cases}\max(i,j) & \text{if } \min(i,j)=0\\ \min\begin{cases} lev_{v,w}(i-1,j)+1 & [\text{deletion}]\\ lev_{v,w}(i,j-1)+1 & [\text{insertion}]\\ lev_{v,w}(i-1,j-1)+\mathbf{b} & [\text{substitution}]\end{cases} & \text{otherwise}\end{cases}$$

Where $\mathbf{b}=0$ when $v_i = w_j$ and $\mathbf{b}=1$ otherwise, and $lev_{v,w}(i,j)$ is the distance between the first i characters of v and the first j characters of w.

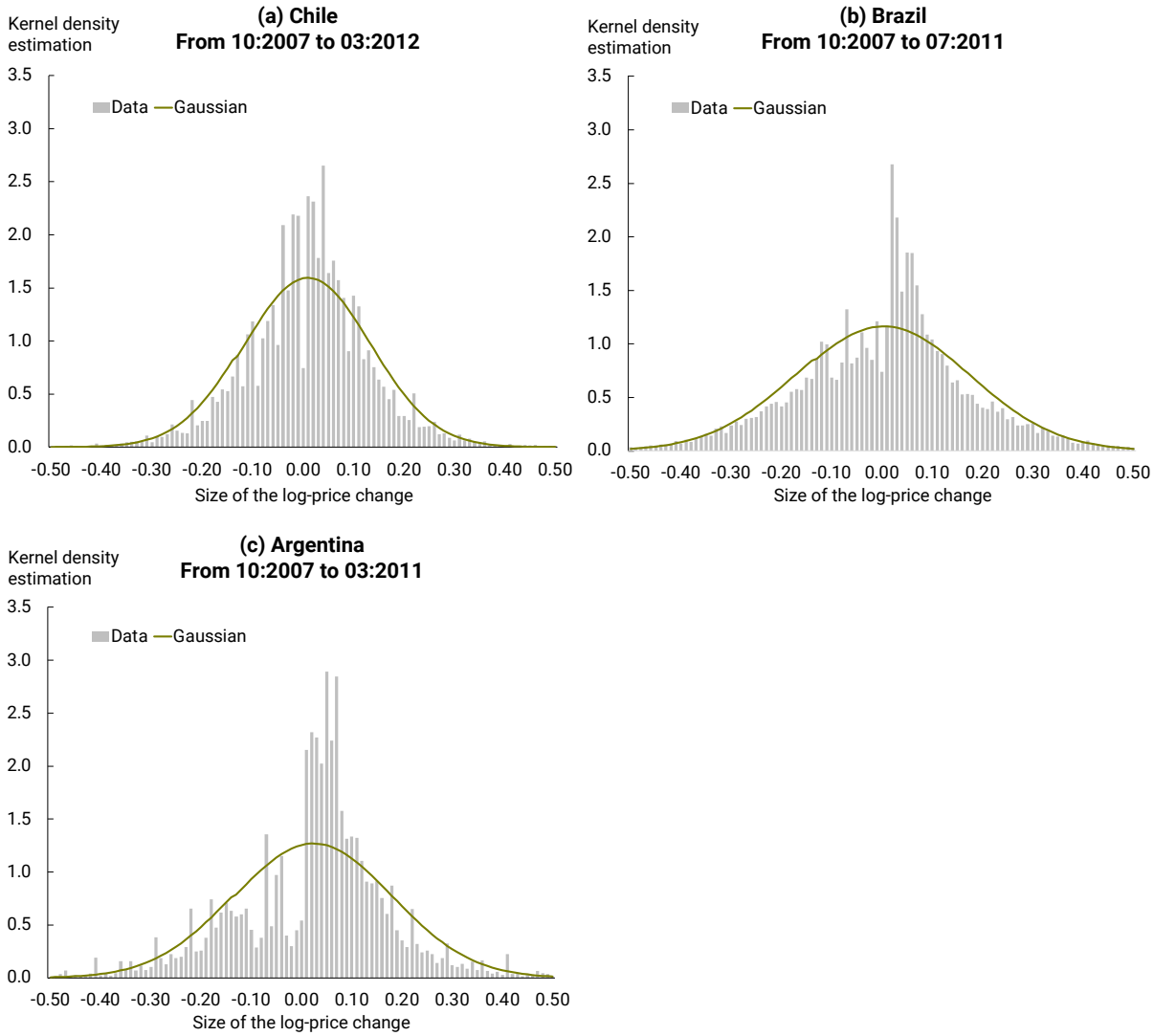
Once obtained the Levenshtein distance, I can derive the Levenshtein ratio (LR), which I use to compare the similarity between two strings, as:

$$r=\frac{(|v|+|w|)-lev_{v,w}(i,j)}{|v|+|w|}$$

By construction $r=1$ when the two strings are identical, and $r\to 0$ for completely different strings. For concreteness, consider the string "Coke Light 500ml". Its LR with "Coke Light 375ml", "Sprite 500ml", and "Maple Syrup 375gr" are 0.88, 0.57, and 0.24, respectively.

A.2. Additional tables and figures

Figure 6: Histograms of price changes in Billion Prices Project data



Note: The y-axis corresponds to the kernel density estimation (KDE) of each distribution –plotted in blue lines– which is a non-parametric smoothing method of obtaining a probability distribution.

Figure 7: Concentration in the size of temporary price changes

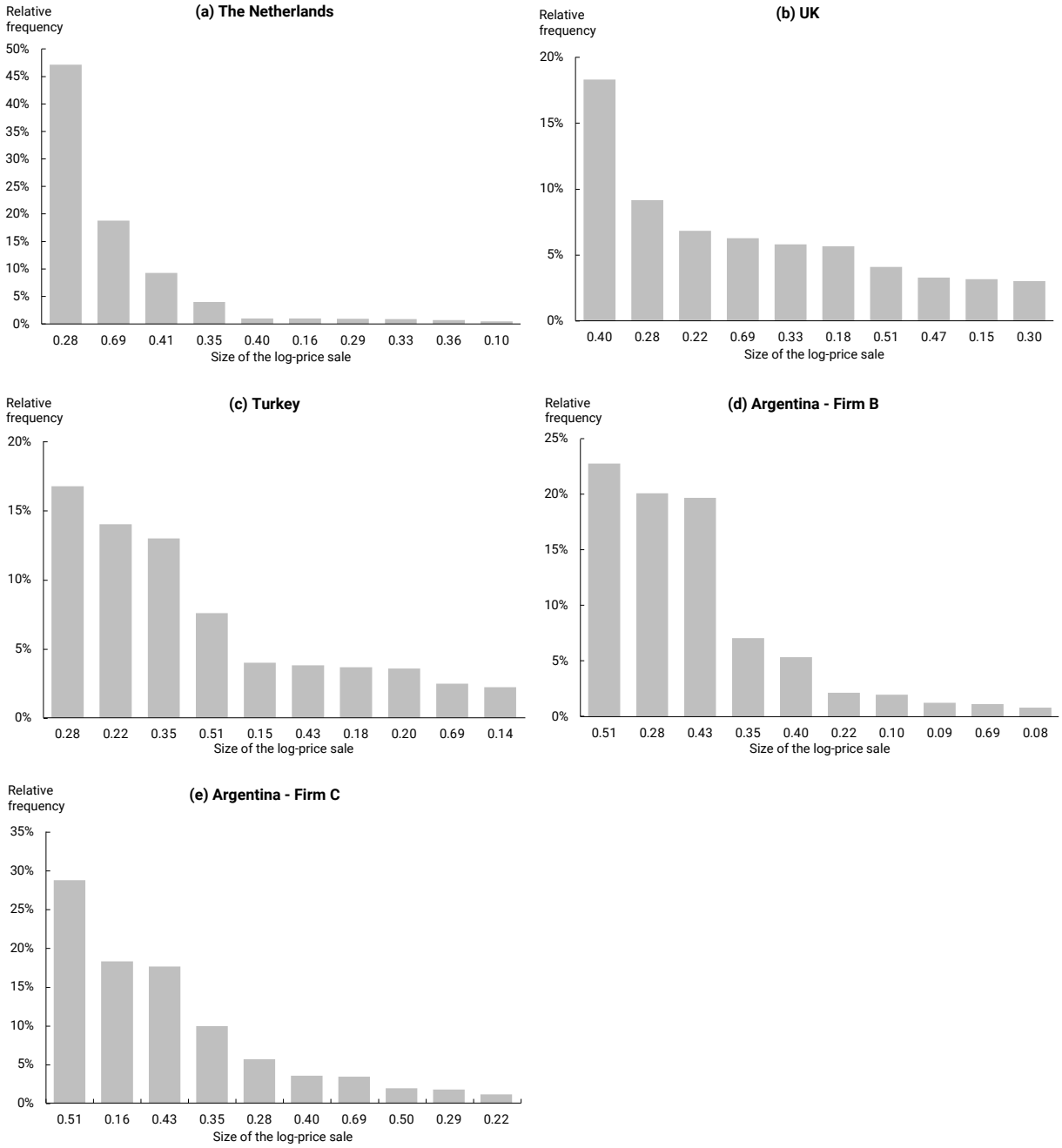
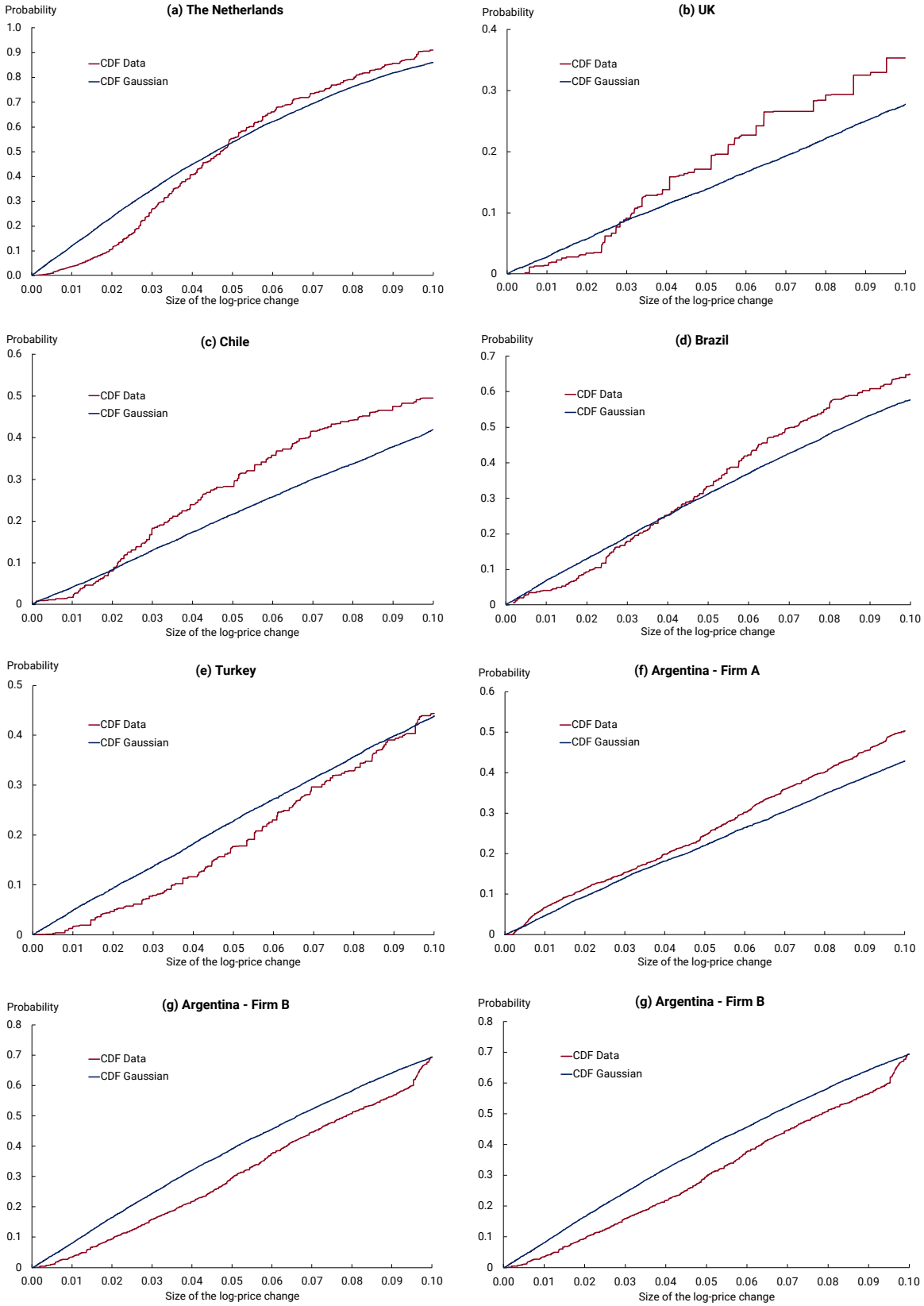


Figure 8: Range [0, 0.10] of the cumulative distribution function of the absolute size of log-price changes



Note: The x-axis is trimmed to the range [0, 0.10] to provide a clearer picture of the number of small price changes. Also note that the scale of the vertical axis differs across retailers depending on the dispersion of the magnitude of changes, also visible in Figure 4.

Jornadas Monetarias y Bancarias del BCRA 2021

En 2021 las Jornadas Monetarias y Bancarias del Banco Central de la República Argentina se abocaron al tema de "Condiciones macroeconómicas, crecimiento y distribución. Problemas subyacentes de la economía global y lecciones de la pandemia", buscando generar un espacio de reflexión sobre los desafíos que enfrentan los Bancos Centrales en un nuevo contexto global signado por los efectos del COVID-19. Las jornadas se llevaron a cabo los días 3, 10, 17 y 24 de noviembre del año pasado bajo la modalidad virtual.* A continuación, se presentan los trabajos basados en las ponencias de algunos de los expositores y las expositoras.

Panel sobre Política fiscal, crecimiento y desigualdad

- Barry Eichengreen | Deuda pública en perspectiva histórica
- Özlem Onaran | Inversión pública y política tributaria bajo un nuevo contrato social para un desarrollo sustentable y equitativo post pandemia
- Mark Setterfield | Neoliberalismo: un régimen de crecimiento enraizado pero exhausto

Panel sobre Políticas monetaria y financiera, estabilidad macroeconómica y desarrollo

- Claudio Borio | Política monetaria y desigualdad
- Annina Kaltenbrunner | Jerarquías monetaria y financiera a nivel internacional: implicancias macroeconómicas para economías emergentes

Panel sobre el Rol de los Bancos Centrales

- Alejandro Díaz de León Carrillo | Retos y lecciones de los bancos centrales en la pandemia
- Roger Edwin Rojas Ulo | Promoviendo el crecimiento con igualdad: desafíos generados por la pandemia y respuestas de política en Bolivia
- Julio Velarde | Los retos de la banca central para los próximos años

* El programa del evento y los videos de las presentaciones de los panelistas pueden encontrarse en: https://www.bcra.gob.ar/Institucional/jornadas-monetarias-bancarias-BCRA-2021.asp.

Política fiscal, crecimiento y desigualdad

In Defense of Public Debt

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Abstract

I offer a balanced view of the benefits and risks of public debt issuance. The role of public debt in mobilizing resources to meet national emergencies is a historical constant, most recently illustrated by the response to the COVID-19 pandemic. But this emergency response also leaves a legacy. I reflect on the prospects for debt consolidation and on how governments should meet the challenge of managing public debt now as we enter a period of higher global interest rates.

JEL Classification: N1, G1.

Keywords: economic history, public debt, sovereign debt.

[*] An earlier version of this essay appeared in *Le Grand Continent*. It draws on Barry Eichengreen, Asmaa El-Ganainy, Rui Esteves and Kris James Mitchener, *In Defense of Public Debt* (Oxford University Press, 2021). The views expressed in this article are of the author and do not necessarily represent the ones of the BCRA or its authorities. Email: eichengr@econ.berkeley.edu.

En defensa de la deuda pública

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Resumen

Planteo una visión equilibrada de los beneficios y riesgos de la emisión de deuda pública. El papel de la deuda pública en la movilización de recursos para hacer frente a las emergencias nacionales es una constante histórica, ilustrada recientemente por la respuesta a la pandemia del COVID-19. Pero esta respuesta de emergencia también deja un legado. Reflexiono sobre las perspectivas de la consolidación de la deuda y sobre el modo en el que los gobiernos deberían afrontar el desafío de gestionar la deuda pública ahora que entramos en un periodo de tasas de interés globales más elevadas.

Clasificación JEL: N1, G1.

Palabras clave: deuda pública, deuda soberana, historia económica.

1. Introduction

Recent years have witnessed a sea-change in how elected officials and their constituents view public debt. Anyone over the age of 50 will recall the 1990s, when there were widespread concerns about government profligacy and pervasive fears that debt was on an unsustainable path. These worries found their way into the Maastricht Treaty, which required European countries to limit their budget deficits to 3 per cent of GDP and bring their public debts down to 60 per cent of GDP, or at least close to that level, in order to qualify for admission to the euro area. The U.S. Congress adopted the 1990 Budget Enforcement Act, under which permissible spending rose more slowly than inflation and new outlays were subject to pay-as-you-go rules requiring either additional taxes or cuts in other programs. Worry was widespread that government spending was dangerously out of control.

This consensus that excessive spending was a problem and that fiscal consolidation was required to correct it wobbled in the face of the Global Financial Crisis. The United States adopted the $787 billion American Recovery and Reinvestment Act (or Obama Stimulus), causing federal debt to shoot up from 64 percent of GDP at the beginning of 2008 to 84 percent at the end of 2009. European countries such as Ireland, forced to recapitalize broken banking systems, experienced even larger increases in indebtedness. But once recovery dawned, and sometimes even before, governments took a quick right turn toward austerity. The fiscal events of 2008-09 were dismissed as just a temporary, if necessary, deviation from orthodoxy. As soon as the crisis passed, debts and deficits were again seen as a problem. Fiscal consolidation again became the name of the game.

2. Enter COVID-19

COVID-19 turned this fiscal world, along with much else, upside down. Governments are running unprecedented deficits and accumulating unprecedented debts. The U.S. federal government deficit is an extraordinary 14 per cent of GDP and would be still larger if President Joe Biden had his way. Federal government debt in the hands of the public now exceeds 100 percent of U.S. GDP. Germany has abandoned its iconic debt brake in favor of a deficit of 4.2 per cent of GDP in 2020; the European Commission forecasts that the Federal Republic's deficit will be twice again as large in 2021. Euro area wide, debt is more than 100 percent of GDP, just as in the U.S. – far above Maastricht levels. European Commission officials, traditionally the enforcers of austerity, are now, instead, cautioning governments not to raise taxes or cut public spending prematurely.

So, is this change in attitudes and practices justified? And will it last?

Extraordinary circumstances, such as those of a global pandemic, when not just livelihoods but also lives themselves are at risk, clearly justify extraordinary action. A government that does not respond to this kind of public-health emergency by mobilizing all available resources, including by issuing debt, will not long retain its legitimacy. Public debt scolds, when cautioning against deficits, reason by way of analogy between the household budget and the government budget. Just as a responsible household should balance its budget and live within its means, so too, they argue, should a responsible government. Under ordinary circumstances, perhaps. But a government that

doesn't borrow in order to provide essential services during a deadly pandemic would be accused of dereliction, and rightly. Such a government, to continue with the analogy, would be like parents who refused to borrow to obtain life-saving surgery for a child.

3. History lessons

This pattern has recurred throughout history. States and leaders have long borrowed to meet national emergencies, first and foremost wars. Rulers have borrowed to expand their territories but also to defend the realm and survive. Borrowing to mount a sturdy national defense worked to strengthen the state, not just in the material sense of repelling invaders but also in a political sense, since a state that provided an adequate national defense was seen as legitimate in the eyes of its citizens.

It followed that Europe was the world's debt pioneer, since war was especially prevalent, for a combination of geographic and political reasons, on the European continent. After the collapse of the Carolingian Empire in 888, Europe was divided into literally hundreds of princely kingdoms, many no more than cities with modest hinterlands. Europe's geography as a landmass riven by mountain ranges and river valleys posed natural obstacles to the formation of more extensive territorial states. This division into a multitude of jurisdictions tempted rulers to seize territory and resources when they could and placed them at the mercy of their neighbors. As the eminent sociologist and historian Charles Tilly put it, war was the normal condition in Europe from the dawn of the second millennium A.D.

It is commonly asserted that prior to the 20th century, when indebtedness became a common condition, sovereigns accumulated debt during wars and retired it in peacetime, so that they would have a clean financial slate when the next war broke out. In practice, however, not all debt issued in wartime was retired subsequently. Levels of indebtedness rose over the centuries, as states built the economic, financial, and political infrastructure needed to service additional obligations.

4. Making a market

The king or sovereign was regarded as the supreme earthly power. Ironically, this unlimited power limited his ability to borrow, since there was nothing to prevent him from unilaterally reneging on his obligations. Sovereigns could borrow, it followed, only if they were prepared to pay high interest rates. Kings might force loans on their subjects, but this risked fomenting a rebellion. They might pledge the crown jewels as collateral to their foreign lenders. But such hypothecation, much less loss of the royal patrimony in the event of default, might fatally undermine public regard for the sovereign.

Sovereign debt began its rise to modern levels, therefore, only with the creation of representative assemblies in which the creditors sat and were empowered to oversee tax collection, approve increases in spending, and authorize additional debt issuance. With the creation of such assemblies, first in Italian city-states such as Florence, Genoa and Venice and then in the Netherlands and England, costs of borrowing came down. Sovereign debt came to be recognized as an obligation of the state rather than the individual occupying the throne.

The rise of public debt also had economic preconditions. In order to place debt in private hands, there had to be a population of individuals with adequate savings to invest. Not surprisingly, we see the successful placement of public debt in private hands at the same times and places where commercial activity was expanding. Venice, Genoa, the Netherlands, and Great Britain, which were among the public debt pioneers, were all leading naval and commercial powers in their day. Similarly, French towns that were home to the Champagne fairs were among the first jurisdictions to successfully market what today we would call government bonds ("life rents" or "*rents*").

Finally, successful debt issuers had to meet financial preconditions. They had to create secondary markets on which debt securities could be bought and sold, allowing investors to diversify their claims and limit their risks. Eventually they created an entity, a central bank, to backstop this market, ensuring its stability and liquidity.

In turn, the existence of this stable and liquid market encouraged private financial and commercial activity. As government debt securities came to be seen as safe and liquid, they were accepted as collateral for other borrowing and lending. Thus, the growth of transactions in public debt spurred the broader process of economic and financial development. Scholars sometimes ask: "Why Europe was first?" Why was it the first part of the world to experience modern economic, financial, and commercial development? Its precocity in issuing public debt is not the entire story. But it is a part.

5. Debt evolves

Over time, there was then further evolution in the uses to which public debt was put. Financing wars remained of premier importance. World Wars I and II thus saw the two largest public debt explosions of the 20th century. But governments borrowed in addition to invest in roads, railways, ports, urban lighting, and sewers – the infrastructure associated with modern economic growth. Issuing debt to finance these projects made sense, insofar as construction took time. As the returns rolled in, in the form of higher tax revenues or user fees, they could be used to service and amortize debt.

In addition, governments issued debt to finance social programs and transfer payments. Like the national defense, these public spending programs lent legitimacy to the state. They showed that government was prepared to insure its citizens from risks against which individuals couldn't adequately insure themselves.

Why these social programs couldn't be financed mostly, or even entirely, out of current revenues is less obvious. Part of the answer is that demand for spending on such programs is most intense when times are tough – when the economy is doing poorly, unemployment is high, and government revenues are growing slowly. Political fractionalization, another characteristic of our modern world, is another part of the answer. In a fractionalized polity, each political faction, while regarding certain social programs as indispensable, will tend to have just enough power to block taxes on itself but not enough to impose taxes on others. Finally, electoral uncertainty may lead politicians to advocate more spending on their preferred programs when in office, since they may be in a weaker position to push such spending later, and since the additional debt incurred today will be someone

else's problem tomorrow. So, with the broadening of the electoral franchise and greater electoral uncertainty, public debts shot up.

It was at this point, in the last part of the 20th century, that public debt acquired its bad name, as debts exploded, especially in polities characterized by political fractionization and electoral uncertainty. The duty of responsible political leaders, the conclusion followed, was to reduce heavy debts to more sustainable levels. Leaders did what they could, some successfully, others not. In many places, debts remained uncomfortably high.

6. Will today's more tolerant attitude persist?

The public health emergency starting in March 2020 was perceived as a crisis tantamount to war, and it elicited a warlike fiscal response. The question is whether the resulting sea-change in attitudes and actions toward public debt will persist. If the change in the fiscal landscape is simply the product of COVID, and no more, then shouldn't the intellectual tide go back out? Shouldn't we expect old attitudes cautioning against excessive debts to resurface when herd immunity is reached?

In fact, there is reason to think that this new, more tolerant view of government indebtedness reflects more than just the public health emergency. First, there has been a shift in attitudes about government spending that pre-dates COVID-19. Scholars such as Thomas Piketty were already worrying about rising income inequality and declining economic opportunity before COVID-19 and arguing for government to address these problems. Others, such as Raghuram Rajan, former governor of the Reserve Bank of India and current University of Chicago professor, were highlighting society's "fault lines," not just inequalities of income and wealth but also of education and opportunity There was growing recognition of the need for government to provide public goods – education, health care, basic research, transportation infrastructure, and climate-change-abatement measures – that are not adequately provided by private markets left to their own devices. This is what President Biden means when he refers to the need for government to "go big."

The result is a shift in attitudes toward the role of government in economy and society, conducive to an increase in spending whether or not corresponding revenues are there. Gary Gerstle, a U.S. historian at the University of Cambridge, distinguishes America's "New Deal Order" starting in the 1930s, when it came to be taken for granted that governments would be the main supplier of these public goods, from the "Neoliberal Order" starting in the 1980s, when Ronald Reagan and Margaret Thatcher ushered in an era of limited government and market fundamentalism. That even the U.S. and UK, where the "Neoliberal Order" was most firmly embedded, are swinging back the other direction suggests that bigger government, larger deficits, and heavier debts are here to stay.

In addition, there is less reason to worry about heavy debts and less urgency about reducing them because interest rates are low. Low interest rates in turn mean that advanced-country governments are actually devoting a smaller faction of GDP to debt service, despite the fact that they are now carrying considerably more debt. In the U.S., federal government debt service cost just 2 per cent of GDP in 2020, virtually unchanged from 2001, when the debt-to-GDP ratio was barely half as high.

Given current low interest rates, there is no immediate crisis of debt sustainability. The fiscal status quo can be allowed to persist.

7. Low rates forever?

Just why interest rates have been becalmed at low levels for a decade is disputed. Some say that the explanation is the high savings of Germany, Saudi Arabia, and fast-growing emerging markets such as China. In an integrated global market, their ample savings depress interest rates worldwide. Demography works in the same direction: life expectancy in the advanced economies has risen by nearly five years over the last three decades, and when people live longer and enjoy more years of retirement, they sock away more savings while working. Other observers suggest that interest rates have fallen because physical investment has declined with the shift from manufacturing to services and from factories to digital platforms. Whatever the cause, the result has been to confront more saving supply with less investment demand, resulting in lower interest rates.

There's no guarantee, of course, that interest rates will remain at their current low levels. The savings rates of oil-exporting economies could fall as the demand for their petroleum dries up. Consumption in China could rise to levels more customary for a middle-income country. Additional deficit spending by the U.S. and other governments in 2021 could so supercharge spending as to put upward pressure on rates. Low birth rates leading to slower labor-force growth could put upward pressure on wages, leading to cost-push inflation that is incorporated into higher interest rates.

8. What to do

Higher interest rates, when they come, will create a need to reduce debt-to-GDP ratios. If the last decades have taught us anything, it is that emergencies happen. There will be another global financial crisis, or novel coronavirus, or geopolitical event, or climate-change related disaster requiring governments to deploy their fiscal capacity. Having utilized that capacity recently, prudent governments should contemplate steps to enhance and restore it now.

The obvious way for reducing debt-to-GDP ratios is by running budget surpluses. But very few countries have succeeded in running large budget surpluses, for extended periods, on the scale that will be needed for heavily indebted governments to reduce their debt ratios to pre-COVID levels. The ability to sustain such surpluses for years, even decades, is especially limited in a polarized political environment. When political parties are poles apart on necessary and desirable reforms, the compromises needed to sustain fiscal reforms are elusive. Thus, dealing with post-COVID debt will be challenging for countries where political polarization has been rising for decades, and in which COVID-19 has only elevated it further.

Alternatively, central banks can allow inflation to accelerate. This will cause the growth of nominal GDP to rise relative to the nominal interest rate the government pays on its debt, at least for a time, since some of that debt is long term and its interest rate is fixed to maturity. A favorable nominal-

growth-rate-nominal-interest-rate differential is one way that governments have reduced heavy debts in the past. With enough inflation, it could happen again.

So will the Fed, the ECB and other central banks tolerate much higher inflation? COVID-19 changes everything, it is said, so perhaps it will change central banks' inflation tolerance. Still, there are reasons to be skeptical that it will create a tolerance for significantly higher inflation. An inflation rate marginally above 2 per cent for some period, perhaps, but not more. By running inflation at significantly higher levels, to the surprise of investors, central banks would be inflicting losses on the pension funds, insurance companies, banks and individuals who hold government bonds. Populations are ageing. Older people dislike inflation for self-interested financial reasons, including that they invest in bonds. And they vote in disproportionate numbers.

Or we can attempt to grow out from under the debt burden. In other words, we can raise the denominator of the debt/GDP ratio. This is the ostensible goal of the European Commission's €850 billion Recovery and Resilience Facility. It is the rationale for President Biden's physical infrastructure, social infrastructure, and climate-change-related investment packages. But however, many leaders invoke their mantras of infrastructure, digitization, and green growth, they lack a magic elixir to produce faster growth. They can only hope.

All this is to say that there are no simple solutions. History shows that countries that have successfully addressed problems of debt sustainability without major economic, financial and political dislocations have done so by maintaining stable financial conditions, turning to fiscal restraint when the time was right, and growing their economies. Not addressing the problem from all three angles is a recipe for failure.

A Green Purple Red New Deal: Rebuilding an Economy for All in the Aftermath of the Pandemic

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Abstract

This paper discusses the building blocks of a paradigm shift for a needs-based approach to macroeconomic policy to tackle the multiple crises of inequalities, care and climate change in the aftermath of the pandemic, and outlines a "green, purple, red" policy mix of increasing public spending in the care and green economy, labor market policies and progressive taxation of both income and wealth.

JEL Classification: E1, E2, E62.

Keywords: care economy, employment, fiscal policy, functional income distribution, gender wage gap, green investment, physical infrastructure, productivity, purple investment, social infrastructure, wealth concentration, wealth tax.

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Un *New Deal* verde, púrpura y rojo: reconstruyendo una economía para todos después de la pandemia

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Resumen

Este documento analiza los componentes principales de un cambio de paradigma hacia un enfoque de la política macroeconómica que se base en las necesidades de hacer frente a las múltiples crisis de desigualdad, cuidado y cambio climático tras la pandemia, y esboza una combinación de políticas "verdes, púrpuras, rojas" que consiste en aumentar el gasto público en la economía del cuidado y en la economía verde, en políticas del mercado laboral y en la tributación progresiva tanto de la renta como de la riqueza.

Clasificación JEL: E1, E2, E62.

Palabras clave: brecha salarial de género, concentración de la riqueza, distribución funcional de la renta, economía del cuidado, empleo, infraestructura física, infraestructura social, inversión púrpura, inversión verde, impuesto sobre la riqueza, política fiscal, productividad.

1. Introduction

The Covid-19 crisis laid bare the intersecting crises in the world, with inequalities and ecological breakdown at their core. Public spending increased substantially in the countries with fiscal space to support the emergency measures to mitigate the effects of the crisis on household income and firms but fell short of linking the short-term emergency policy response to long-term rebuilding of the economies.

There are two important lessons from the pandemic for policy: first, the pandemic and inequalities with respect to class, race, gender and across countries exacerbate each other. As all crises, the pandemic has also left distributional scars. To tackle both the public health crisis and the economic fall out in the aftermath of the pandemic, we have to tackle inequalities which requires being bold about regulating labour markets, public investment, and international development.

The second lesson is to recognize the needs for public investment in both the green and care economy. On the one hand, the pandemic added to the vast evidence regarding the unsustainability of the way human activities interact with the nature. Reversing the ecological crisis requires a massive and urgent mobilization of large amounts of spending in renewable energy, public transport, housing, energy efficiency in the existing buildings, industry and the grid, sustainable agriculture, forestry, recycling, and repair. On the other hand, the effects of the pandemic became deeper due to the inadequate levels of public provision of health and social care. The pandemic also increased the unpaid domestic care requirements, which fell disproportionately on women, increasing their time poverty and reversing former gains made towards gender equality. The scale and the urgency of the spending needs to address both of these deficits in the green and care economy and the public good character of these services requires a large public spending program, which cannot be substituted by private investment based on profit motive.

There is widespread recognition of the care and ecological deficits and class, race and gender inequalities which are exacerbated by the crisis, but when it comes to policies to address these, the budget deficit is still conventionally seen as a binding constraint in the medium run. After an unprecedented rise in public debt during the pandemic, policy makers once again raise concerns that spending cuts in the future may be inevitable. The timing of this renewed fiscal conservatism is particularly unfortunate at a time when social and environmental needs require a more substantial urgent mobilization of fiscal policy.

The multiple crises of our time requires a paradigm shift towards a needs-based approach to macroeconomic policy, in particular fiscal policy, avoiding competition between urgent social and ecological requirements. The public provision of high quality universal free basic services in social care, health, childcare, and education from early childhood to university tackles both the care deficit and inequalities by both creating decent jobs and providing the much-needed services. Public spending in the green economy is the key policy to address both the scale and timing of the investment required for transition to a zero-carbon economy. While short-term responses such as furlough schemes and flexible short working time arrangements have helped to limit the rise in

unemployment in some countries, and further policies such as job guarantee schemes, education grants, retraining schemes, paid on the job training are very important, there has never been a better moment to make the case for creating permanent public sector jobs with decent wages.

Following this introductory section, section two of this paper discusses the building blocks of a theoretical framework for a needs-based approach to macroeconomic policy, informed by structuralist post-Keynesian/post-Kaleckian demand-led growth models, gender economics and ecological macroeconomics. Section three summarizes the findings of Onaran *et al*. (2019) on the effects of a "purple, green, red" policy mix of increasing public social and green infrastructure spending, labour market policies to increase real wages of both men and women with an upward convergence in wages closing gender gaps, and more progressive taxation of both income and wealth in the case of the UK. This section discusses the macroeconomic multiplier effects of public spending which helps to finance part of this spending as well as the effects of wealth taxation, compared with those of taxation of capital or labour income, and presents how wealth taxation can ease the budgetary constraints on fiscal spending. Finally, section four concludes with further policy implications.

2. A theoretical macroeconomic framework for a green, purple and red new deal

This section presents a theoretical framework for macroeconomic analysis based on a gendered structuralist post-Keynesian/post-Kaleckian demand-led growth model building on Onaran *et al*. (2019a, b, 2022a, b) and Oyvat and Onaran (2020), incorporating explicit analysis of both the components of demand and supply side analysis, the government and employment.[1] Unlike standard neoclassical growth models that assume full employment, this theoretical framework recognizes: i) demand-side constraints in the economy, which lead to excess capacity and involuntary unemployment, ii) the effects of different types of public spending on demand, income distribution, and employment in both the short run and the medium run as well as on the supply side on productivity in the medium run, iii) the dual effects of wages on not just production costs but also aggregate demand, iv) the effects of distribution of wealth and income between wages and profits, as well as gender gaps in wages and employment on both demand and productivity, v) the effects of the structural features of the economy in terms of sectoral composition, oligopolistic price setting, import dependency, financialization, household debt, gender differences in the distribution of unpaid and paid labor in different sectors, and bargaining power between labor and capital and between different genders.

Addressing both the care and ecological needs, we analyze the effects of three different types of government spending: i) green public spending in renewable energy, energy efficiency and public transport, ii) purple current spending in the care economy including spending in education,

[1] Post-Kaleckian models within the post-Keynesian macroecomomics synthesize Keynesian and Marxist economic analysis of the dual role of wages on aggregate demand.

childcare, healthcare, and social care, and iii) other capital spending in infrastructure (*e.g.* housing or buildings for the care economy, hospitals or schools).[2,3]

The economy has three sectors: i) the social sector, which consists of the current expenditure of the government in the care economy, *i.e.*, provides the public services in education, childcare, healthcare, and social care, ii) the rest of the market economy, and iii) the unpaid care sector.

Wealth inequality is defined as wealth concentration, *i.e.*, the share of the private net wealth of the top 1% in total wealth. Changes in wage rates, gender pay gap and tax rates on wages, profits, and wealth impact both wealth distribution and functional income distribution between labor and capital.

On the demand side of the model, components of aggregate demand, *i.e.*, consumption, private investment, net exports are defined by behavioral equations. Therefore, differences in the marginal propensity to consume out of wages or profits, or out of the wealth of the top 1% vs. bottom 99%, or gendered differences between women and men in not just the marginal propensity to consume in aggregate but also in the composition of their consumption in the social sector vs. the rest of the economy have an impact on the macroeconomy. Similarly, the sensitivity of private firms' investment to profitability vs. demand matter for the effects of wage increases on aggregate output.

On the supply side, labor productivity (output per worker in the rest of the economy) is expected to increase in response to an increase in output, wages, private and public spending in the care economy, green economy, and other infrastructure.

All three types of public spending are expected to have direct positive effects on total output as well as further multiplier effects, as they generate more employment and aggregate income, which in turn increases household consumption as well as private investment due to demand effects. The magnitude of the multiplier effects of the three different types of spending will depend on i) the labor intensity of the sectors receiving the extra spending, ii) the marginal propensity to import out of the new spending, iii) the effects on household consumption by substituting private spending, iv) the effects on private investment by providing public infrastructure, and the v) the gender composition of new employment.

The effect of public spending on employment depends on the relative size of the increase in output and labor productivity. We expect the proportionate increase in output to be larger than that in productivity in response to all three public spending categories, and thereby a positive medium-run effect on employment, albeit with gender differences.

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[2] See Onaran and Oyvat (2022) for an analysis of the macroeconomic effects of public spending in the green economy. See Dafermos and Nikolaidi (2019) for an ecological Post-Keynesian macroeconomic model; Pollin *et al*. (2015) for an input-output analysis of the employment effects of public spending in renewable energy and energy efficiency; and Batini *et al.* (2021) for an econometric analysis of the multiplier effects of public investment in renewable energy.

[3] İlkkaracan (2013) coined the term "purple economy" to identify the care economy, indicating its effects on gender equality. Public spending in education, childcare, health, and social care are categorized as current spending (government consumption) in national accounts; however feminist economics literature emphasizes the investment character of this spending given the positive effects on productivity and the positive externalities due to their public good character and refers to it as social infrastructure investment (Elson, 2016, 2017; Women's Budget Group, 2015; Onaran *et al*., 2019a, b, 2022a).

Higher public spending with constant tax rates could increase the public debt as a ratio to GDP, if multiplier effects are not very high. This, in turn, might lead to an increase in the interest rate under certain circumstances, in particular if monetary policy does not actively accommodate fiscal policy. Consequently, depending on the interest elasticity of investment, there may be negative crowding out effects on private investment. However, this effect might be small if investment is not very sensitive to interest rate and the effect of public borrowing on the interest rate is not very high.

3. A policy simulation for a green, purple and red new deal

This section summarizes the findings of Onaran *et al*. (2019a, b) on the effects of a "purple, green, red" policy package based on econometric estimations for the case of the UK, which includes on the fiscal policy side increasing both public spending and taxation of both capital income and wealth, and on the labor market side policies to increase real wages of both men and women and close gender gaps.

In detail, the policy package includes:

i) an annual increase in government spending in both the purple and green economy by 1%-point as a ratio to GDP. Purple public spending includes creating decent public care jobs, *i.e.*, hiring more nurses, social care workers, teachers with decent wages, decent working conditions and adequate career prospects. Investing in the green economy and infrastructure includes public spending in renewable energy, energy efficiency, housing, or public transport. The public sector spending policies also target increasing the wage rates while at the same time closing gender wage gap via upward convergence, *i.e.*, increasing the wages at the bottom of the pay scale at a higher rate, and enforcing equal pay legislation. The policy simulation is based on the effects of an annual 2% increase in women's hourly wage rate and 1% in men's hourly wage rate in real terms, *i.e.* a combination of "red" and "purple" pay policies.

ii) an increase in the average tax rate on wealth by 1%-point (which corresponds to a doubling of the tax rate on wealth in the UK), and an increase in the progressivity of income taxation via an increase in the average effective tax rate on profit income by 1%-point and a decrease in the average tax rate on wage income by 1%-point.[4] These correspond to progressive "red" policies.

iii) a combination of "red" and "purple" labour market policies, targeting an increase in the hourly real wage rate of women in the private sector by 2% and that of men by 1%, again closing gender gaps via upward convergence in the rest of the economy.

In a nutshell, in the case of the UK, this policy mix leads to in the medium-run a 10.9% increase in GDP, an increase in the hours of paid employment of women by 9.6%, and that of men by 5.8% and

[4] Tippet, Wildauer, and Onaran (2021) presents the tax revenue potential of a progressive scheme of wealth taxation, aiming at the top 1% of the wealthiest households. This is particularly important after the pandemic which is likely to substantially increase wealth inequality.

a substantial improvement in public finance with a 10.3%-point decline in public debt as a ratio to GDP (Onaran *et al*., 2019a, b).

In more detail, public social and green infrastructure spending has a very strong effect on output and employment of men and women. Public spending is partly self-financing (albeit not fully), as it increases national income and thereby tax revenues even without an increase in the tax rate. Public spending, in particular on education, childcare, health, and social care has a very high positive effect on productivity in the rest of the economy in the UK, directly and indirectly.

An increase in the progressivity of income taxation by increasing the tax rate on profits and decreasing the tax rate on labor income increases output, men's and women's employment, and decreases public debt/GDP. However, an increase in the tax rate on wealth has a much higher positive impact on output, and thereby employment and the budget. This is because it decreases wealth concentration, which in turn reduces the financialization of non-financial companies, market concentration, and barriers to entry, and thereby stimulates private investment. As such, taxation of wealth is a particularly effective policy to fund purple and green public spending, while tackling income, gender, and wealth inequalities.

Fiscal policies are crucial in reducing inequalities. Taxes on profits and wealth decrease wealth concentration. Public spending improves functional income distribution by increasing employment and wage income. Public spending in the purple care economy also plays a crucial role in closing the gender gaps in employment and income.

4. Conclusions and policy implications for global development

Building a caring and sustainable society based on a green, purple and red new deal in the aftermath of the pandemic is possible and public investment is the key to such a policy programme.

How to finance such a green, purple and red new deal? The answer is both simple and complex: the social and ecological needs, and the urgency of an effective response to the multiple crises of inequalities, care and climate change requires the use of all tools of policy.

Public spending even without any increases in the tax rates, is partially self-financing, thanks to the strong multiplier effects.

Public borrowing to fund some of this spending can be justified given the effects on productivity and sustainability, or to put it negatively, the expected damage to the ecology, society, and economy if investment needs are not delivered on time. On a related matter, from a long-term perspective, it would be beneficial if fiscal sustainability did not narrowly focus on public borrowing or public gross debt, but at least on net wealth. Also, in the case of public spending in the care economy, considering their long-term effects on productivity, such spending could be considered as public investment in social infrastructure rather than current expenditure, which justifies borrowing to fund spending if need be.

However, eventually the large scale of spending needs requires undeniably a combination of progressive taxation of both income and wealth.

National and regional investment banks working in cooperation with the government and central bank are also crucial for funding large scale public infrastructure projects.

Crucially, policy coordination should involve the coordination of fiscal and monetary policies. The strict separation between monetary and fiscal policy is becoming more difficult to justify. Effective monetary policy requires coordination with expansionary fiscal policy targeting long-term public investment in social and green infrastructure, building on a needs-based approach to policy considering long term needs to tackle inequalities, social, economic, and ecological sustainability. The lessons of the past decade show that the central banks' mandate should include a dual target of full/high employment and an inflation target high enough to be consistent with the former, moving within a band, with a higher weight for employment.

Although unconventional monetary policy (quantitative easing (QE)) carried the heavy lifting in terms of policy since the Great Recession and helped to stabilize financial markets and prevented a new Great Depression, monetary policy is less effective than fiscal policy, and one reason for this is that the elasticity (sensitivity) of private corporate investment to interest rate is low and its elasticity to demand is high. For example, in the UK, for £200bn early QE, which is about 10% of GDP, the growth effect on GDP in 2009 was about 1.5-2% according to the own forecast of the BoE (as recently cited by Bailey *et al*., 2020). If we had fiscal spending of 10% of GDP at a time of recession, we might have achieved 15% growth effect, assuming cautiously a multiplier of 1.5. This multiplier is consistent with our econometric estimates (Onaran, Oyvat, Fotopoulou 2019a, 2022; Obst, Onaran, Nikolaidi, 2019) and is at the lower end of the estimations of multipliers in recessions (Blanchard and Leigh, 2013, Stockhammer *et al*., 2019). QE has further contributed to inequalities, financialization and higher wealth concentration at the top 1% via asset price inflation; both of these led to lower private corporate investment according to our research (Onaran, Oyvat, Fotopoulou 2019, Tori and Onaran 2018, 2021). This in turn leads to low productivity and deepens a vicious circle of low paid precarious jobs despite low unemployment.

International policy coordination can make further difference, in particular for the emerging economies. The effects of public spending are stronger and negative effects on the current account balance are moderated, if policies are implemented simultaneously in all the countries (Onaran, 2016; Obst *et al*., 2016). If the large high-income economies lead the way, this creates space for small import dependent balance of payments constrained emerging economies. From the perspective of the emerging economies, public investment as part of a well-designed industrial policy is also key to structural change and productivity gains.

Managing the short-run constraints on the balance of payments requires further policies in terms capital controls and FDI policies. Finally, to address global inequalities, which have further deepened with the pandemic, two policies stand out: firstly, cancellation or restructuring of parts of the debt of the developing countries needs to be part of the international development agenda.

Secondly, transfer of technology to support mass not-for-profit global production of key public goods from vaccines and medication to solar panels, turbines, or batteries for storing renewable energy is the only way to tackle global crises such as the pandemic or climate change.

The coordination of fiscal policies with the labor market policies also makes the effects of fiscal spending stronger and eases the funding pressures as higher wages lead to higher tax revenues (Onaran, 2016; Obst *et al*., 2016). Strong pro-labor institutions –particularly, strong, well-coordinated trade unions, equal pay legislation, increased job security, permanent contracts, higher minimum wages, and an improved and equitable parental leave are good for an equality-led and sustainable development. Labor market regulation for a shorter working week can also promote a rise in gender equality in paid and unpaid work and income, while facilitating a green transition and higher productivity (Onaran and Calvert Jump, 2022).

Finally, The Covid-19 crisis opens space to rethink not just the role of fiscal policy and public spending but also public ownership in key sectors of the care and green economy. Health and social care, education, childcare, energy, water, transport, and social housing are at the top of these key sectors where private for-profit provision proved to lead to high prices, low quality, and inadequate level of supply. In the next phase of the economic crisis, when the rise in the debt of low-income households, small and medium enterprises and low and middle income countries trigger a new financial crisis, we will be reminded of the fact that we need publicly owned banks as well as financial regulation -a lesson, which was missed after the financial crisis in 2008. The chaotic management of the pandemic by governments relying on outsourced private services opens space to emphasize the need for a radical structural change including in decision making and ownership in key sectors towards national coordination in combination with collective, municipal, and cooperative ownership and democratic participatory decision making. The urgency of managing a transition to a zero-carbon economy also invites a more planned and participatory approach to the economy.

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Neoliberalism: An Entrenched but Exhausted Growth Regime

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Abstract

This paper analyzes Neoliberalism in the US economy with a view to identifying the effects of Neoliberalism on macroeconomic performance since 1990, underlying problems with the structure of the Neoliberal economy, and the effects of Neoliberalism on the economic consequences of the COVID-19 pandemic. It is shown that Neoliberalism 'worked' from 1990-2007 by combining an 'incomes policy based on fear' that permitted non-inflationary growth and low unemployment with a debt-financed, consumption-led demand regime that, as evidenced by the 2007-09 financial crisis and Great recession, was unsustainable. Since 2009 Neoliberalism has proved to be an entrenched but exhausted growth regime, producing only a 'depressed upswing' 2009-2019 that was terminated by the onset of the COVID-19 recession –the response to which was neither efficient nor equitable. The paper concludes that at this juncture, the epithet 'build back better' must be applied to the entire US economy.

JEL Classification: B52, E12, E31, E32, E64, E66.

Keywords: COVID-19 recession, depressed upswing, incomes policy based on fear, Neoliberalism.

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El Neoliberalismo: un régimen de crecimiento arraigado pero agotado

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Resumen

Este documento analiza el Neoliberalismo en la economía estadounidense con el fin de identificar sus efectos en los resultados macroeconómicos desde 1990, los problemas subyacentes con la estructura economía Neoliberal, y los efectos del Neoliberalismo en las consecuencias económicas de la pandemia del COVID-19. Se demuestra que el Neoliberalismo "funcionó" entre 1990 y 2007 al combinar una "política de ingresos basada en el miedo" que permitió un crecimiento no inflacionario y un bajo desempleo con un régimen de demanda financiado por deuda e impulsado por el consumo que, como demostró la crisis financiera de 2007-2009 y la Gran Recesión, era insostenible. Desde 2009 el Neoliberalismo ha demostrado ser un régimen de crecimiento arraigado pero agotado, que sólo produjo una "reactivación deprimida" en 2009-2019 que terminó con el inicio de la recesión del COVID-19, cuya respuesta no fue ni eficiente ni equitativa. El documento concluye que, en esta coyuntura, el epíteto "reconstruir mejor" debe aplicarse a toda la economía estadounidense.

Clasificación JEL: B52, E12, E31, E32, E64, E66.

Palabras clave: Neoliberalismo, política de ingresos basada en el miedo, reactivación deprimida, recesión COVID-19.

1. Introduction

The purpose of this paper is to analyze US experience with Neoliberalism since 1990. The discussion focuses the effects of Neoliberalism on macroeconomic performance, underlying problems with the structure of the Neoliberal economy, and the effects of Neoliberalism on the economic consequences of the COVID-19 pandemic. The project is ambitious and in what follows, a number of important pathologies of the Neoliberal economy are discussed only briefly or, in some cases, set aside (but see Flaschel *et al*. (2022) for greater detail). A distinction is made between the 'Neoliberal Boom' in the US economy (1990-2007) –a long boom spanning two successive business cycles that was terminated by the 2007-09 financial crisis and Great Recession– and the subsequent 'depressed upswing' (2009-2019) that was terminated by the onset of the COVID-19 pandemic and the recession it initiated.[1] During the latter period, Neoliberalism is identified as an exhausted but institutionally entrenched growth regime that, having endogenously generated one major crisis (the Great Recession), contributed to a second (the COVID-19 recession and its aftermath) by proving incapable of responding either equitably or efficiently to a major exogenous shock. The US-centric focus of the analysis is justified by the fact that the US (together with the UK) can be considered the vanguard and subsequent 'leading edge' of Neoliberalism, following the Thatcher-Reagan 'revolutions' of the 1980s. Most major economies have 'neoliberalized' to some extent over the past four decades, however, including those usually associated with different 'varieties of capitalism' (see, for example, Setterfield and Kim, 2020). Moreover, a number of the problems discussed in what follows can also be found in middle-income economies (see, for example, Ormaechea, 2021; de Medeiros and Trebat, 2021; Caldentey and Vernengo, 2021).[2]

The remainder of the paper is organized as follows. The next section provides an account of Neoliberalism in theory and practice, drawing attention to macroeconomic performance during the Neoliberal boom, the underlying (structural) basis for this macroeconomic performance, and the problems therewith. In the third section, US macroeconomic performance 2009-2019 is identified as a 'depressed upswing' associated with an institutionally entrenched but now effectively exhausted Neoliberal growth regime. The final section offers some conclusions, foremost among which is the need for fundamental structural reform that shifts the focus of capitalist economies away from Neoliberalism and towards 'social capitalism'.

2. Neoliberalism in theory and practice

2.1. US macroeconomic performance during the Neoliberal Boom

The thesis advanced in this section is that during the Neoliberal Boom (1990-2007) and judged in terms of conventional indicators of macroeconomic performance, Neoliberalism 'worked' but not as advertised. The claim that Neoliberalism 'worked' can be substantiated with reference to Table 1,

[1] See, for example, Guttmann (2021, pp.12-14) for further discussion of the foundations of this approach to analyzing the US economy over the past several decades.

[2] The focus in Caldentey and Vernengo (2021) is on 'financialization' rather than Neoliberalism –but note that these are frequently treated as synonyms, with Neoliberalism regarded as a modern form of financialized capitalism (see, for example, Duménil and Lévy, 2011).

which reports four indicators of macroeconomic performance (the rates of unemployment, inflation and growth, and the wage share of income) together with the Federal Funds rate (an indicator of the monetary policy stance of the Federal Reserve Bank —FRB—) from 1960-2007. Performance in the first column (1960-73) corresponds to the end of the postwar 'Golden Age' growth regime, while that reported in the fourth and fifth columns (1990-2000 and 2001-2007) corresponds to the Neoliberal Boom. The second and third columns describe events during the *inter regnum* that separated the Golden Age and Neoliberal growth regimes. Table 1 shows that following the marked deterioration in unemployment, inflation, and growth performance in the US 1974-89, during which time the both the wage share of income and the Federal Funds rate rose, after 1990 Neoliberalism succeeded in restoring US unemployment and inflation performance to levels last witnessed during the Golden Age, with an accompanying restoration of the low interest rate environment characteristic of that earlier period. Growth performance was little improved under Neoliberalism, however, while the wage share was not just restored to its Golden Age level but further reduced below that level. But overall, Table 1 suggests that during the Neoliberal Boom, the US macroeconomy functioned in a manner more reminiscent of the postwar Golden Age than of the 1974-89 period of *inter regnum*.

Table 1 | US Macroeconomic Performance, 1960-2007

	1960-73	1974-79	1980-89	1990-2000	2001-2007
Unemployment	4.9	6.8	7.3	5.6	5.2
Inflation	3.1	9.6	5.6	3.1	2.7
Growth	4.3	3.0	3.1	3.3	2.5
Wage share	62.0	62.5	62.6	61.9	60.6
Federal Funds rate	4.77	7.67	9.97	5.24	3.03

Source: Setterfield (2006) and FRED.

2.2. Neoliberalism in theory and practice

According to its advocates –which, for much of the period corresponding to the Neoliberal Boom, included major international organizations such as the IMF and World Bank under the aegis of the 'Washington consensus'– Neoliberalism worked by 'freeing up' the private sector from the fetters of the state and revitalizing the supply side of the economy.

In particular, Neoliberalism was understood to make the labor market 'flexible', reducing 'disincentives' to work (such as the generosity of unemployment insurance schemes) and removing or diminishing the influence of 'impediments' to wage adjustment (such as trade unions). The resulting flexible labor market allegedly resulted in higher employment and hence higher output and income (when accompanied by the passive and accommodating adjustment of aggregate demand to the economy's enhanced potential output). Any initial increase in inequality associated with measures undertaken to increase labor market flexibility would be offset, advocates reasoned, by income gains among the least affluent that would 'trickle down' from aggregate income gains accruing disproportionately to more affluent members of society.

In reality, Neoliberalism worked because it successfully institutionalized an 'incomes policy based on fear' (Cornwall, 1990). Like any incomes policy, the Neoliberal incomes policy based on fear was made up of a stable and coherent set of formal and informal institutions that framed aggregate wage and price setting dynamics, mediating conflict over income shares so as to better reconcile conflicting claims on aggregate income (see Setterfield, 2007, p.129). It emanated from a systematic process of 'zapping labor' by corporations and the state (Harrison and Bluestone, 1988), that began in the 1980s and was purposely designed to weaken the bargaining power of workers: labor law 'reforms' designed to make unionization harder and deunionization easier; increased 'non-standard' (part-time, temporary, and 'gig') employment that threatens full-time, year-round workers with involuntary underemployment at any given rate of unemployment; 'downsizing' exercises that threaten unemployment independently of the state of general macroeconomic performance; and the credible threat of unemployment due to domestic or international plant relocation –which threat has also been shown to contribute to the undermining of unionization drives (Palley, 1998; Bronfenbrenner, 2000).[3]

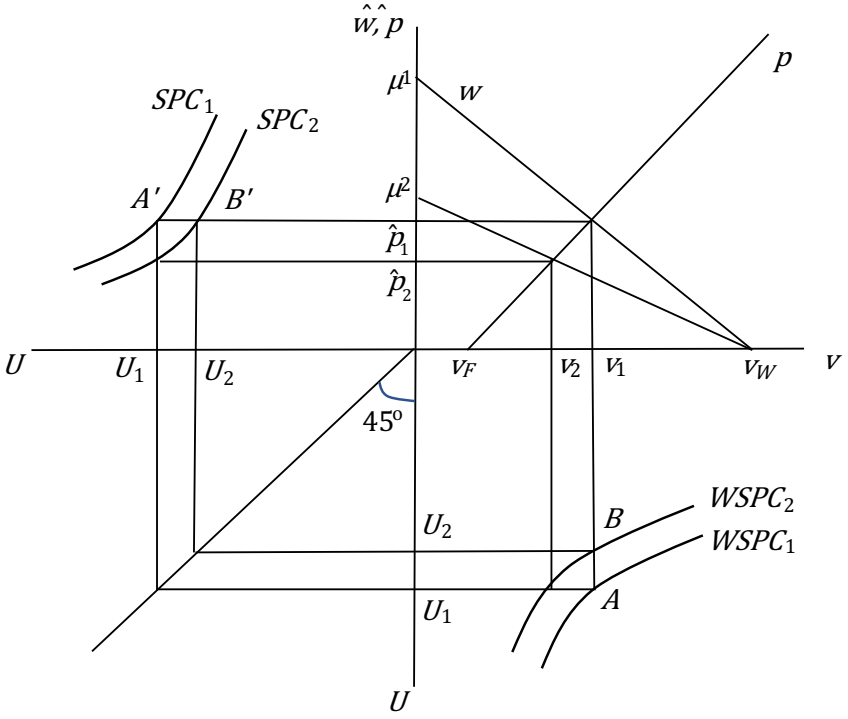
The upshot of these developments is a form of institutionalized worker insecurity that curtails inflationary forces and buttresses profitability regardless of the rate of unemployment, so allowing monetary easement and reductions in unemployment that neither propagate inflation nor threaten to squeeze profits (Setterfield, 2006, 2021). These outcomes are illustrated in Figure 1 which, in the north-east quadrant, depicts structural relationships between the rates of growth of nominal wages ($\hat{w}$) and prices ($\hat{p}$) on one hand, and the wage share of income (v) on the other. As the wage share rises, $\hat{p}$ rises along the price-setting schedule (p) as firms, subject to their price-setting power in product markets, seek to restore target profit margins consistent with their preferred profit share ($1 - v_F$). Meanwhile, as the wage share falls, $\hat{w}$ rises along the price-bargaining schedule (w) as workers, subject to their bargaining power *vis a vis* firms (represented by the parameter μ), seek to defend the value of the real wage implicit in their preferred wage share, v_W.[4] Initially, the interaction of these conflicting income claims results in an equilibrium wage share v_1 and rate of inflation $\hat{p}_1$ that, at the prevailing rate of unemployment U_1, constitute points on the standard and wage-share Phillips curves SPC_1 and $WSPC_1$ in the north-west and south-east quadrants of Figure 1, respectively. The institution of the Neoliberal incomes policy based on fear reduces worker bargaining power (from μ_1 to μ_2) – which development, *ceteris paribus*, is consistent with a reduction in the wage share and rate of inflation (to v_2 and $\hat{p}_2$, respectively) at U_1, shifting the SPC and WSPC to SPC_2 and $WSPC_2$, respectively. A fall in the interest rate that stimulates output and employment and so reduces unemployment (to U_2) then raises worker bargaining power (to μ_1), restoring the wage share and inflation rate to v_1 and $\hat{p}_1$, respectively. This results in movement along SPC_2 and $WSPC_2$ in the north-west and south-east quadrants of Figure 1. Considered simultaneously, the combined result of these developments is movement from points *A* and *A'* to points *B* and *B'* in Figure 1: non-inflationary and nonwage-share-increasing declines in unemployment brought about by monetary stimulus and facilitated by the institution of the incomes policy based on fear. Effectively, the institutionalized threat to worker income and employment security created by the incomes policy based on fear substitutes for the

[3] The systematic weakening of the bargaining of workers over the last four decades is now acknowledged and discussed by 'mainstream' authors such as Stansbury and Summers (2020) –having been accepted much earlier by central bankers such as Alan Greenspan, whose 'labor market fear factor' testimony to the US Congress, in defense of FRB interest rate policy during the mid-1990s, epitomizes the core workings of the Neoliberal incomes policy based on fear.
[4] For further discussion of this model see, for example Blecker and Setterfield (2019, chpt.19).

threat created by higher unemployment, allowing for monetary easement and reduced unemployment without inflationary pressure or a profit squeeze.

These outcomes are consistent with the data in Table 1 describing the restoration of Golden Age macroeconomic performance in the US during the Neoliberal Boom, following the *inter regnum* of the 1970s and 1980s when 'tight money' and high unemployment were deemed essential to control high inflation and pressure on corporate profitability.

Figure 1 | The Neoliberal "incomes policy based on fear"



However, the problem with the incomes policy based on fear as an institutional framework or 'operating system' for advanced capitalism is the risk it poses to the process of demand formation –which risk is implicit in the falling wage share in Table 1, and the threat this poses to the majority of households who depend mainly or exclusively on wage income to fund consumption spending, the single largest component of aggregate expenditures. As has been discussed in a large literature, this problem was 'solved' during the Neoliberal Boom by household borrowing, which debt-financed rising consumption expenditures that could not be funded by stagnant wage incomes (Palley, 2002; Brown, 2008; Cynamon and Fazzari, 2008; Barba and Pivetti, 2009; Setterfield, 2013; Wisman, 2013). But this transformed rather than eliminated the risk to the macroeconomy, which now took the form of growing financial fragility (Godley and Izurieta, 2002; Palley, 2002). As is well known, having remained latent throughout the Neoliberal Boom, the risk posed by increasing financial fragility finally became manifest during the 2007-09 financial crisis and Great Recession –events that ultimately brought the Neoliberal Boom itself to an end.

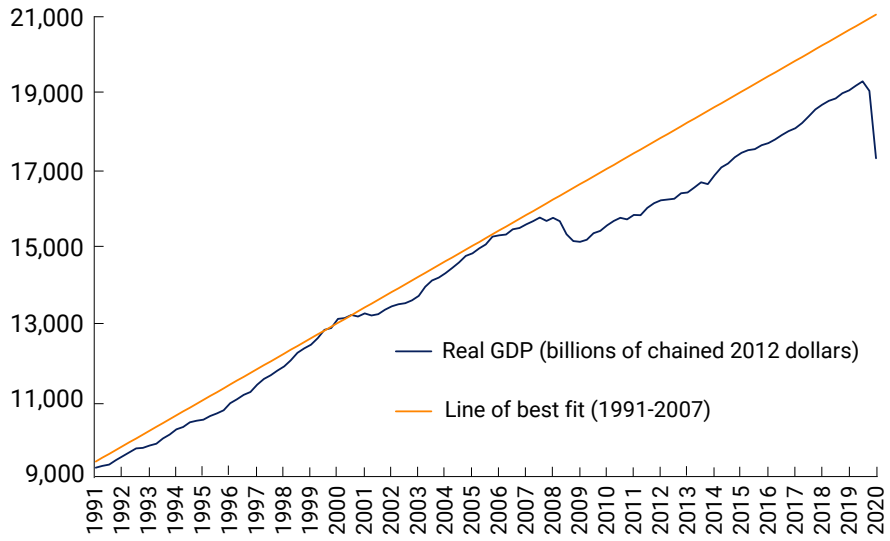
3. An entrenched but exhausted growth regime

3.1. An exhausted growth regime

Having ended the borrowing 'offset' to the latent demand-formation problem inherent in the structure of Neoliberalism (see Cynamon and Fazzari, 2016), the financial crisis and Great Recession presented the US economy with a dilemma: 'wind up the clock springs' of household debt accumulation once again or confront a future of something like secular stagnation (Cynamon *et al.*, 2013). History shows that this 'choice' was resolved in favor of the latter. The recovery from the Great Recession from 2009-2019 is best characterized as a 'depressed upswing' rather than a robust trade cycle boom, that demonstrates the exhaustion of the Neoliberal growth regime post-2009.[5] Two prominent features of the 2009-2019 period bear out this diagnosis: the trajectory of real output since 2009; and the overstated 'tightness' of both the goods and labor markets towards the 2019 cyclical peak.

As Figure 2 illustrates, the trajectory of real output in the US after 2009 paints a dismal picture of failure to recover to anything resembling the trend path of real output established during the 1990-2007 Neoliberal Boom. In the wake of the Great Recession, the growth of real output in the US reasserted itself at something like its 1990-2007 trend rate. But at no point during the 2009-2019 depressed upswing did the US witness sustained real output growth in *excess* of its trend rate, sufficient to restore the economy to its pre-2009 trend output path. In other words, and unlike either of the two previous recoveries during the Neoliberal Boom illustrated in Figure 2, the 2009-2019 recovery was not even so much as 'U'-shaped (much less 'V'-shaped).

Figure 2 | US real GDP 1991-2019

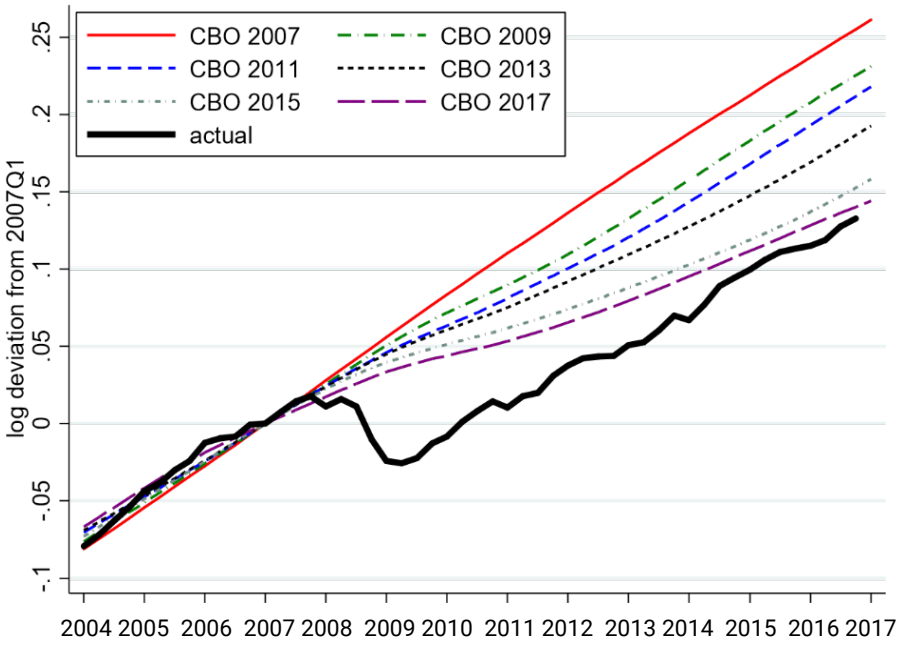


Source: Authors' calculations based on Federal Reserve Economic Data (FRED).

[5] See, for example, Palley (2013) for an early anticipation of this theme of Neoliberalism as an exhausted growth regime.

The weakness of the recovery in real output is further illustrated by the behavior of the output gap. By conventional measures the output gap narrowed as the boom progressed, suggesting a progressively tightening goods market as the US approached its 2019 cyclical peak. But as is well known, the conventionally measured output gap narrowed 2009-2019 largely because of successive downward revisions in the Congressional Budget Office's (CBO) estimates of the potential output path in the US, as illustrated in Figure 3. As shown in Figure 4, the alternative measure of goods market slack developed by Tercioglu (2020), which is designed to make estimates of potential output and hence the output gap less sensitive to actual output, shows that the US experienced a sustained output gap throughout the 2009-2019 depressed upswing. This again contrasts with experience during either of the two previous business cycle upswings during the Neoliberal Boom, when the output gap diminished and was eventually eliminated as the upswing progressed towards its cyclical peak.

Figure 3 | CBO estimates of US potential output since 2007

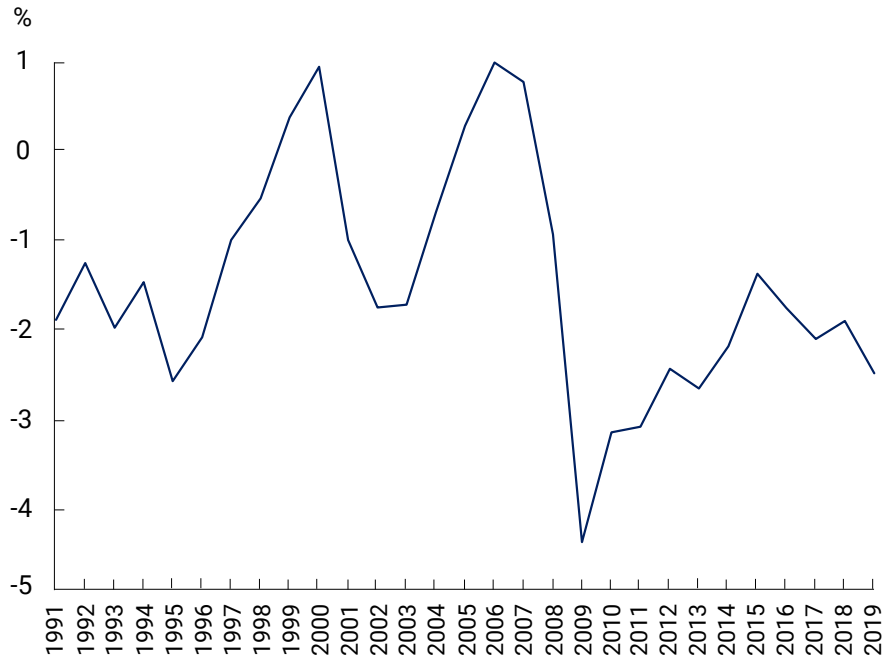


Source: Coibion *et al*., 2018.

At the same time, the tightness of the US labor market towards the closing stages of the 2009-2019 depressed upswing was systematically overstated by the conventional U3 measure of unemployment. As previously noted, an important constituent part of the Neoliberal incomes policy based on fear is the threat of underemployment (at any given rate of conventionally measured unemployment) created by the growth of part time and contingent employment and the associated growth of *involuntary* part time and contingent employment. When this latter phenomenon is considered together with discouraged workers (who reduce labor force participation and thereby falsely deflate U3), the resulting U6 measure of unemployment developed by the Bureau of Labor Statistics (BLS) demonstrates that even during the later stages of the 2018-19 depressed upswing, the US labor market remained slack. This is illustrated in Figure 5, which plots the BLS's U3 and U6 measures of US unemployment throughout the Neoliberal era. U6 averaged 11.9% during the 2009-

2019 depressed upswing, almost a third higher than its average of 9.1% during the previous (2002-2007) trade cycle upswing at the end of the Neoliberal Boom.

Figure 4 | An alternative measure of the US output gap

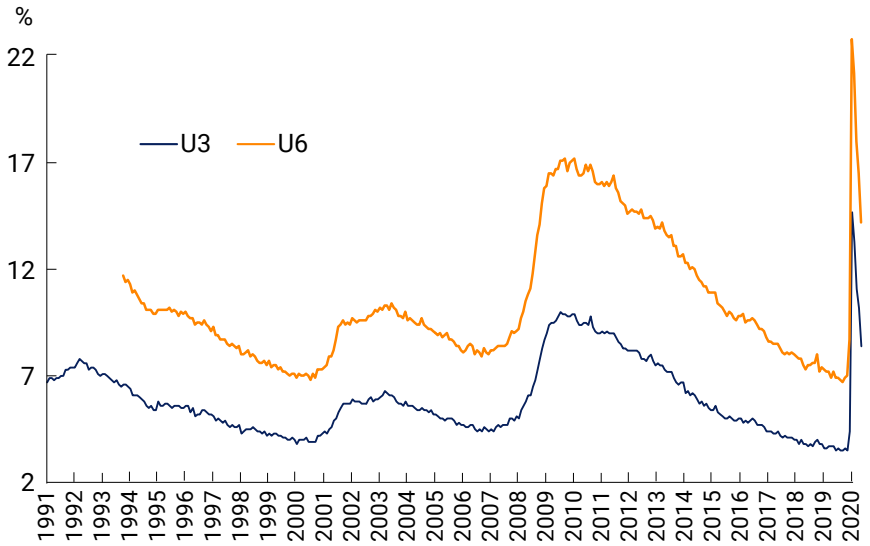


Source: Author's calculations based on Tercioglu (2020).

3.2. An entrenched growth regime

Just as the evidence of the 2009-2019 depressed upswing suggests that the Neoliberal growth regime is now exhausted, so, too, it suggests that this growth regime remains entrenched –that its basic structure remains intact, even as it now fails to deliver macroeconomic performance on a par with that during the Neoliberal Boom. Hence core Neoliberal mechanisms for suppressing labor and generating income inequality continued to function after 2007. This is demonstrated in Figure 6, which illustrates the fabled 'Goodwin pattern' in the US economy since 2000. The Goodwin pattern describes a high-frequency clockwise rotation in wage share × employment rate space, and is a well-established feature of advanced capitalist economies over the last century or more (see, for example, Setterfield, 2021, and the various references therein). Figure 6 shows that the US wage share fell markedly between the cyclical peaks of 2000 and 2007, during the closing stages of the Neoliberal Boom. A similar marked decline in the wage share is again evident between the business cycle peaks of 2007 and 2019. Indeed, Figure 6 provides no evidence of even so much as a traditional profit squeeze during the 2009-19 depressed upswing, the wage share remaining essentially constant even as the employment rate rose by approximately six percentage points.

Figure 5 | Alternative measures of unemployment in the US, 1991-2020



Source: Bureau of Labor Statistics (BLS).

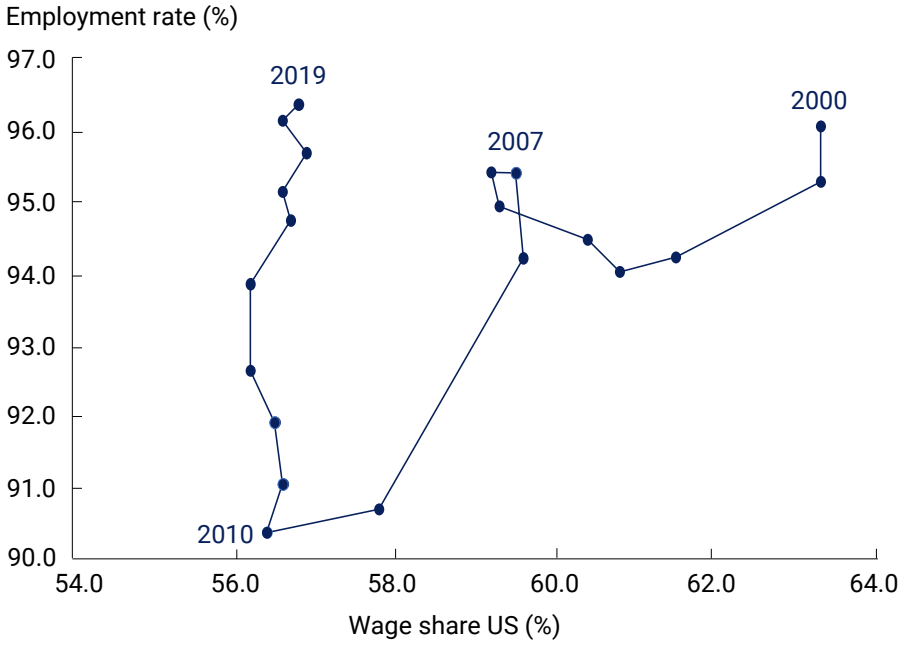
The 2009-2019 depressed upswing was, of course, brought to an abrupt end by the onset of the COVID-19 pandemic and associated 'lockdowns' which, although motivated by the purpose of protecting public health, had the immediate and widespread effect of reducing both production and (in-person) exchange, resulting in the onset of recession in the US economy in early 2020. As a result of this turn of events, a Neoliberal system that had already proved itself capable of manufacturing crisis from *within* (the 2007-09 Great Recession) was now shown to be incapable of responding either efficiently or equitably to a substantial shock from *without*.[6] As regards the inefficiency of the response, we need only refer to events in the labor market once the beginning of 2020. Absent any equivalent of the German *Kurzarbeit* work sharing system, designed to respond to economic downturns by reducing hours worked (and compensating still-employed workers for loss of income due to short hours), the US economy instead responded to the crisis through *ad hoc* reliance on various extensions to the unemployment insurance system, designed to compensate workers for total loss of income due to the sudden onset of mass unemployment. Labour in the US economy was thus underutilized during the COVID-19 recession in a manner that served to maximize worker-firm separations and (judging by trends in the labour force participation rate since the beginning of 2020) encouraging many US workers to drop out of the labour force altogether.[7] This uncoordinated, inefficient labour market response to the onset of the crisis is among the various factors now hampering recovery from the COVID-19 recession, as firms who simply laid off workers altogether (without the possibility of recall) now struggle *en masse* to rehire.[8]

[6] See also Scott and Pressman (2021) and Ghosh and Renna (2021) on inefficiencies and inequities in the response to COVID-19 in Neoliberal economies such as the US and UK.

[7] Whether this reduced labor force participation proves merely persistent or, in fact, becomes a permanent 'hysteresis effect' remains to be seen. The nature and consequences of reduced labor force participation are discussed further below.

[8] As argued by Rosenberg (2021, p.424), the inefficiency of the response to COVID-19 in the US was also reflected in a shortage of personal protective equipment (PPE) for essential workers that can be associated with the 'free market' logic of Neoliberalism, the concomitant refusal of the Trump administration to utilize the Defense Production Act, and the resultant competition among states for PPE.

Figure 6 | The "Goodwin pattern" in the US 2000-2019



Meanwhile, the inequity of the Neoliberal response to the COVID-19 crisis is once again illustrated by labour market outcomes. As noted by Guttmann (2021, p.5), the COVID-19 lockdowns created three classes of workers: privileged professionals, who were largely able to adapt by working from home at full pay; 'essential' workers, who continued to work in-person regardless of the risks to their health; and those who lost their jobs altogether (or suffered reductions in hours) with concomitant reductions in pay. These developments reinforced previously existing trends towards increasing wage inequality and created a new source of inequality due to the risks to personal health unique to by the second group of workers. The lockdowns also had disproportionately adverse effects on already-disadvantaged groups such as women and racial minorities, who were disproportionately exposed to the concentration of job losses in low-wage service-sector industries, disproportionately exposed to COVID19 as a result of their disproportionate representation among 'essential' workers, and/or disproportionately responsible for additional childcare and schooling due to the lockdowns.

As previously noted, the US economy has struggled with the early stages of recovery from the COVID-19 recession, partly as a result of the extent of worker dislocation during the recession coupled with what may prove to be a 'hysteresis effect' on labour force participation caused by this dislocation. Hence the US labour force participation rate fell sharply during the early stages of the COVID-19 recession, then rebounded sharply to recover more than half of its initial loss, but has since remained roughly constant, substantially below its pre-pandemic rate. There are several possible reasons for this, including (but not limited to) the discouraging effects of lingering health care concerns, which may prove merely persistent. First, the COVID-19 recession imposed greater-than-usual job losses on low-wage service-sector industries (as opposed to manufacturing industries) and hence on women (as opposed to men) –see Albanesi and Kim (2021). Women displaced from low-wage service sector work may remain permanently outside the labour force

because of re-evaluations of work/life balance and/or the realization –borne of a 'natural experiment' forced upon them by a combination of involuntary unemployment and reorganization of the provision of child care and schooling– that the economics of low-wage work and costly child care makes less financial sense than reversion to a more traditional household structure that involves women providing unpaid services to children in the sphere of household production. Meanwhile, other workers forced through the same natural experiment –especially those displaced from industries in which employment conditions have deteriorated during the Neoliberal era due, for example, to power-biased technical change (Skott and Guy, 2007)– may have brought forward decisions to retire that would otherwise have been more evenly dispersed over a period of years.

These developments appear to be having some effects on wage growth, particularly among lower-wage workers in the leisure and hospitality industries who disproportionately bore the brunt of the layoffs precipitated by the COVID-19 lockdowns. Something akin to 'spontaneous collective action' has arisen as a result of reduced labour force participation coupled with the 'great resignation'. In the context of the sheer speed and size of recent adjustments in the economy (the sudden and massive loss of jobs following health-related lockdowns and the equally sudden surge in economic activity following the creation and distribution of COVID-19 vaccinations), the effect has been an empowerment of workers *vis a vis* firms in the wage bargain –at least in the short-term. This qualification is necessary because in other respects, the recovery from the COVID recession demonstrates the continued underlying structural weakness of labour that has been the hallmark of Neoliberalism. Hence rather than prompting immediate resort to increased wage offers designed to increase the quantity of labour supplied –which ought to be the primary mechanism of adjustment in a truly competitive and tight 'free market' for labour– excess demand for workers by mid 2021 instead resulted in calls for political solutions designed to increase labour supply and so permit trade at the 'offer price' for labour preferred by employers. The clamor for nationwide early termination of more generous COVID-era unemployment benefits exemplifies this tendency –which clamor arose despite the lack of any substantial evidence that the strategy was proving effective in states that had already moved to terminate the benefits ahead of their federal expiry date. Meanwhile, although wages in industries such as leisure and hospitality are growing faster than inflation during the second and third quarters of 2021, the average hourly earnings of all employees did not –with the result that real wages fell. Hence according to Federal Reserve Economic Data (FRED), even as the annual rate of increase in the US consumer price index rose from an average of 1.3% during the first 11 months of recovery from the COVID-19 recession (May 2020 - March 2021) to an average of 5.3% from April to October 2021, the annual rate of increase in the hourly earnings of all employees actually *fell*, from 5.0% to 3.4%, between these two periods. These considerations have important implications for concerns about the specter of inflation. They suggest that the structural weakness of labour created by the Neoliberal incomes policy based on fear will predominate as the recovery continues. The upshot of this will be the absence of anything resembling a robust wage-price inflationary spiral. As such, rather than foreshadowing the onset of a genuine inflation –a steady rise in the general price level– it is more likely that increases in measured inflation during the second half of 2021 reflect only once-over changes in prices in specific industries. This has damaging implications for workers because as the FRED data outlined above illustrate, it implies greater reductions in the average real wage than would otherwise occur

if there was sufficient worker bargaining power to create the real wage resistance necessary to propagate a robust wage-price inflationary spiral and hence a genuine inflation. In other words, more so than the economy's nominal dynamics, it is distributional outcomes that are once again the 'adjusting margin' in the recovery from the COVID-19 recession, bringing additional distress to those who lost out during the recession and who have been the 'serial losers' under decades of Neoliberalism. There is also an important lesson here for central banks who, in the current environment, need to be mindful of the difference between inflation proper (a *steady* rise in the *general* price level) and the appearance of inflation (caused by month-to-month changes in an index number driven by specific prices). Fortunately, there is evidence that this view is not lost on central bankers themselves (Sheremirov, 2021).

4. Conclusions

Despite the improvement in US macroeconomic performance between 1990 and 2007 relative to the 1974-89 period, Neoliberalism never was a basis for sustainable and inclusive growth. The insecurity-dependence of Neoliberalism meant it could never be inclusive, as evidenced by the secular rise in inequality over the past three decades. The debt-dependence of its demand regime, meanwhile, made the Neoliberal economy unsustainable. This was demonstrated by the 2007-09 financial crisis and Great Recession that brought the Neoliberal Boom to an end.

Persisting now as an entrenched but exhausted regime, Neoliberalism is no longer a basis for growth of any sort. This was demonstrated over the course of the 2009-2019 'depressed upswing', and it is difficult to expect anything better over the course of the next upturn in the business cycle following the inefficient and inequitable response to the COVID-19 recession.

Indeed, the problems created by Neoliberalism now extend well beyond the economic sphere. The rise of nativism, xenophobia, and outright racism associated with right wing populism, and the problems these developments pose for the very fabric of social and political life, can all be linked to 'managing the discontent of the losers' under Neoliberalism (Setterfield, 2020).

The notion of 'building back better' after the COVID crisis, associated with US President Biden's plans for infrastructure investment and social policy, in fact needs to be applied to the entire structure of the Neoliberal economy. As argued by Flaschel *et al*. (2022), the challenge involves harnessing capitalism's forces of production within modified relations of production to create a 'social capitalism' that better directs the forces of production to serve the public purpose. The task ahead is formidable, but it has been confronted before –in the aftermath of two world wars and the Great Depression– and can be again.[9] The insufficiency of *political will*, as opposed to any lack of economic expertise or the presence of binding economic constraints, will likely be the critical impediment to successful pursuit of this agenda.

[9] See, for example, Flaschel *et al*. (2022).

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Políticas monetaria y financiera, estabilidad macroeconómica y desarrollo

Monetary Policy and Inequality

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Abstract

The nexus between monetary policy and inequality has attracted attention since the Great Financial Crisis. By keeping interest rates unusually low for unusually long to engineer a recovery and raise inflation, central banks have contributed to the perception that they have been raising inequality. But understanding the nexus requires a more holistic analysis. Long-term trends in inequality are not a monetary phenomenon: they reflect structural forces that are beyond the reach of monetary policy. Nevertheless, it can do a lot to foster a more equitable distribution over business cycles: its mandate requires it to tackle the major sources of inequality over business fluctuations: price, macroeconomic and, hence, financial instability. Changes in the nature of the business cycle have complicated this task, calling for greater support from other policies.

JEL Classification: E30, E31, E44, E52, D63.

Keywords: business cycle, financial stability, inequality, inflation, monetary policy.

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Política monetaria y desigualdad

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Resumen

El nexo entre la política monetaria y la desigualdad ha atraído la atención desde la Gran Crisis Financiera. Al mantener las tasas de interés inusualmente bajas durante un tiempo inusualmente largo para lograr una recuperación y aumentar la inflación, los bancos centrales han contribuido a la percepción de que han aumentado la desigualdad. Pero entender el nexo requiere un análisis más holístico. Las tendencias a largo plazo de la desigualdad no son un fenómeno monetario: reflejan fuerzas estructurales que están fuera del alcance de la política monetaria. Sin embargo, ésta puede hacer mucho para fomentar una distribución más equitativa a lo largo de los ciclos económicos: su mandato le obliga abordar las principales fuentes de desigualdad a lo largo de las fluctuaciones económicas: los precios, la inestabilidad macroeconómica y, por tanto, la financiera. Los cambios en la naturaleza del ciclo económico han complicado esta tarea, exigiendo un mayor apoyo de otras políticas.

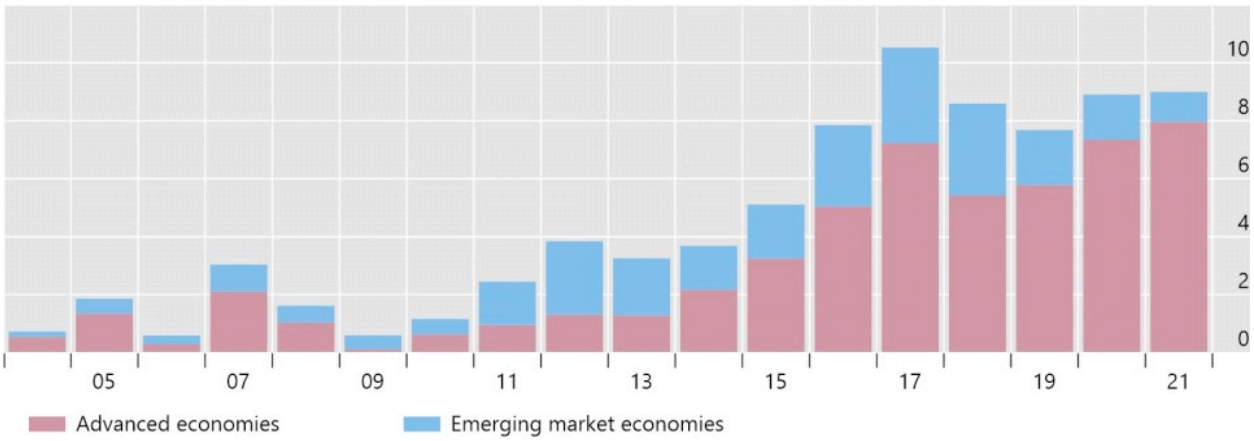
Clasificación JEL: E30, E31, E44, E52, D63.

Palabras clave: ciclo económico, desigualdad, estabilidad financiera, inflación, política monetaria.

1. Introduction

The nexus between monetary policy and inequality has come to the fore in recent years. In part, this reflects greater concerns about inequality as such, following its secular increase in countries around the world. In part, it reflects the fact that, in the wake of the Great Financial Crisis (GFC), central banks have kept interest rates unusually low for unusually long in order to engineer a recovery and push a stubbornly low inflation rate back to target. Hence the perception that they have been increasing inequality by boosting the prices of assets disproportionately held by the rich, notably equities, and by reducing the yield on bank deposits. The Covid-19 crisis has further heightened attention to these issues. Indeed, the term "inequality" has figured increasingly in central bank speeches (Figure 1).

Figure 1 | Share of speeches mentioning inequality (percentage share)



Speeches of central bankers mentioning the keywords "inequality" and "distributional consequences/impact of monetary policy" expressed as a share of all central bankers' speeches in the BIS database. Only selected speeches in English and, for the United States, only speeches by members of the Board of Governors of the Federal Reserve System and the Federal Reserve Bank of New York are included in the database. Data until end-May 2021.
Sources: BIS; BIS calculations.

But what exactly is the relationship between monetary policy and inequality? In this year's Annual Economic Report we devote a chapter to this question.

We highlight three takeaways.

First, we reaffirm that, fundamentally, long-term trends in inequality are not a monetary phenomenon. They have to do with structural forces that are beyond monetary policy's reach.

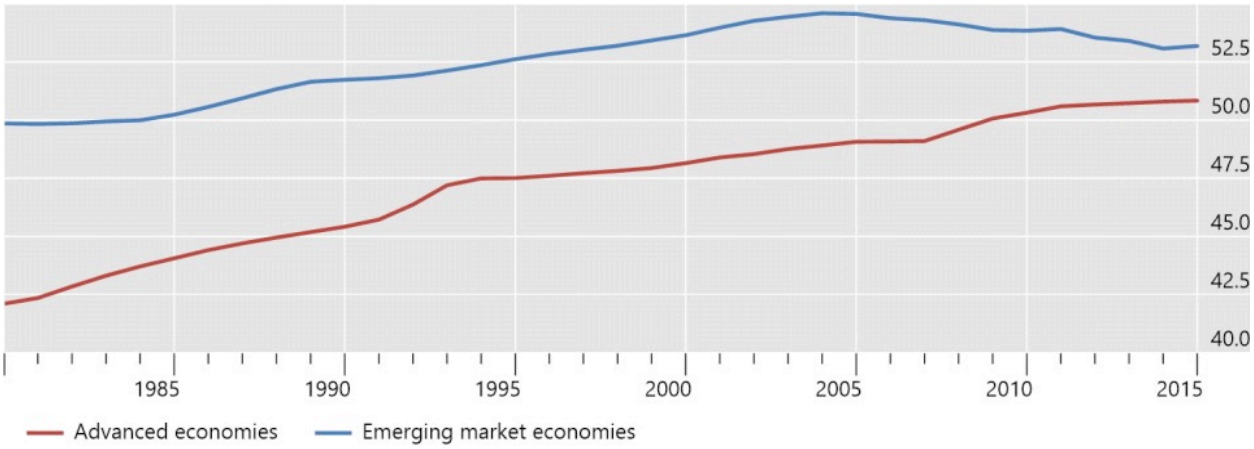
Second, and despite this, monetary policy can do a lot to foster a more equitable distribution over business cycles. This is because price, macroeconomic and, hence, financial instability amplify inequality. And fighting such instability is what monetary policy mandates are all about.

Finally, changes in the nature of the business cycle have complicated this task, and thus the impact of monetary policy on inequality. This means that it is more important than ever for other policies to play a complementary role in stabilising the economy – in particular, prudential, fiscal, and structural.

2. A structural problem calls for structural solutions

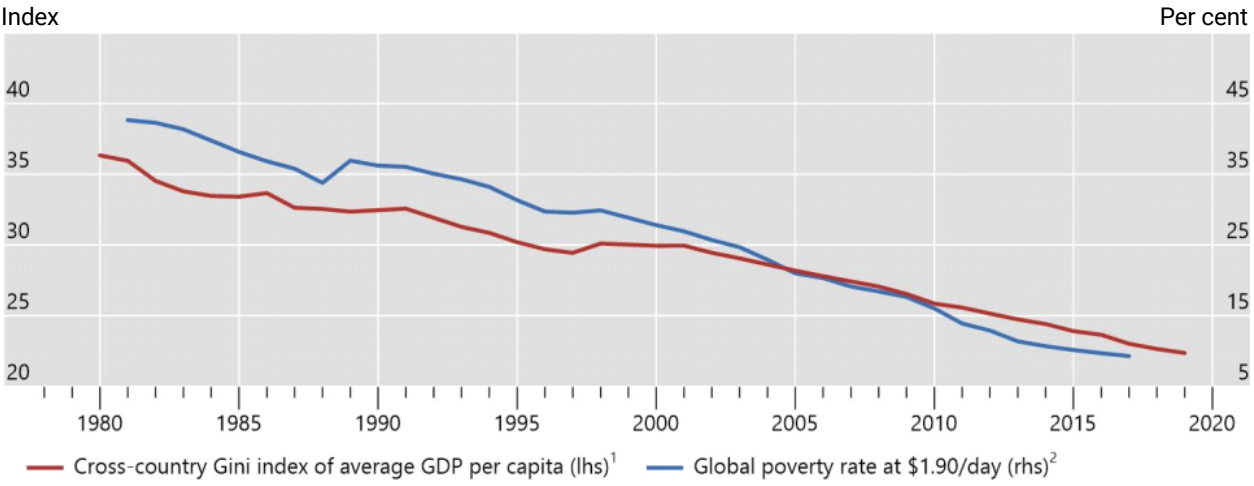
Inequality within countries has been rising since the early 1980s, in both advanced and emerging market economies (EMEs) (Figure 2). While the graph shows income inequality (here based on the standard Gini coefficient), the same is true of wealth inequality – which, admittedly, is somewhat harder to measure. This has happened even as inequality across countries has declined and so has poverty (Figure 3).

Figure 2 | Pre-tax, pre-transfer Gini index (index)



Pre-tax, pre-transfer Gini index is calculated using the amount of money coming into the household pre-tax, excluding government cash or near-cash benefits. Weighted averages of selected economies, based on 1980 GDP and PPP exchange rates. Advanced economies = CA, DE, FR, GB, JP and US; emerging market economies = BR, CN, IN and ZA.
Sources: Standardized World Income Inequality Database (SWIID); World Inequality Database (WID); BIS calculations.

Figure 3 | Cross-country inequality and global poverty rate

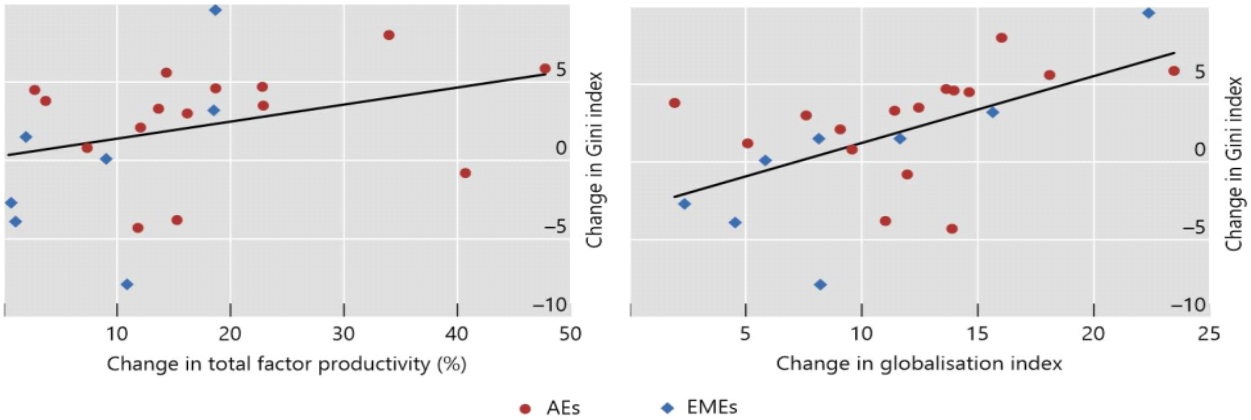


Gini index of average GDP per capita (constant prices, PPP) on a cross section of countries. AEs: AT, AU, BE, CA, CY, DE, DK, ES, FI, FR, GR, IE, IT, LU, MT, NL, NZ, NO, PT, SE, CH, GB, CN, HK, IN, ID, JP, KR, MY, PH, SG, TH, TW and US; EMEs: AR, BR, CL, CO, MX, PE, HU, PL, SA, ZA and TR. Global poverty headcount ratio at $1.90/day poverty line (2011 PPP).
Sources: IMF, World Economic Outlook; World Bank; BIS calculations.

Long-term structural developments necessarily have structural causes. Two highlighted in this context are technology and globalisation. Technology is thought to have raised inequality by increasing the demand for the skilled relative to the unskilled; and globalisation, by displacing swathes of workers who lose their comparative advantage. Accordingly, over long periods there is a clear correlation across countries between measures of inequality, on the one hand, and technology (Figure 4, left-hand panel) and globalisation (right-hand panel).

Figure 4 | Inequality is driven by structural forces

The effect of technology on inequality **The effect of globalisation on inequality (1)**



The sample includes 15 AEs and nine EMEs; changes are computed over the period 1981–2015 (or shorter, depending on country-level data availability). (1) Based on the KOF Globalisation Index.
Sources: Penn World Table; UNU-WIDER, World Income Inequality Database (WIID); KOF Swiss Economic Institute; BIS calculations.

Structural causes call for structural remedies. Ultimately, only structural policies can adequately address inequality. They can tackle the underlying forces by improving health, education, antitrust legislation and, more generally, by fostering equal opportunities. In addition, fiscal policy can offset the impact of those forces: inequality is significantly lower after the tax-and-transfer system has done its job (Figure 5).

Figure 5 | Income inequality: before and after taxes and transfers (Gini index)

For FR, 2012; for JP, 2015; for IT, 2017; for CA, DE, GB and US, 2018. For IN, 2013; for BR, 2014; for CN, 2015; for RU and ZA, 2018.
Sources: Luxembourg Income Study (LIS) Database; Standardized World Income Inequality Database (SWIID); BIS calculations.

Moreover, wearing their non-monetary hats – of a more structural character – central banks have a role to play, to an extent that depends on their specific responsibilities and, importantly, the tools at their command. For instance, by fostering financial development, inclusion, and literacy, they can offer the more disadvantaged more, better, and safer savings vehicles. By contributing to financial consumer protection, they can shield them from predatory practices. And by making payment systems more efficient and competitive, they can help reduce costs, notably for cross-border payments and remittances, which disproportionately hit the poor.

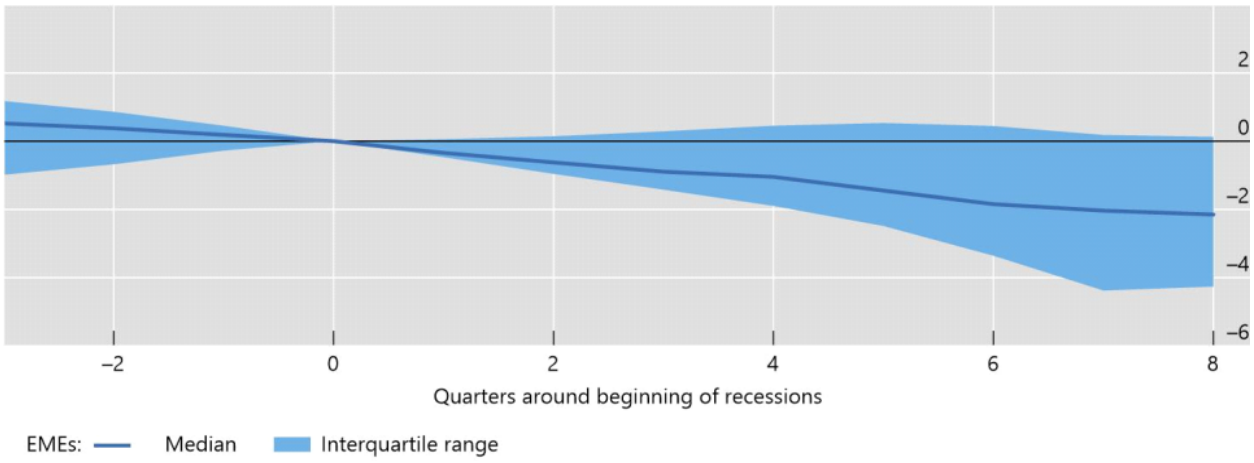
3. Inequality and monetary policy objectives

None of what I have said so far implies that monetary policy has no role to play in mitigating inequality. Far from it. The two major sources of greater inequality over business cycles are inflation and recessions, or downturns more generally. And this is precisely what monetary policy mandates are all about: seeking to deliver price and macroeconomic stability, for which financial stability is a prerequisite, whether financial instability is interpreted narrowly – as banking or financial crises – or more broadly – as the financial amplification of recessions.

The impact of inflation on inequality has been amply studied. Not surprisingly perhaps, inflation is often portrayed as a regressive tax. And it is generally agreed that its impact rises disproportionately with the inflation rate. I can attest to that, having seen first-hand the havoc that high inflation can wreak on the poorer segments of society when I grew up in Argentina. The poor are the most vulnerable. They are the first to lose their jobs when inflation erodes the economic fabric of society. They are the first to see the purchasing power of their wages dwindle when prices soar. And they are the least able to protect their savings.

Figure 6 provides some stylised evidence on the impact of inflation on inequality. It shows what happens to inequality once inflation declines below a 5% threshold on a sustained basis in several episodes in EMEs since the mid-1980s. Income inequality declines – both on average, and in general.

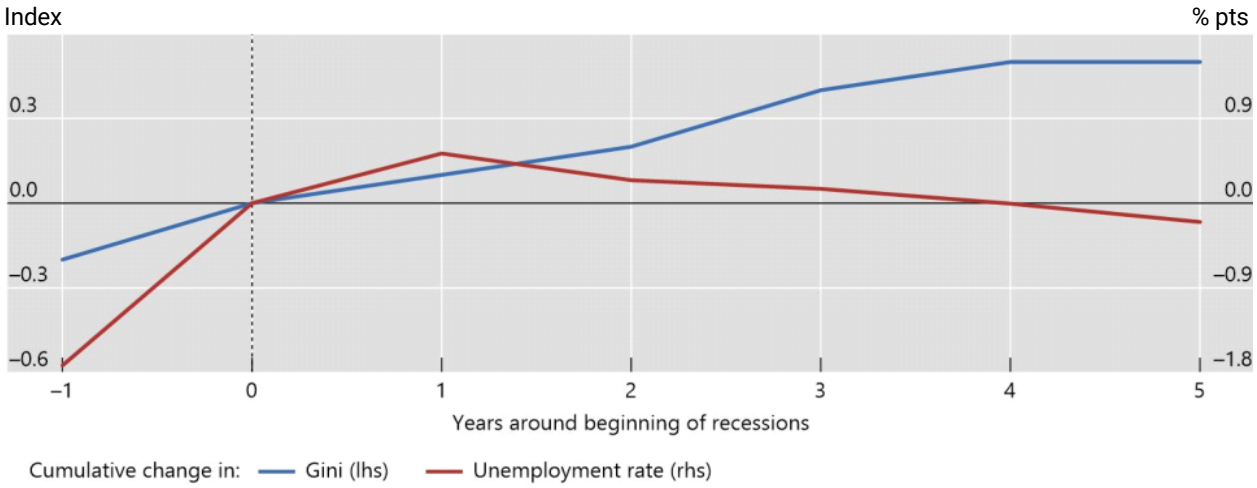
Figure 6 | The conquest of inflation and subsequent change in income Gini change (Gini index cumulative change)



Year t is the year in which the 10-year average realized inflation rate fell below 5% for the first time, without subsequent reversal of average to 1 percentage point above that. The vertical axis represents variation of the net income Gini index relative to year t. Based on 34 "conquest of inflation" episodes which satisfied the above criteria and occurred between 1992 and 2016.
Sources: IMF, International Financial Statistics and World Economic Outlook; World Bank; BIS; BIS calculations.

What about recessions? It makes sense that recessions should widen inequality. In particular, the unskilled are the first to swell the ranks of the unemployed. Indeed, following recessions, unemployment rises, and so does inequality, more persistently (Figure 7).

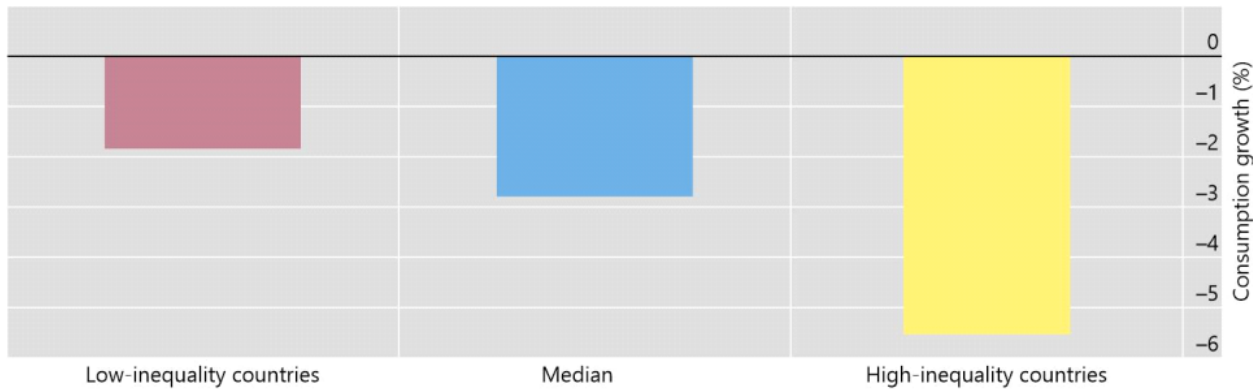
Figure 7 | Gini income inequality and unemployment around recessions



Based on 79 recession events over the period 1980–2018 for AR, AT, AU, BE, CA, CH, CL, CO, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HK, ID, IT, JP, KR, LT, LV, MT, MX, MY, NL, NO, NZ, PE, PT, RU, SE, SG, SI, SK, TH, TR, TW, US and ZA.
Sources: IMF, World Economic Outlook; Standardized World Income Inequality Database (SWIID); BIS calculations.

But the relationship goes further. For one, evidence suggests that, all else equal, higher inequality goes hand in hand with deeper recessions. In a sample of AEs and EMEs, the higher inequality is, the deeper the recessions are (Figure 8). This could reflect a larger proportion of vulnerable workers.

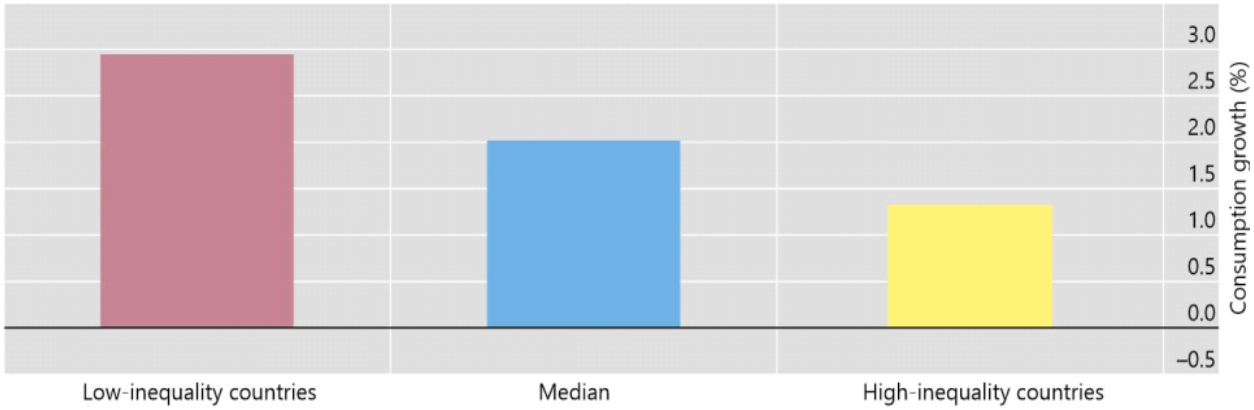
Figure 8 | Depth of recessions and inequality across countries



Estimated declines in real per capita private consumption during a recession at the specified percentile of income inequality. Recessions are defined as a year of negative real GDP growth, and the share of income of the top 10% is taken as the indicator of income inequality. Estimates are based on a dynamic panel specification that includes country and time fixed effects. Specifically, real per capita private consumption growth is regressed on its lag, a recession dummy, the share of income held by the top 10% and the interaction between the latter two variables. Based on 1981–2019 data for 91 countries. Financial recessions are recessions that were associated with sovereign debt, banking, or currency crises. For further details, see E Kohlscheen, M Lombardi and E Zakrajšek, "Income inequality and the depth of economic downturns", Economics Letters, vol 205, August 2021.
Sources: World Bank; national data; BIS calculations.

In addition, there is evidence that, on balance, higher inequality makes monetary policy less powerful in stimulating economic activity (Figure 9). Across countries, when inequality is higher, the cumulative impact of a monetary policy easing on consumption is smaller. A plausible explanation is that richer people have a lower marginal propensity to consume, while poorer people may find it harder to borrow when interest rates decline, as they may face tighter credit constraints than their richer peers.

Figure 9 | Cumulative consumption growth two years after monetary easing



The bars represent the estimated response of consumption from year t–1 until year t+2 to an expansionary monetary policy shock of 100 basis points in year t. These estimates are obtained through a two-step procedure. In the first step, a panel vector autoregression (PVAR) featuring CPI inflation, real GDP growth and the short-term policy interest rate is estimated for AEs using quarterly data from Q1 1999 to Q4 2019. Based on this PVAR, economy-specific monetary policy shocks are identified as quarterly innovations to policy interest rates that are orthogonal to those to economic growth and inflation. In this stage, the euro area is considered as a group. In the second step, we aggregate the quarterly monetary policy shocks to annual frequency for 21 AEs and estimate a local projection equation, where the logarithm of real (per capita) consumption in each country is regressed on its own lag, monetary policy shocks, the share of income accruing to the top 10% of earners and their interaction, as well as country fixed effects.
Sources: World Bank; BIS calculations.

Putting these various findings together, we see the possibility of a perverse amplification. On the one hand, recessions increase inequality; on the other, inequality deepens recessions, and mutes the impact of monetary policy, making its task harder.

4. Inequality and monetary policy regimes

The analysis so far indicates that, by keeping the economy on an even keel in pursuit of its mandate, monetary policy can also keep in check the major sources of inequality over business cycles: inflation and recessions.

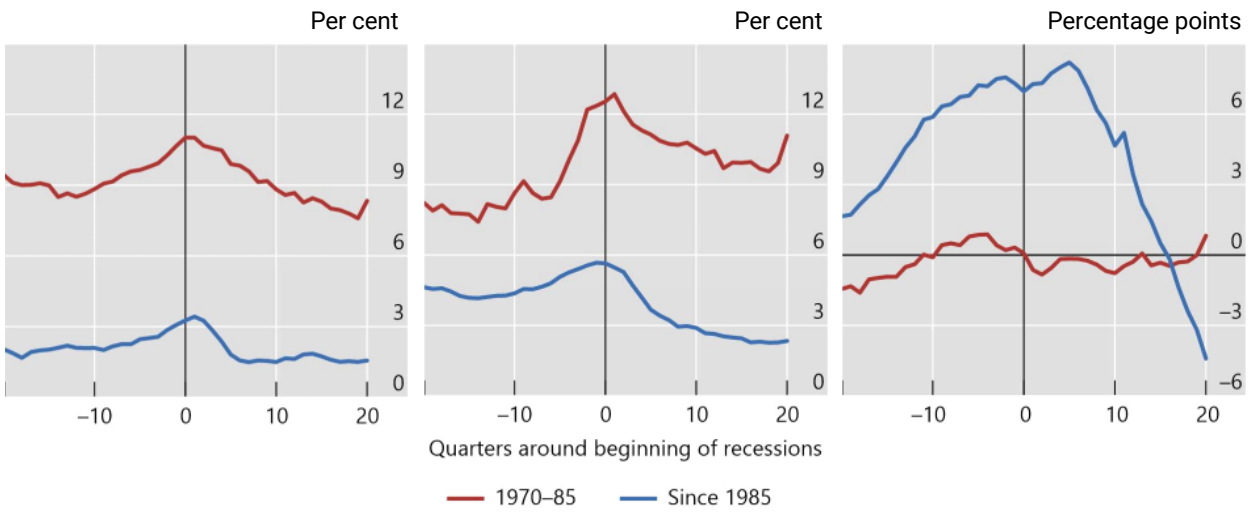
Moreover, if we dig further, we see that this has an additional advantage. It avoids the intertemporal trade-offs that arise when things do go wrong and monetary policy has to bring the economy back on track. The more the economy gets out of kilter, the larger the required changes in interest rates to correct this, and hence the bigger and more prominent the distributional consequences. This can generate unwelcome short-term costs, which are necessary to reap larger long-term benefits.

Bringing inflation under control will cause a recession. Unemployment and inequality rise in the short term as the inevitable pain incurred to achieve the bigger longer-term gains – in terms of both employment and equality – of non-inflationary growth.

Fighting recessions involves a more subtle trade-off, which arises from the need to keep interest rates low to nurse a recovery. In this case, there is no trade-off in terms of income inequality: boosting employment is precisely what reduces it. But there may be a trade-off in terms of wealth inequality. This becomes apparent if interest rates stay very low for very long, thereby lifting asset prices a lot, especially those of equities. To be sure, even this adverse outcome is not a given, as it depends on the structure of asset holdings. In particular, if home ownership is sufficiently dispersed, wealth inequality could actually decline according to some measures. But even then, extremely high house prices have their own distributional consequences, typically benefiting the old at the expense of the young.

Intertemporal trade-offs such as these have always been present. But they have become more salient due to a fundamental change in the nature of the business cycle. As inflation has become low and stable – sometimes too low and too stable, perhaps – and financial factors have come to the fore, there has been a shift from what one could term "inflation" recessions to "financial" recessions (Figure 10). Until the mid-1980s, it was a sharp monetary policy tightening (centre panel) to quell rising inflation (left-hand panel) that caused the recession. Little happened to credit – here measured by the deviation of the credit-to-GDP ratio from its long-term trend (right-hand panel). Since then, with inflation more subdued, monetary policy has tightened only slightly, but a large credit boom has turned to a bust.

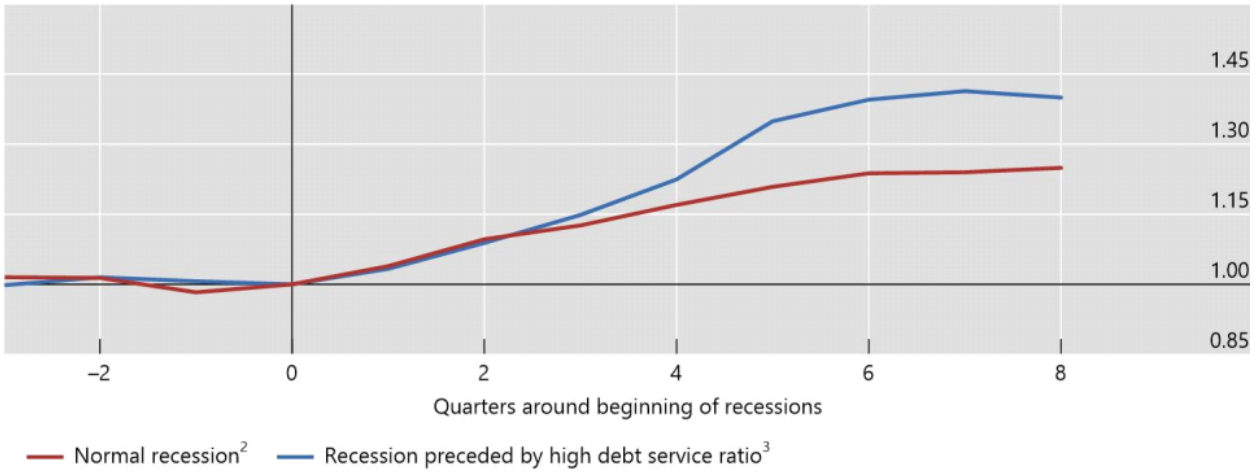
Figure 10 | More prominent role of financial factors in business cycle fluctuations



The horizontal axis denotes quarters around recessions in the business cycles, with the peak date set at zero (vertical lines). Lines show the median evolution across 16 AEs and events in the respective time period.
Source: C Borio, M Drehmann and D Xia, "The financial cycle and recession risk", BIS Quarterly Review, December 2018, pp 59–71.

This change has had two major consequences. The first is that recessions have become deeper and longer – especially, but not only, if banking crises break out. The impact on employment of financial recessions – here identified as those preceded by outsize private sector debt service ratios – is larger and more drawn-out than that of other recessions (Figure 11). As a result, central banks cut interest rates more aggressively and for longer, with a potentially bigger impact on wealth inequality.

Figure 11 | Impact of financial recessions on unemployment (unemployment index)



Based on 1980–2020 data for AT, AU, BE, CA, CH, CZ, DE, DK, ES, FI, FR, GB, HU, IE, IT, JP, KR, LU, NL, NO, NZ, PT, SE and US. (2) Recessions for which the preceding debt service ratio for the private non-financial sector (share of interest payments plus amortizations in income) was below the country-specific average plus 2 percentage points. (3) Recessions for which the preceding debt service ratio was at or above the country-specific average plus 2 percentage points.
Sources: National data; BIS; BIS calculations.

Why are financial recessions deeper and longer? Largely because the economy has to tackle the legacy of the financial imbalances that built up during the typically longer previous expansion. Balance sheets – of households, firms, and banks – have to be repaired. The debt and capital overhangs have to be worked off. Credit has to be reallocated. In the process, spending is cut back and the supply of funding curtailed. These problems are naturally bigger if a banking crisis breaks out and financial intermediation breaks down. The GFC is just the most recent and remarkable such example.

The second major consequence is that, with inflation expectations well anchored and inflation less responsive to economic slack during expansions – a flatter Phillips curve – central banks have been able to push harder. This does boost employment further, and hence reduces income inequality, in the short to medium run. But by possibly contributing to risk-taking and the build-up of financial imbalances, it raises the risk of a financial recession down the road, with its bigger consequences for inequality.

What is the implication? With financial factors playing a larger role in business fluctuations, a more balanced policy approach is needed – involving prudential, fiscal, and structural policies – as part of a more holistic macro-financial stability framework.

Taken together, these policies can improve the trade-offs monetary policy faces in reconciling price, financial and, hence, macroeconomic stability over time, thereby also reducing inequality, on average. As we elaborate in the chapter, these policies do so primarily by helping to tame the financial cycle, and by playing a critical complementary role in crisis management.

5. Conclusions

Monetary policy has neither the responsibility nor the tools to address structural inequality: structural policies are essential.

But by pursuing its mandate effectively, monetary policy can do a lot to tame the macroeconomic forces that amplify inequality over business cycles – inflation, recessions, and thus also financial instability.

Changes in the nature of the business cycle have complicated this task, highlighting the need to put in place a more holistic macro-financial stability framework.

International Monetary and Financial Hierarchies: Macroeconomic Implications for Emerging Market Economies

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Abstract

This paper discusses the hierarchic features of the international monetary and financial system and the implications these hierarchies have for macroeconomic conditions in Emerging Capitalist Economies (ECEs) using the example of the Covid Shock in March 2020. In particular, it draws attention to two key macroeconomic implications: first, the existence of external vulnerability and adverse exchange rate dynamics, increasingly independent of economic conditions in ECEs; second, the external constraint on monetary policy in ECEs. Analytical emphasis is placed on how recent changes in the global financial system, such as the rise of non-bank financial institutions (NBFIs) and the general move to market-based financial systems, might affect those international monetary and financial hierarchies and their consequences.

JEL Classification: F31, F32, F36, F38, F62.

Keywords: international monetary system, international financial system, emerging capitalist economies, external vulnerability, monetary policy, non-bank financial institutions (NBFIs).

* The views expressed in this article are of the author and do not necessarily represent the ones of the BCRA or its authorities. Email: a.kaltenbrunner@leeds.ac.uk.

Jerarquías monetaria y financiera a nivel internacional: implicancias macroeconómicas para economías emergentes

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Resumen

Este documento analiza las características jerárquicas del sistema monetario y financiero internacional y las implicancias que tienen para las condiciones macroeconómicas de las Economías Capitalistas Emergentes (ECE), utilizando el ejemplo del shock Covid de marzo de 2020. En particular, se destacan dos implicancias macroeconómicas clave: en primer lugar, la existencia de vulnerabilidad externa y una dinámica cambiaria adversa, cada vez más independiente de las condiciones económicas de las ECE; en segundo lugar, la restricción externa de la política monetaria en las ECE. Se hace hincapié en el análisis sobre la forma en que los cambios recientes en el sistema financiero mundial, como el peso creciente de las instituciones financieras no bancarias (IFNB) y el avance generalizado hacia un sistema financiero basado en el mercado, podrían afectar a estas jerarquías monetarias y financieras internacionales y sus consecuencias.

Clasificación JEL: F31, F32, F36, F38, F62.

Palabras clave: economías capitalistas emergentes, instituciones financieras no bancarias (IFNB), política monetaria, sistema financiero internacional, sistema monetario internacional, vulnerabilidad externa.

The presentation at the 2021 Jornadas Monetarias and Bancarias of the Argentinean Central Bank discussed the hierarchic features of the international monetary and financial system and the implications these hierarchies have for macroeconomic conditions in Emerging Capitalist Economies (ECEs). The international monetary hierarchy refers to the dominant role of the US Dollar in the international monetary systems and the existence of a global currency hierarchy, in which currencies assume different ranks depending on their ability to fulfil international money functions. Financial hierarchies are reflected in the nature of cross-border capital flows and the agglomeration of financial activities in financial centers in Advanced Capitalist Economies (ACEs). The presentation drew particular attention to two key macroeconomic implications of these monetary and financial hierarchies: first, the existence of external vulnerability and adverse exchange rate dynamics; second, the external constraint on monetary policy in ECEs. In addition, analytical emphasis was placed on how recent changes in the global financial system, such as the rise of non-bank financial institutions (NBFIs) and the general move to market-based financial systems, might affect those international monetary and financial hierarchies and their consequences.

A large literature has pointed to the dominant role of the US dollar in the international monetary system (*e.g*. Kenen, 2002; Aldasoro and Ehlers, 2018; Gourinchas, 2021). Indeed, despite the US' declining economic power with regards to international trade and foreign direct investment, the Dollar remains the dominant international medium of exchange (vehicle and trade settlement currency), unit of account (vehicle and funding currency), and store of value (investment currency) *(e.g*. Cohen and Benney, 2014; Belfrage *et al*. 2106).[1] According to data compiled by the Bank for International Settlements, in 2019 the Dollar denominated more than 80% of international foreign exchange transactions, around 50% of international trade, and more than 40% of international debt securities (BIS, 2020).

At the same time, ECE currencies continue to assume a very limited international – and indeed sometimes domestic – role, and are situated at lower ranks of the international currency hierarchy (*e.g*. Prates and Andrade, 2013; Kaltenbrunner, 2015; Bonizzi, 2017). The rise of market-based finance and NBFIs have further accentuated these monetary hierarchies. This is so because the Dollar is the currency of denomination of most investment vehicles, collateral requirements, debt that is used to leverage investments, as well as the required base currency for most NBFIs' clients. This raises the demand for the dollar and – as a flipside – latent depreciation pressures on those currencies less able to fulfil international monetary functions. At the same time, although some ECE currencies have seen increased demand by non-residents/non-nationals, this demand has been biased towards potentially destabilizing short-term investment currency internationalisation, rather than more sustainable forms of internationalisation such as trade invoicing/settlement and funding currency internationalisation (Belfrage *et al*. 2016; Orsi, 2019).

International financial asymmetries can be characterized from a spatial and from an institutional level. Concerning the former, financial activities remain highly concentrated in a few financial

[1] The analysis of currency internationalisation and currency dominance according to the degree a currency assumes international money functions draws on an established body of literature both in Economics (*e.g*. Kenen, 1983) and International Political Economy (*e.g*. Cohen, 1971). This literature normally distinguishes between the demand for international money by private and public actors. For simplicity, we abstract from public actors here.

centers predominantly in ACEs (*e.g.* Wójcik, 2013). From an institutional angle, ACE institutions remain key players and sources of cross-border capital flows. For example, Fichtner (2017) shows that in 2014 more than 50% of external deposits of all BIS reporting banks were held by Anglo-American institutions. This dominance of ACE institutions in the global financial system is likely to be exacerbated by the rise of NBFIs, at least in the short to medium term. Indeed, the asset manager industry, to a much greater extent than global banks, is concentrated in the US: among the 20 largest asset managers 14 are US institutions (Thinking Ahead Institute 2021).

These monetary and financial asymmetries have severe implications for macroeconomic conditions in ECEs. As indicated above, the presentation focused on two: first, external vulnerability, that is the risk of sudden and large withdrawals of non-resident financial flows, and adverse exchange rate dynamics; second, the external constraints on monetary policy.

The sudden and large withdrawal of cross-border financial flows has been a long-standing policy concern of ECEs (*e.g.* Griffith-Jones, 1998). In the wake of the ECE exchange rate crises of the 1990s and early 2000s, the traditional literature located the reasons for these withdrawals largely in domestic policy failures. These included the mismanagement of macroeconomic fundamentals (*e.g.* the monetary financing of fiscal deficits), and the distortions created by strongly managed (pegged) exchange rate regimes (*e.g.* current account deficits and currency and maturity mismatches in domestic actors' balance sheets) (*e.g.* Krugman, 1979; Radelet *et al.* 1998; Sarno and Taylor, 1999). More progressive authors pointed to the inability of ECE actors to fund themselves in domestic currencies, their "original sin" (*e.g.* Eichengreen *et al.* 2003). Policy recommendations to overcome these vulnerabilities included further removal of discretionary government interventions, including increased macroeconomic discipline, the adoption of floating exchange rate regimes, and in many cases inflation targeting as the primary aim of monetary policy. Domestic financial fragilities in the form of currency mismatches were hoped to be addressed by further developing domestic financial markets, ideally with the presence of long-term (institutional) foreign investors.

However, as recent experiences in the Global Financial Crisis and most recently in the Covid shock showed, these policy measures have not reduced ECEs' external vulnerability and the risk of large and sudden exchange rate depreciations. To the contrary, as highlighted in the growing literature on the global financial cycle (*e.g.* Rey, 2015), these risks have become exacerbated over recent years and have become even more uncoupled of domestic economic conditions. For example, the IMF shows that in the first quarter of March 2020, when fears about the virus first spooked international financial markets, currencies like the South African Rand, the Mexican Peso, and the Brazilian Real lost around 25% of their value (IMF, 2020a). Moreover, evidence seems to indicate that rather than stabilizing domestic financial markets, non-resident institutional investors with a longer investment horizon such pension and insurance funds contributed to ECEs' external vulnerability – in particular during moments of significant liquidity squeezes on global financial markets (Bonizzi and Kaltenbrunner, 2018).

The presentation located this sustained external vulnerability in the structural monetary and financial asymmetries of the global financial system. Non-resident financial investors, even if they

have a longer investment horizon, remain firmly embedded in ACE/Dollar funding markets, which leaves them vulnerable to international market and funding conditions. An increase in international risk aversion and/or tightening of global dollar funding, can force those investors to sell their ECE assets largely independent of domestic economic conditions. Moreover, as highlighted by Kaltenbrunner and Painceira (2015) as "new forms of external vulnerability" and the BIS as "original sin redux" (*e.g*. Hofman *et al*. 2020), though some ECE actors, in particular sovereigns in large ECEs, have managed to reduce their original sin and borrowed in domestic currencies, this has not reduced their exposure to sudden and large capital outflows. This is so because ECE local currency borrowing from non-resident investors, funded in ACE currencies on international financial markets, shifts the currency mismatch from the domestic agent to the non-resident investor. This currency mismatch in non-resident investors' balance sheets, in turn, makes them more vulnerable to (expected) exchange rate changes, potentially exacerbating the volatility of financial flows.

This structural external vulnerability of ECEs is likely to be deepened by the rise of NBFIs and market-based finance. As discussed above, the rise of NBFIs has further cemented the role of the US Dollar as the system's key funding currency. At the same time though, these institutions have less stable and secured access to dollar funding (including lender of last resort activities of the FED), which raises the risk of fire sales and sudden withdrawals of capital. Moreover, recent evidence shows that the use of index and exchange-traded funds by NBFIs can lead to quasi-automatic adjustments in investment decisions, as countries are in/excluded in the index and/or country compositions change (*e.g*. Petry *et al*. 2021; Aramonte *et al*. 2022). Redemption calls by global clients of NBFIs can further contribute to these pressures, largely independent of conditions in ECEs and often against the own assessment of fund managers (Kaltenbrunner, 2018; Naqvi, 2019).

The second macroeconomic implication of the global monetary and financial hierarchies highlighted in the presentation is the constraint these impose on monetary policy making in ECEs. Indeed, arguably much more so than in ACEs, monetary policy in ECEs is geared towards securing the smooth integration into the global economy, at times at the expense of domestic considerations. This external constraint on monetary policymaking refers to both the management of macroeconomic prices, in particular the interest rate and the exchange rate, and the provision of liquidity through reserve accumulation and lender of last resort activities. Whereas macroeconomic prices constitute a crucial part of returns for non-resident financial investors, foreign exchange liquidity is essential to provide (a) the security of macroeconomic price stabilization (*e.g*. through exchange rate interventions), and (b) the possibility for non-resident investors to withdraw their investments at any time and no/little loss of value.

Again, these constraints are likely to be deepened with the rise of NBFIs and market-based financing. In US dollar dominated, market-based financial systems, where financial returns are predominantly based on trading gains, the stabilization of asset prices and the provision of (US Dollar) liquidity becomes arguably even more important than in bank-based system. The stabilization of asset prices might require interventions in capital markets directly, rather than only in money and foreign exchange markets. At the same time, more volatile financial markets might require more frequent provision of foreign exchange liquidity to secure investor exit. This increased role for central bank liquidity operations has spurred some commentators to argue that we observe

a transformation of central banks from lenders of last resort to market makers of last (daily) resort (Hauser, 2021; Mushtaq, 2021). Overall, interventions are becoming more complex due to the rising interconnectedness between sophisticated financial instruments, diverse financial actors – which frequently don't have direct access to central bank liquidity – and traditional dealer banks.

ECE central bank interventions in the Covid shock are a good example of both, the external constraint imposed on monetary policy making in ECEs, and the increasingly complex and changing role of those central bank operations. For the first time, ECE central banks didn't only intervene in the foreign exchange market to smooth the impact of the large external shock, but also engaged in direct asset purchases mainly in secondary government bond markets (Arslan *et al*. 2020; IMF, 2020b). In some countries, such as Chile, Colombia, and Brazil, central banks even intervened in corporate bond markets. According to results from the IMF, these interventions were aimed at stabilizing bond markets, provide liquidity to the financial sector, and strengthen monetary policy transmission at longer maturities (IMF, 2020b). Only in a few countries (*e.g*. Ghana, Guatemala, Indonesia, and Philippines), they were aimed explicitly at budgetary financing.

Interestingly, even countries with interest rates well above zero (*e.g*. India, Philippines, and South Africa) engaged in direct asset purchases. This shows that rather than just domestic economic policy concerns, fears of portfolio outflows and ineffective policy transmissions were a key concern for ECE central banks in their interventions. Indeed, according to Arslan *et al*. (2020) bond purchase programs in ACEs were "designed to provide credit support for firms, keep bond markets functional and support monetary accommodation more generally as policy rates have reached their effective lower bound. By contrast, EM BPPs do not explicitly seek to provide monetary stimulus or credit support. Instead, they address market dislocations arising from investor risk aversion. By launching them, EME central banks signal that they are taking the role of dealers and buyers of last resort in the bond market, to reassure investors" (pp. 2).

In sum, this essay –and the presentation it is based on– have shown the severe macroeconomic complications the hierarchic international monetary and financial system brings for ECEs. It discussed particularly the risk of external vulnerability and adverse exchange rate dynamics, and the substantial external constraints international monetary and financial subordination imposes on monetary policy making in those countries. These adverse macroeconomic dynamics and external constraints, in turn, substantially constrain development and developmental policies. Only an at-least partial de-coupling from international financial markets will be able to reduce some of the worst implications of these international hierarchies. This would entail, on the one hand, a careful development of domestic financial markets with the participation of long-term oriented (institutional) investors and, on the other hand, the revival of state-backed financial institutions such as development banks. However, given the structural causes of these monetary and financial hierarchies, national policy measures will ultimately not be enough. Stemming the power of private finance on the global level and reducing its spatial and national concentration will also be essential to mitigating the adverse consequences of ECES' international monetary and financial subordination.

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Repensando el rol de los Bancos Centrales

Retos y lecciones de los Bancos Centrales en la pandemia

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Resumen

En el contexto de la pandemia del COVID-19, se identifican tres choques de distinta magnitud y duración: financiero, de oferta y demanda, y se describen sus afectaciones iniciales y las políticas aplicadas en diversos países. Ante las presiones inflacionarias registradas durante 2021, se resaltan las diferencias en las respuestas de política monetaria entre las economías avanzadas y emergentes. Para el caso de México, se mencionan las medidas implementadas por el Banco Central y los retos que se presentaron. En lo referente a las lecciones derivadas de la pandemia para los bancos centrales de economías emergentes, se señala la relevancia de haber ofrecido una respuesta oportuna al choque financiero y de contar con un marco macroeconómico sólido, expectativas de inflación bien ancladas y bancos centrales con alta credibilidad. Finalmente, se destaca la importancia de conducir la política monetaria con margen de maniobra y flexibilidad para ajustarse a un entorno incierto.

Clasificación JEL: E50, E52, E58.

Palabras clave: bancos centrales, COVID-19, economías emergentes, política monetaria.

* Las opiniones expresadas en el presente trabajo son del autor y no se corresponden necesariamente con las BCRA o sus autoridades.

Challenges and Lessons from Central Banks in the Pandemic

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Abstract

In the context of the COVID-19 pandemic, three shocks of different magnitude and duration are identified: financial, supply and demand; and their initial effects and the policies applied in various countries are described. Given the inflationary pressures registered during 2021, the differences in monetary policy responses between advanced and emerging economies are highlighted. In the case of Mexico, the measures implemented by the Central Bank and the challenges that arose are mentioned. Regarding the lessons derived from the pandemic for central banks of emerging economies, the relevance of a timely response to the financial shock and having a solid macroeconomic framework, well-anchored inflation expectations and central banks with high credibility are highlighted. Finally, the importance of conducting monetary policy with degrees of freedom and flexibility to adjust to an uncertain environment is also highlighted.

JEL Classification: E50, E52, E58.

Keywords: central banks, COVID-19, emerging economies, monetary policy.

1. Introducción

La pandemia que se originó a finales de 2019 ha transformado radicalmente la economía, las interacciones sociales y la vida cotidiana de los habitantes del planeta. Todas las instituciones, ya sean públicas, privadas o sociales han tenido que adaptarse para responder a este fenómeno inédito, mantener sus funciones y cumplir sus metas. Los bancos centrales también han enfrentado nuevos retos y disyuntivas para ejercer sus mandatos en un contexto tan complejo y desafiante.

Los bancos centrales desempeñan un papel fundamental en la sociedad, al asumir el mandato prioritario de proveer a la economía de moneda nacional y procurar que ésta cumpla satisfactoriamente con sus funciones como depósito de valor, unidad de cuenta y medio de intercambio. Igualmente, en la mayoría de los países, los bancos centrales tienen responsabilidades con respecto al buen funcionamiento de los sistemas financiero y de pagos. En la medida en que logran estos objetivos, los bancos centrales coadyuvan a mantener una inflación baja y estable, a promover la estabilidad y desempeño eficiente del sistema financiero y a dar plena certeza al uso de la moneda nacional en sus diferentes modalidades. De esta manera, estos organismos proveen bienes públicos indispensables para un crecimiento sostenible y, por ende, para favorecer el bienestar de la población.

Desde hace más de año y medio la economía global ha estado sujeta a los efectos de la pandemia del COVID-19. En general, las afectaciones económicas y financieras asociadas con los choques derivados de esta pandemia han sido muy distintas a las de crisis o recesiones anteriores. En particular, los bancos centrales han tenido que lidiar con una elevada volatilidad en los mercados financieros, con una profunda contracción económica, con una recuperación heterogénea entre sectores y, sobre todo, con un alto grado de incertidumbre en torno a la dinámica de la inflación. En este contexto, es importante reconocer que los modelos económicos y herramientas de análisis disponibles no fueron diseñados para evaluar la dinámica de crisis de este tipo, originadas por una emergencia de salud pública y sin relación con los ciclos económico y financiero. Por consiguiente, ha sido sumamente difícil identificar los efectos de corto, mediano y largo plazos derivados de este inusual fenómeno.

La perspectiva que otorgan los ya casi dos años transcurridos de pandemia nos permite hacer algunas reflexiones, por un lado, acerca de los principales choques con los que este evento impactó a nuestros países y, por otro lado, acerca de la evolución del efecto de la pandemia en la economía a lo largo de distintas fases. Además, este periodo de pandemia también nos brinda una visión retrospectiva para enlistar algunas de las principales lecciones que, hasta ahora, consideramos se pueden extraer a partir de nuestra experiencia, desde la perspectiva de las economías emergentes.

2. Choques derivados de la pandemia del COVID-19

En cuanto a la dimensión económica de la crisis del COVID-19 es posible distinguir tres choques con distinta temporalidad, magnitud y duración.

- **Choque financiero:** ante un aumento súbito en la aversión al riesgo global, principalmente durante marzo y abril de 2020, se observaron reasignaciones en los portafolios de los inversionistas hacia activos seguros. Para las economías emergentes, lo anterior implicó flujos de salida de capital, incrementos en las primas por riesgo y depreciaciones cambiarias.

  Este choque en gran medida se revirtió ante las políticas expansivas adoptadas en las economías avanzadas, así como por las medidas para proveer liquidez y reestablecer el funcionamiento ordenado de los mercados financieros que implementaron las autoridades de cada país.

  No obstante, los mercados emergentes continúan enfrentando un entorno que presenta tanto riesgos derivados de la pandemia y asociados a las nuevas variantes del virus, como otros riesgos asociados a las presiones inflacionarias globales y a la normalización de la política monetaria de los bancos centrales en economías avanzadas.

- **Choque de oferta:** las medidas para contener la propagación del virus, como la suspensión total o parcial de actividades en diversos sectores de la economía, propiciaron múltiples restricciones de oferta, incluyendo disrupciones en las cadenas globales de valor.

  Como se analiza más adelante, durante la recuperación económica, y principalmente en 2021, las economías se han visto afectadas por perturbaciones de oferta asociadas a escasez de insumos, problemas logísticos y cuellos de botella en los procesos productivos.

- **Choque de demanda:** la propagación de la pandemia a nivel global propició una menor demanda externa. Asimismo, las medidas de distanciamiento social adoptadas y la caída en los ingresos de hogares y empresas condujeron a una menor demanda interna.

  Como se describe posteriormente, esta dinámica se revirtió: la disponibilidad de vacunas y la reapertura de actividades en diversos sectores ha conducido a una recuperación de la demanda, en un contexto en que se han aprobado cuantiosos estímulos fiscales especialmente en las economías avanzadas como Estados Unidos.

3. Retos y respuesta de política en economías emergentes

En cuanto a las afectaciones económicas derivadas de los choques asociados a la pandemia del COVID-19 y los retos que se han enfrentado es posible distinguir dos etapas, la primera corresponde al impacto inicial de estos choques, principalmente a lo largo de 2020, mientras que la segunda corresponde a la etapa de recuperación económica y de presiones inflacionarias que hemos observado durante 2021.

3.1. Fase inicial de la crisis económica del COVID-19

En cuanto a la etapa inicial:

- En una primera instancia, la pandemia propicio el cierre abrupto de actividades productivas lo que condujo a que las empresas buscaran reducir costos, inventarios, inversión y personal, dejando fragilidades y poca capacidad de respuesta por el lado de la oferta.

- En este contexto, se presentaron profundas afectaciones sociales y tensiones políticas, que contribuyeron a la adopción de cuantiosos estímulos al gasto, principalmente en economías avanzadas.

- Ante la adopción de medidas de distanciamiento social y los temores de contagio, se registró una recomposición del gasto de los hogares, de los servicios hacia los bienes de consumo.

- Se presentaron afectaciones profundas en el mercado laboral y el empleo, con una disminución de la participación laboral, así como una menor propensión a trabajar en los sectores de servicios con mayor exposición y riesgo de contagio.

Desde la perspectiva de los bancos centrales, y en términos de la consecución de su mandato de estabilidad de precios, es importante destacar que los choques derivados de la pandemia tuvieron un impacto negativo sobre la actividad económica, mientras que sus efectos sobre la inflación actuaron en distintas direcciones. Si bien durante 2020 la mayoría de las economías avanzadas y emergentes enfrentaron una contracción económica y una menor inflación, especialmente en los servicios, en algunas economías, incluyendo la mexicana, registraron a la vez amplias condiciones de holgura y presiones inflacionarias, lo que implicó disyuntivas importantes para la política monetaria.

En general, la respuesta de política en las economías emergentes en 2020 fue significativa y oportuna. El mayor margen de maniobra del que dispusieron en esta ocasión es un reflejo del fortalecimiento de sus marcos institucionales, de su éxito relativo para controlar la inflación, así como del desarrollo de sistemas financieros resilientes que se han logrado en las últimas décadas. De este modo, al inicio de la pandemia, además de reducir sus tasas de política monetaria, muchos bancos centrales de estas economías implementaron una amplia gama de medidas para promover el comportamiento ordenado de los mercados financieros, fortalecer los canales de otorgamiento de crédito y proveer liquidez para el sano desarrollo del sistema financiero.[1] Aunado a lo anterior, y con mayor heterogeneidad, en algunos países también se adoptaron medidas fiscales para hacer frente a los efectos económicos de la pandemia.

[1] Para una descripción de estas medidas ver el Recuadro 2. "Uso del Balance y Programas de Provisión de Liquidez en Bancos Centrales de Economías Emergentes" del Informe Trimestral Julio-Septiembre 2020, Banco de México.

3.2. Fase de recuperación económica y presiones inflacionarias

Posteriormente, a lo largo de 2021, las economías emergentes han enfrentado retos adicionales en un entorno que sigue determinado por la evolución de la pandemia. En particular:

- La actividad económica mundial se ha venido recuperando a un ritmo heterogéneo entre países. Ello debido a las diferencias en la disponibilidad de vacunas, en la evolución de la pandemia y en las medidas de estímulo al gasto.

- La reapertura de actividades productivas ha conducido a una recuperación económica que ha resultado más acelerada de lo que usualmente se observa durante los ciclos económicos.

- Dada la participación de Estados Unidos en la economía global, los apoyos fiscales y las transferencias a los hogares en este país, contribuyeron a un aumento significativo en la demanda de bienes de consumo duraderos a nivel mundial.

En este escenario, la economía global ha transitado de una suspensión súbita de actividades en 2020, a un entorno de expansión vigorosa del gasto, acompañada de disrupciones en los procesos de producción de bienes y servicios.

En general, la reapertura de actividades y las medidas de apoyo al gasto, como el cuantioso estímulo fiscal en Estados Unidos, están impulsando la demanda agregada. Ello, junto con las disrupciones en los procesos de producción de bienes y servicios, han contribuido al surgimiento de múltiples cuellos de botella. Ante las dificultades para que la oferta de bienes y servicios satisfaga adecuadamente el ritmo de expansión de la demanda, especialmente en las mercancías, se han presentado presiones inflacionarias a nivel global.

En adición a las presiones de costos y disrupciones de oferta referidas, también han contribuido a la mayor inflación global las presiones en los precios de las materias primas, así como efectos aritméticos de una baja base de comparación.

Ante este entorno de inflación al alza, los bancos centrales de economías avanzadas han contado con un amplio margen para mantener posturas acomodaticias por un tiempo prolongado. Ello debido a que han registrado niveles de inflación y de sus expectativas por debajo de sus metas por lapsos prolongados. No obstante, ante las presiones significativas sobre los precios y una inflación que en la mayoría de los casos ya se ubica ampliamente por arriba de sus metas, existe la perspectiva de un retiro del estímulo monetario más rápido de lo inicialmente previsto, lo que generaría condiciones financieras astringentes.

Para las economías emergentes este contexto internacional tiene implicaciones y retos en diferentes dimensiones. Por una parte, ante una fuerte recuperación económica global, tendrán los beneficios de un mayor dinamismo de la demanda externa. Por otra parte, han enfrentado mayores presiones inflacionarias, así como el riesgo de periodos adicionales de volatilidad y de un apretamiento en las

condiciones financieras globales. Lo anterior implica un reto para atraer y retener los capitales externos que, como economías pequeñas y abiertas, requieren para complementar su ahorro interno.

Cabe destacar que las economías emergentes han enfrentado incrementos importantes en la inflación ante los mayores precios de las materias primas, los choques de oferta y las depreciaciones de sus monedas. Asimismo, aquellas economías emergentes con un mayor grado de integración comercial con las economías avanzadas que presentan una recuperación más vigorosa y mayor inflación han estado más expuestas a las presiones inflacionarias externas. En este complejo entorno, las economías emergentes han registrado incrementos en la inflación, al mismo tiempo que, en muchos casos, sus niveles de actividad permanecen por debajo del potencial, mientras que los mercados financieros siguen sujetos al riesgo de que se presenten episodios adicionales de volatilidad.

Adicionalmente, debido a que las economías emergentes experimentan con mayor frecuencia episodios inflacionarios, el riesgo de un desanclaje de las expectativas de inflación o pérdida de credibilidad de sus bancos centrales es mayor ante los altos niveles de inflación que actualmente registran.

En este contexto, los bancos centrales en las economías emergentes se han visto en la necesidad de incrementar sus tasas de política y reducir el estímulo monetario. Ello, al tiempo que la actividad económica continúa su recuperación con riesgos y vulnerabilidades importantes determinados por la evolución de la pandemia. En este sentido, el reto fundamental para los bancos centrales de dichas economías es implementar una política monetaria que contribuya a un ajuste ordenado de los precios relativos, de los mercados financieros y de la economía en su conjunto.

4. El caso de México

En cuanto a la experiencia mexicana, ante el inicio de la crisis derivada de la pandemia, la política monetaria enfrentó el reto de conducirse en un entorno en el que, simultáneamente, se registraba una elevada volatilidad en los mercados financieros, una profunda contracción económica y una brecha de inflación positiva. Esto último, en contraste con otras economías emergentes. En este sentido, la inflación general en México, después de registrar en abril de 2020 su segundo nivel históricamente más bajo al ubicarse en 2,15%, a partir de mayo comenzó a incrementarse, registrando niveles por arriba de la meta de 3%.

En un entorno de elevada incertidumbre, era crucial tener un enfoque prudente y dependiente de los datos. En este contexto, la respuesta del Banco de México consistió en reducir el objetivo para la Tasa de Interés Interbancaria a 1 día en 300 puntos base a lo largo de 2020. Aunado a lo anterior, los choques derivados de la pandemia afectaron negativamente el funcionamiento de los mercados financieros nacionales. En particular, los mercados de renta fija y cambiario presentaron menor profundidad, baja liquidez y un deterioro en sus condiciones de operación. Para hacer frente a esta problemática, en marzo y abril de 2020 se anunciaron una serie de medidas extraordinarias. Estas acciones tuvieron como objetivo: i) proveer liquidez y reestablecer condiciones de operación en el mer-

cado de dinero; ii) promover el comportamiento ordenado en los mercados de valores gubernamentales y valores corporativos; iii) fortalecer los canales de crédito; y iv) promover el comportamiento ordenado del mercado cambiario, en atención a las directrices de la Comisión de Cambios.[2]

En su conjunto, estas medidas en moneda nacional proporcionaban un apoyo al funcionamiento del sistema financiero hasta por 800 mil millones de pesos, equivalente a 3,3% del PIB de 2019. Cabe señalar que, si bien no todas las medidas implementadas utilizaron el monto total asignado, su anuncio y disponibilidad constituyó una señal y una garantía que contribuyó a reestablecer el funcionamiento ordenado de los mercados financieros nacionales.

El Banco de México tenía que asegurar que sus acciones de política condujeran a un ajuste ordenado de precios relativos, de los mercados financieros y de la economía en su conjunto. Ante una profunda contracción económica, era deseable que toda la curva de rendimientos presentara un ajuste ordenado a la baja, ya que los diferentes componentes de la demanda agregada responden a los diferentes segmentos de dicha curva. Al respecto, es importante señalar que las tasas de interés de mediano y largo plazo incluyen diversas primas de riesgo. En este contexto, para lograr menores costos de financiamiento a lo largo de toda la curva de rendimientos, era necesario contar con un marco macroeconómico sólido. En este sentido, una política monetaria prudente enfocada en procurar un entorno de estabilidad de precios fue esencial para que las primas por riesgo inflacionario se mantuvieran acotadas.

En general, es importante destacar que, en un ambiente de elevada incertidumbre como el actual, un marco macroeconómico sólido que incluye finanzas públicas sanas, una política monetaria enfocada en procurar la estabilidad de precios, un régimen de tipo de cambio flexible y una regulación financiera adecuada, así como mercados financieros líquidos y profundos, han contribuido a la resiliencia de la economía mexicana. Así, ante los choques derivados de la pandemia, los ajustes en los mercados financieros nacionales han sido más ordenados y de menor magnitud que en crisis previas.

Durante 2021, la economía mexicana ha enfrentado retos adicionales. La inflación global y las afectaciones en las cadenas de suministro y en los procesos productivos de diversos bienes y servicios han presionado significativamente la inflación en México. Las trayectorias esperadas para la inflación general y subyacente se han venido revisando al alza a lo largo de 2021, particularmente para el corto plazo. Ello considerando las características de los choques que han afectado la dinámica de los precios. En este sentido, el balance de riesgos para la trayectoria esperada de la inflación en el horizonte de pronóstico ha resultado al alza.

Se presentan retos considerables para la inflación por i) las profundas disrupciones y falta de flexibilidad en la producción de múltiples bienes y servicios; ii) la concentración del gasto en el consumo de bienes; iii) las significativas transferencias recibidas por los hogares, especialmente en las economías avanzadas, y iv) el importante incremento en el ahorro financiero de los hogares,

[2] Para una descripción de estas medidas ver el Anexo y el Recuadro 7. "Políticas Económicas Consideradas en México para Enfrentar el Panorama Adverso Generado por la Pandemia de COVID 19" del Informe Trimestral Enero-Marzo 2020, Banco de México.

que puede sostener patrones levados de gasto hacia delante. Todo ello hace más complejo e incierto anticipar la duración de las presiones sobre la inflación mundial, a las que también está sujeto nuestro país.

Por lo anterior, han aumentado los riesgos para la formación de precios y las expectativas de inflación. Por ello, en las últimas cinco decisiones de política monetaria, en junio, agosto, septiembre, noviembre y diciembre, la Junta de Gobierno del Banco de México consideró necesario reforzar la postura monetaria, ajustándola a la trayectoria que se requiere para que la inflación converja a su meta de 3% dentro del horizonte de pronóstico. En particular, la Junta de Gobierno decidió incrementar el objetivo para la Tasa de Interés Interbancaria a un día por un total acumulado de 150 puntos base, ubicándolo en un nivel de 5,5% al cierre del 2021.

Para hacer frente a los retos actuales, la Junta de Gobierno del Banco de México expresó que en las siguientes decisiones de política monetaria vigilará estrechamente el comportamiento de las presiones inflacionarias, así como todos los factores que inciden en la trayectoria prevista para la inflación en el horizonte de pronóstico y en sus expectativas. Esto a fin de que la tasa de referencia sea congruente en todo momento con la trayectoria que se requiere para propiciar tanto la convergencia ordenada y sostenida de la inflación general a la meta de 3% en el plazo en el que opera la política monetaria, así como un ajuste adecuado de la economía y de los mercados financieros.

Cabe destacar que en la decisión de política monetaria de agosto entraron en vigor los siguientes cambios en la estrategia de comunicación del Banco de México:

- En el comunicado de prensa se identifica el sentido de la votación de cada uno de los integrantes de la Junta de Gobierno que hayan participado en dicha decisión (antes se conocían dos semanas después con la publicación de la minuta).

- En cada decisión de política monetaria se publica la actualización de los pronósticos de inflación general y subyacente para los siguientes ocho trimestres.

- A partir del comunicado del 16 de diciembre, adicionalmente a estas trayectorias, se publican las variaciones trimestrales desestacionalizadas anualizadas de esos mismos índices para el mismo horizonte de pronóstico.

Estas medidas son parte del proceso continuo de mejora que el Banco Central ha implementado para reforzar la transparencia y su comunicación con la sociedad. En particular, la publicación de pronósticos de inflación de manera coincidente con las decisiones de política monetaria permite una mejor comprensión de la función de reacción del Instituto Central por parte de los agentes económicos, los cuales están en mejores condiciones para anticipar las acciones de política monetaria. Asimismo, dichos pronósticos constituyen una referencia para analistas, inversionistas y público en general, lo que puede contribuir al anclaje de las expectativas de inflación, así como evitar sobrerreacciones de los mercados. Esto es fundamental en periodos de elevada incertidumbre como el actual.

5. Lecciones de la crisis

A partir del entorno descrito, de la respuesta de política implementada y de los retos que aún se enfrentan, a continuación, se enumeran algunas lecciones para los bancos centrales de economías emergentes.

- Responder de manera oportuna al choque financiero fue clave para evitar un escalamiento o inclusive una crisis financiera. Es importante recordar que primero se enfrentó un choque financiero, por lo que fue necesaria la adopción de medidas para restablecer el funcionamiento ordenado de los mercados financieros y, en general, del sistema financiero. Estas acciones, junto con las medidas de estímulo de los bancos centrales de economías con importancia sistémica, fueron cruciales para estabilizar los mercados. En el caso de México, como se mencionó, el Banco Central redujo la tasa de referencia e implementó una serie de medidas, dentro de su ámbito de competencia, para proveer liquidez y financiamiento propiciando un funcionamiento ordenado de los mercados financieros y fortaleciendo los canales de crédito de la economía. De acuerdo con análisis empíricos llevados a cabo por el Instituto Central, dichas medidas generaron un relajamiento en las condiciones financieras nacionales, contribuyendo a la recuperación económica.[3]

- Contar con un marco macroeconómico sólido brinda mayores alternativas para hacer frente a choques externos o idiosincráticos. En un ambiente de elevada incertidumbre, como el asociado con los choques derivados de la pandemia, un marco macroeconómico sólido que incluya disciplina fiscal, una política monetaria enfocada en procurar la estabilidad de precios, un régimen de tipo de cambio flexible, una regulación financiera adecuada, así como mercados financieros líquidos y profundos, son elementos de suma importancia. Durante los últimos veinte años, las economías emergentes han fortalecido significativamente sus marcos de política macroeconómica han mejorado la regulación de sus sistemas bancarios y han desarrollado mercados financieros cada vez más líquidos y profundos, lo que ha contribuido a incrementar su resiliencia.

- El anclaje de las expectativas de inflación y la credibilidad de los bancos centrales han incrementado el espacio de maniobra de la política monetaria. En contraste con la respuesta a crisis anteriores, como en los años 90 en que los bancos centrales de economías emergentes tuvieron que incrementar las tasas de interés para contener depreciaciones cambiarias, en esta ocasión estas autoridades fueron capaces de reducir las tasas de referencia de forma inmediata. No obstante, como se ha observado en los últimos meses, en estas economías el margen de maniobra para mantener posturas acomodaticias es menor que en las economías avanzadas. En este contexto, un reto para los bancos centrales de economías emergentes ha sido responder a la crisis contribuyendo a un comportamiento ordenado de los mercados financieros y propiciando que la formación de precios se mantenga anclada alrededor de la meta de inflación. Estas instituciones tienen que evitar que ciclos de relajamiento monetario generen

[3] Ver Recuadro 7 "Efectos de las Condiciones Financieras sobre las Perspectivas Económicas de México", Informe Trimestral Octubre-Diciembre 2020, Banco de México.

incrementos en las primas por riesgo y un empinamiento de la curva de rendimientos. Para ello, el Banco de México buscó seguir un enfoque prudente.

- La conducción de la política monetaria ha requerido conservar margen de maniobra y flexibilidad para ajustarse a un entorno profundamente incierto. Dada la naturaleza de la crisis y el hecho de que los modelos económicos disponibles no están diseñados para analizar plenamente los efectos de ésta sobre la economía, los bancos centrales han requerido una respuesta de política cautelosa, flexible y dependiente de los datos. Estas instituciones han tenido que hacer frente a la crisis con previsiones menos precisas sobre la dinámica de inflación, que se ha visto afectada por cambios en los patrones de consumo, disrupciones de oferta y efectos no lineales de las fluctuaciones cambiarias sobre los precios. Por consiguiente, la información obtenida de las herramientas analíticas y de los modelos de pronósticos debe ser tomada con cautela. A pesar de lo anterior, en muchos bancos centrales se implementaron medidas extraordinarias para limitar los efectos negativos previstos de los choques, los cuales inicialmente se consideraba que podrían llegar a ser tan importantes como los observados durante la Gran Depresión. Las medidas iniciales fueron esenciales para contener las disrupciones sobre los mercados. No obstante, algunas de las que se adoptaron después, especialmente en ciertas economías avanzadas, implicaron importantes transferencias a los hogares en un momento de reducción en las oportunidades de gasto, lo que ha propiciado retos inflacionarios significativos. Conforme se fueron materializando los distintos choques, y especialmente durante 2021, ha sido esencial que los bancos centrales mantengan su flexibilidad, actuando con mesura y prudencia, especialmente en cuanto a sus mensajes de posibles acciones futuras de política monetaria. Ello en un entorno en el que, ante el nivel de incertidumbre, las decisiones tomadas tienen importantes repercusiones en los mercados y las perspectivas económicas.

6. Conclusiones

En suma, a pesar de un comportamiento positivo de la actividad económica y condiciones financieras relativamente favorables durante 2021, continúan surgiendo riesgos importantes asociados a la pandemia. En particular, se han gestado presiones inflacionarias globales no vistas hace dos décadas. En este contexto, las economías emergentes aún enfrentan retos significativos, con menor margen de maniobra en las políticas públicas, y con problemas estructurales e idiosincráticos.

En este sentido, y dada la magnitud histórica de los retos, es esencial que se reconozca la importancia de trabajar con diligencia, creatividad y cooperación, a fin de superar los retos que enfrentan las sociedades.

La búsqueda de colaboración tiene una dimensión global, en la que los organismos internacionales juegan un papel importante para generar consensos y ordenar e integrar esfuerzos. En particular, dichos organismos pueden contribuir a establecer condiciones para una recuperación más sólida, para generar una arquitectura financiera mundial más resistente y para abatir rezagos y mejorar el bienestar en los países de ingresos medios y bajos. Igualmente, pese a la retórica y tendencias proteccionistas que han llegado a manifestarse recientemente en diversas latitudes, los acuerdos

comerciales y las uniones económicas, siguen siendo sido útiles como medios para que los países den certeza sobre el compromiso de seguir estrategias integrales de desarrollo de largo plazo.

La búsqueda y soluciones también tienen una dimensión nacional, en la que las distintas fuerzas políticas, los agentes económicos y las sociedades al interior de los países, deben hallar puntos de encuentro y objetivos compartidos. La política constructiva constituye el arte de encontrar las mejores coincidencias entre los diferentes intereses individuales y el bien común. Cuando existe una convergencia de objetivos y se comparte una visión de futuro, las sociedades se acercan a su verdadero potencial en términos de resultados económicos, políticos y sociales.

En general, el camino de las economías emergentes hacia un mayor desarrollo requiere de la integración comercial y financiera con la economía global, así como de un esquema de incentivos alineados hacia la creación de valor. Considerando las cicatrices sociales ocasionadas por la pandemia y la mayor polarización que ha propiciado, se requiere de una visión compartida del futuro, de consensos básicos en torno a las políticas que han demostrado ser indispensables para el crecimiento y de soluciones creativas que aprovechen plenamente las oportunidades de desarrollo y permitan mejorar de manera sostenida y sustentable el bienestar de la población.

Anexo

En marzo y abril de 2020 en México se anunciaron una serie de medidas extraordinarias para hacer frente a la problemática derivada de la pandemia.[4] Las medidas anunciadas se pueden agrupar en cuatro:

- Para proveer liquidez y restablecer condiciones de operación en el mercado de dinero.

  1) Disminuir el depósito de regulación monetaria en 50 mil millones de pesos.

  2) Reducir la tasa de interés de la Facilidad de Liquidez Adicional Ordinaria (FLAO).

  3) Incrementar la liquidez durante los horarios de operación.

  4) Ampliar los títulos elegibles como colateral para la FLAO, operaciones de coberturas cambiarias y operaciones de crédito en dólares.

  5) Ampliar las contrapartes elegibles para FLAO.

  6) Abrir una ventanilla de intercambio temporal de garantías.

- Para promover el comportamiento ordenado en los mercados de valores gubernamentales y de valores corporativos.

  1) Fortalecer el Programa de Formadores de Mercado de deuda gubernamental.

  2) Abrir una ventanilla de reporto de valores gubernamentales a plazo.

  3) Operaciones de permuta de valores gubernamentales.

  4) Instrumentar una Facilidad de Reporto de Títulos Corporativos (FRTC).

- Para fortalecer los canales de otorgamiento de crédito.

  1) Proveer de recursos para canalizar crédito a MiPyMes y a personas físicas afectadas por la pandemia.

  2) Abrir una facilidad de financiamiento a la banca con la garantía de créditos corporativos, para financiamiento de MiPyMes.

[4] Para una descripción de estas medidas ver el Recuadro 7. "Políticas Económicas Consideradas en México para Enfrentar el Panorama Adverso Generado por la Pandemia de COVID 19" del Informe Trimestral Enero-Marzo 2020, Banco de México.

- Para el comportamiento ordenado del mercado cambiario en atención a las directrices de la Comisión de Cambios.

  1) Ampliación del programa de coberturas cambiarias en dólares liquidables en moneda nacional.

  2) Subastas de crédito en dólares a través del mecanismo temporal de intercambio de divisas con la Reserva Federal.

  3) Coberturas cambiarias liquidables por diferencia en dólares con instituciones no domiciliadas en el país.

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Promoviendo crecimiento con igualdad: desafíos generados por la pandemia y respuestas de política en Bolivia

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Resumen

Este documento estudia la dinámica de las políticas económicas implementadas en el Estado Plurinacional de Bolivia durante el periodo en el que se suscitaron la primera, segunda y tercera ola de la pandemia del COVID-19 (2020 - 2021). Para tal efecto, se realiza un análisis de las políticas fiscales y monetarias implementadas durante el periodo señalado. Los resultados muestran que el modelo aplicado en Bolivia desde 2006 permitió a la economía tener un crecimiento sostenido, que en varios años fue de los mayores en la región. Este desempeño fue revertido por la crisis asociada al golpe de estado de noviembre de 2019 y la posterior administración *de facto* que se prolongó hasta octubre de 2020. No obstante, gracias a las políticas implementadas a partir de noviembre de 2020, ya se advierten signos de recuperación económica. El documento está organizado de la siguiente manera, en la primera sección, se describe el Nuevo Modelo Económico Social, Comunitario y Productivo. En segunda instancia, se discuten las políticas económicas implementadas en Bolivia durante la pandemia de la COVID-19. La tercera sección presenta los resultados de estas políticas económicas. Finalmente, la cuarta sección describe las conclusiones del documento.

Clasificación JEL: E0, E1, E5, E6.

Palabras clave: COVID-19; política económica; política cambiaria; política fiscal; política monetaria; modelo económico social, comunitario y productivo.

* Las opiniones expresadas en el presente trabajo son del autor y no se corresponden necesariamente con las del Banco Central de Bolivia o sus autoridades, ni con las de BCRA y sus autoridades. Email: erojas@bcb.gob.bo

Promoting growth with equality: challenges generated by the pandemic and policy responses in Bolivia

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Abstract

This paper studies the dynamics of the economic policies implemented in the Plurinational State of Bolivia during the period of the first, second and third waves of the COVID-19 pandemic (2020 - 2021). To this end, an analysis of the fiscal and monetary policies implemented during this period is made. The results show that the model applied in Bolivia since 2006 allowed the economy to achieve sustained growth, which was one of the highest in the region for several years. This performance was reversed by the crisis associated the coup d'état of November 2019 and the subsequent de facto administration that lasted until October 2020. However, thanks to the policies implemented from November 2020 onwards, signs of economic recovery are already visible.

JEL Classification: E0, E1, E5, E6.

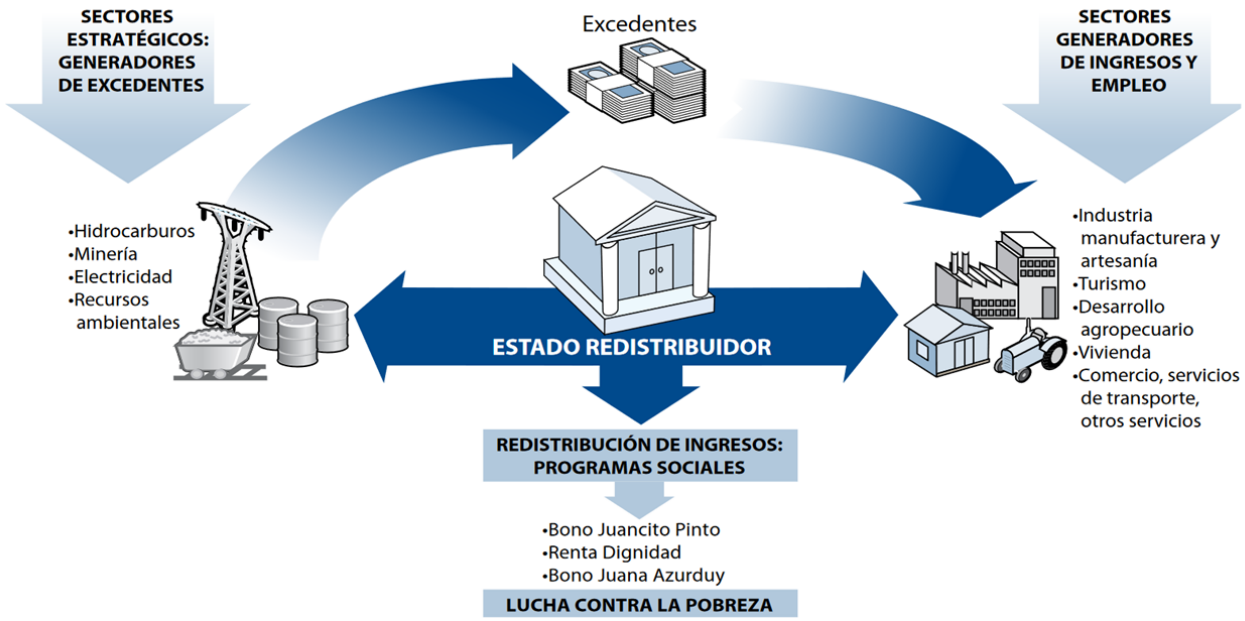
Keywords: COVID-19; economic policy; exchange rate policy; fiscal policy; monetary policy; social, community and productive economic model.

1. El nuevo Modelo Económico Social, Comunitario y Productivo

A partir de 2006 Bolivia implementó el Modelo Económico Social, Comunitario y Productivo (MESCP), el cual principalmente propone un rol central al Estado priorizando la redistribución de las riquezas.

Este modelo se sustenta en dos pilares: un sector estratégico que genera excedentes y un sector generador de ingresos y empleo (Gráfico 1).

Gráfico 1 | Nuevo Modelo Económico Social, Comunitario y Productivo



Fuente: Modelo Económico Social, Comunitario y Productivo Boliviano – Arce L. (2016).

El primer sector está relacionado con la producción, explotación y exportación de los recursos naturales, vinculados con el sector de hidrocarburos, minería, electricidad y otro tipo de recursos ambientales, los cuales se constituyen en una ventaja comparativa para la economía boliviana. No obstante, el segundo sector está constituido por la industria manufacturera, la artesanía, el turismo, el desarrollo agropecuario, es decir, considerando todo lo referente a infraestructura y otro tipo de servicios.

En este ámbito el Estado participa activamente en el proceso de redistribución. La nacionalización de los sectores estratégicos generadores de excedentes, proceso iniciado en 2006, permite la transferencia de los recursos provenientes de estos sectores a los sectores generadores de ingresos y de empleos.

Los ingresos provenientes de ambos sectores permiten al Estado implementar políticas sociales redistributivas para reducir la pobreza y la desigualdad, lo cual debe constituirse en su principal objetivo de política económica en materia de mejora de calidad de vida.

1.1. Políticas monetaria y fiscal

En el marco del MECSP deben existir elementos que permitan establecer en el ámbito netamente de la política económica, el vínculo entre el Gobierno Central y el Banco Central. Este aspecto se constituye de suma importancia, debido a que permite la coordinación de las políticas monetaria y fiscal, en el marco de lo establecido en la Constitución Política del Estado.

En este contexto, la política monetaria acompañó al nuevo modelo en términos de una orientación expansiva (contra cíclica), dotando de liquidez necesaria al sistema financiero boliviano. Asimismo, la política cambiaria mediante la estabilidad de la moneda nacional incentiva su uso (Bolivianización del Sistema Financiero), en créditos otorgados por las Entidades de Intermediación Financiera (EIF) y en los depósitos en cuentas corrientes, cajas de ahorro y a plazo fijo que efectúa la población. La política cambiaria coadyuva en mantener niveles bajos de inflación y genera certidumbre a los agentes económicos. Por tanto, estas políticas son implementadas mediante el desarrollo de instrumentos en materia de política monetaria y cambiaria permitiendo complementar los lineamientos establecidos en el modelo económico, generando un escenario macroeconómico que permita alcanzar mejores resultados.

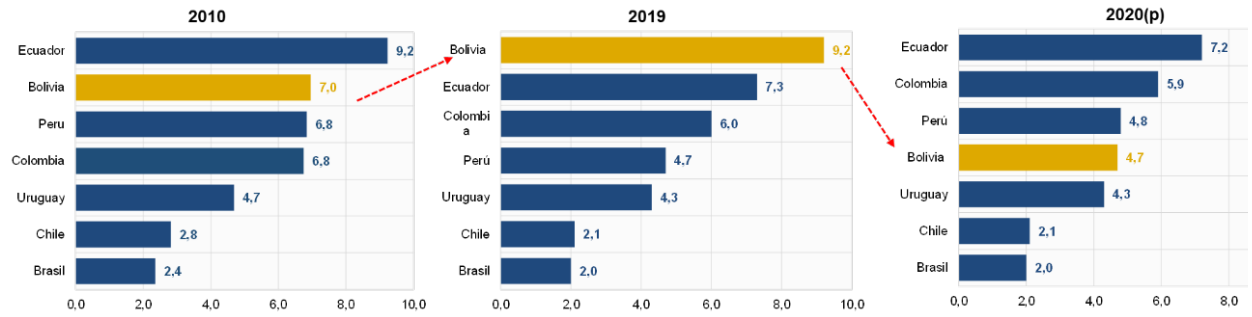
Por otra parte, la política fiscal da lugar a generar una dinámica de la demanda interna a través de la inversión pública, dinamizando y sosteniendo el crecimiento económico. De esta manera, Bolivia logra avances significativos en materia de desarrollo social, producción e infraestructura de su economía.

El Gráfico 2 muestra el nivel de la inversión pública en países seleccionados de la región como ser: Ecuador, Perú, Colombia, Uruguay, Chile, Brasil y Bolivia. En 2010, la participación de la inversión pública ejecutada en Bolivia como porcentaje del Producto Interno Bruto (PIB) fue del 7%, menor que Ecuador. No obstante, en el año 2019, la cifra para Bolivia alcanzó un nivel de 9,2%, incremento que permitió tener la participación más alta de la región en materia de inversión pública, en concordancia con el MESCP.

Desde finales de 2019 a noviembre de 2020, en un periodo de incertidumbre política y social originada por el gobierno *de facto*, la inversión pública se desplomó alcanzando 4,7% del PIB. Esta situación provocó ciertas iniciativas para cambiar el modelo económico que se había implementado en Bolivia de manera exitosa. No obstante, con las elecciones de octubre de 2020 y el arribo en noviembre de un gobierno electo de manera democrática, se reactiva dicho mecanismo contribuyendo a reactivar la economía.

En este contexto, el Estado vuelve a asumir un rol central en el proceso de redistribución de la riqueza.

Gráfico 2 | Inversión pública ejecutada en economías de Sudamérica, 2010, 2019 y 2020
(Como porcentaje del PIB)



Monetario internacional y Viceministerio de Inversión Pública y Financiamiento Externo.
Nota: (p) Preliminar. Los datos provienen de estimaciones del FMI, con excepción de Bolivia que corresponde a información oficial.
Fuente: MEFP, FMI, "Informes del Artículo IV" de cada país del Fondo.

Cabe destacar que gran parte de este esfuerzo tiene lugar a través de un esquema de transferencias condicionadas destinadas a la población más vulnerable, que es principalmente compuesta por:

- Bono Juancito Pinto (26/10/06), tiene el objetivo de incentivar la matriculación, permanencia y culminación del año escolar de la población estudiantil.

- Bono Juana Azurduy (03/04/09), cuya finalidad es mejorar la salud y nutrición de las mujeres embarazadas y de niños y niñas menores de dos años, incentivando la asistencia de las madres a los servicios de salud.

- Renta Dignidad (28/11/07), programa de prestación vitalicia destinada a la población mayor de 60 años. El pago es por un monto mensual que incluye a rentistas.

- Bono contra el hambre (13/11/20), para personas que no perciben salario, ni pensión o renta de la Seguridad Social a Largo Plazo, afectadas por la paralización de la economía a causa de la pandemia del COVID-19.

- Impuesto a las grandes fortunas (30/12/20), impuesto anual sobre fortunas mayores a Bs. 30.000.000 (USD4,37 millones), lo recaudado se redistribuye mediante inversión pública.

- Devolución del IVA (30/12/20), reintegro del 5% del Impuesto al Valor Agregado a personas que tengan un ingreso mensual menor a Bs. 9.000 (USD1.012). La medida coadyuva a la reactivación de la demanda interna.

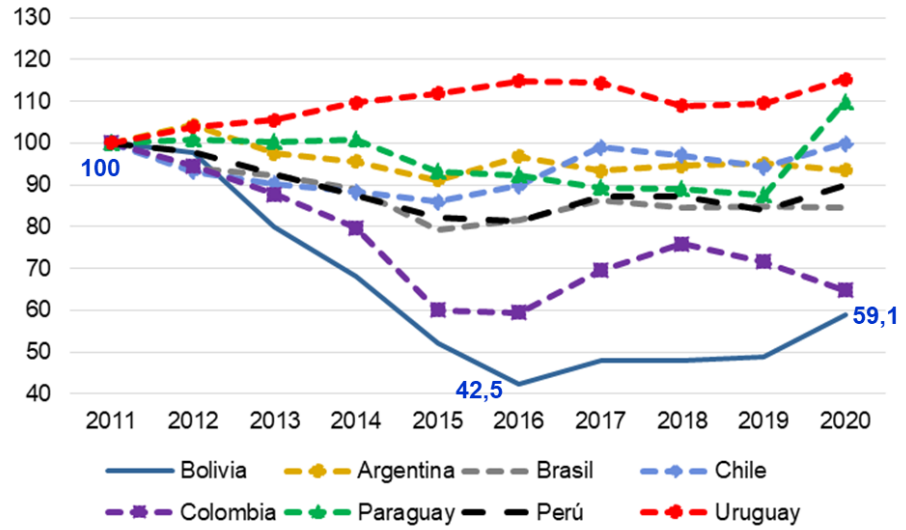
- Devolución de aportes AFP (08/09/21), para personas afectadas especialmente con pérdida de empleo por la pandemia, que requieran voluntariamente la devolución de aportes realizados al Sistema Integral de Pensiones.

2. Políticas económicas en Bolivia durante la pandemia de COVID-19

2.1. ¿Cómo se encontraba el país al irrumpir la pandemia?

A inicios de 2019, la economía boliviana fue afectada por términos de intercambio desfavorables (Gráfico 3), resultado de la incertidumbre generada por un contexto internacional adverso caracterizado por una elevada oferta de materias primas; cambio de modelo de desarrollo de China; volatilidad en mercados cambiarios y financieros globales, incertidumbre geopolítica y disminución del comercio global.

Gráfico 3 | Términos de intercambio en países seleccionados de la región
(Índice, 2011=100)



Fuente: CEPAL, Balance Preliminar de las Economías de América Latina y el Caribe, 2020.

En noviembre de 2019, Bolivia atravesó un escenario político y social complejo, en el que emergió un gobierno *de facto*, carente de legitimidad social; el cual se prorrogó en el poder hasta noviembre de 2020.

En marzo de 2020, la pandemia de la COVID-19 llegó a Bolivia, registrándose los primeros casos y dando inicio a la primera ola de contagios que se extendió hasta noviembre del mismo año. En esta primera ola, la tasa de letalidad en Bolivia fue de 6,2%, una de las más altas de la región, siendo el registro de Sudamérica 3,4%. La política monetaria, implementada por el gobierno *de facto* no fue clara, oportuna, ni efectiva; generando mucha incertidumbre en la población. Durante este periodo se implementaron algunas medidas prudenciales y de gestión de liquidez para preservar la cadena de pagos; pero no se adoptaron medidas para preservar ni fortalecer las Reservas Internacionales Netas (RIN). Además, las políticas de confinamiento poblacional para mitigar los impactos del COVID-19 fueron mal planificadas e implementadas, ocasionando la ruptura de cadenas productivas y mayor desempleo. Estas decisiones conllevaron a un manejo macroeconómico improvisado, prorrogando medidas para otro contexto, lo que tuvo implicancias negativas para la población.

El gobierno *de facto* implementó políticas económicas contrarias al MECSP, como reducir la inversión pública en la economía, paralizando proyectos productivos y sociales, señalizando su intención de retomar el viejo modelo neoliberal.

2.2. Segunda y tercera ola de COVID-19

Posteriormente, la elección democrática del presidente Luis Alberto Arce Catacora, alcanzó uno de los niveles de legitimidad más altos de la historia de Bolivia, dando inicio a una etapa de reactivación económica y planificación de las estratégicas para contener los efectos de la pandemia.

De esta manera, durante la segunda y tercera ola, las tasas de letalidad que registró Bolivia fueron 2,6% y 2,8% respectivamente, cifras similares y menores, a las que alcanzó Sudamérica y bastante inferiores a los registros de la primera ola de contagios (Cuadro N°1).

Cuadro 1 | Tasa de letalidad pandemia - Sudamérica y Bolivia
(En porcentajes)

Tasa de Letalidad	Sudamérica	Bolivia
Primera Ola	3,4%	6,2%
Segunda Ola	2,6%	2,6%
Tercera Ola	3,1%	2,8%

Fuente: UDAPE y Ourworldindata.org

La posesión de un gobierno democrático marcó un punto de inflexión en la gestión de la pandemia (Gráfico 4), adoptándose durante la segunda y tercera ola de contagios medidas de alto impacto para mitigar:

- Los efectos de los choques adversos de demanda y oferta de origen externo e interno;
- Los elevados niveles de incertidumbre;
- Las secuelas de la mala administración del gobierno anterior.

Todo ello, con el propósito de retomar la senda del crecimiento. En este sentido, se estableció los siguientes objetivos de política:

- Mitigar efectos de la pandemia;
- Retomar la senda de crecimiento con una inflación controlada;
- Preservar la estabilidad financiera, retornando a tasas de crecimiento que permitan mejorar la cartera de créditos y depósitos;

- Estabilizar las Reservas Internacionales; y
- Otorgar certidumbre a los agentes.

Gráfico 4 | Evolución de contagios en Bolivia y la región
(Casos confirmados por millón de habitantes, promedio móvil 7 días)

Nota: Datos al 16-sep-21; para fines de análisis se considera el inicio de la 2da y 3ra ola el 1-dic-2020 y 1-abr-2021, respectivamente. (1) Los datos corresponden y/o se computan con base a cifras acumuladas durante el período de la segunda y tercera ola en Bolivia. (2) Datos computados para final de período
Fuente: UDAPE y ourworldindata.org.

En aspectos de política fiscal, el Gobierno Nacional implementó políticas tanto por el lado de la demanda como por el lado de la oferta con el propósito de reconstruir la economía.

Por el lado de la Demanda:

- Se reactivó la Inversión Pública esperando retornar a niveles alcanzados hasta octubre 2019.
- Se activó el Bono contra el Hambre, mediante transferencias condicionadas.
- Se incrementaron las rentas (adicional y extraordinaria) para el Sistema de Reparto y Jubilados.
- Se otorgaron facilidades para regularizar el pago por deudas tributarias.
- Se estableció el Impuesto a las Grandes Fortunas, orientado a estratos que tienen niveles de ingresos altos.
- Se reintegró el Impuesto al Valor Agregado (IVA).

Por el lado de la oferta, las medidas apuntaron al:

- Fortalecimiento y reactivación de empresas públicas.
- Reprogramación de créditos del BCB a Empresas Públicas.
- Reactivación de proyectos estratégicos de infraestructura.
- Constitución del Fondo de Garantía para el Desarrollo de la Industria Nacional.
- Apoyo al sector productivo y acceso a Vivienda de Interés Social, restableciendo los límites a la cartera.
- Incentivos tributarios a la importación de maquinaria y vehículos eléctricos.
- Refinanciamiento y/o reprogramación de créditos del Sistema financiero al público.

En temas de Política Monetaria, se implementaron políticas convencionales y no convencionales.

Dentro las políticas convencionales se tienen:

- Programa Fiscal-Financiero 2021.
- Disminución de la oferta de títulos públicos y bajas tasas de política.
- Restablecimiento de la función del BCB de prestamista de última instancia.

Por otra parte, dentro de las políticas no convencionales están:

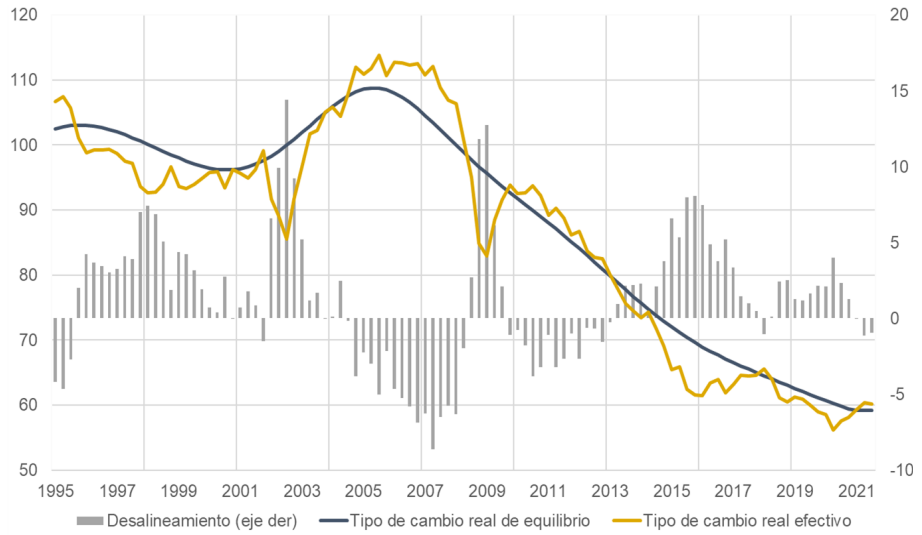
- Modificaciones al Reglamento de Encaje Legal para otorgar créditos de liquidez a Entidades Financieras (Fondos CPVIS II y III).
- Modificación del Reglamento de Posición de Cambios.
- Créditos de liquidez a la Banca Estatal de Desarrollo.
- Reactivación de créditos del BCB a las Empresas Públicas estratégicas.
- Reducción de límites a inversiones en el exterior de Aseguradoras y Bancos.
- Control y límites a los flujos de divisas y pagos electrónicos.
- Modernización del Sistema de Pagos.
- Fortalecimiento de las Reservas Internacionales con el Proyecto Ley del Oro.

En suma, tanto las políticas convencionales y no convencionales permitieron:

- Dinamizar la actividad económica.
- Provisionar la liquidez necesaria al sistema financiero.
- Mantener la Estabilidad financiera.
- Fortalecer las RIN.
- Modernizar el sistema de pagos.

En lo referente a la estabilidad cambiaria y anclaje de expectativas, Bolivia tiene una política cambiaria *Sui Generis* con respecto a los otros países de la región, lo que posibilitó que no se registrasen desvíos persistentes del tipo de cambio real respecto a sus fundamentos. Esta estabilidad cambiaria otorgó certidumbre a la población, anclando las expectativas de los agentes. En este sentido, de acuerdo con los fundamentos macroeconómicos (política fiscal, política monetaria y términos de intercambio) el tipo de cambio real es acorde a sus fundamentos de largo plazo (Grafico 5).

Gráfico 5 | Tipo de cambio real observado y de equilibrio
(Índice, Base 2003)



Fuente: Banco Central de Bolivia.

En este contexto, una política no convencional que es importante señalar es la política de fortalecimiento de las RIN a través del aprovechamiento de un recurso natural estratégico que tiene Bolivia, como es el oro. En este sentido, el BCB presentó al congreso del Estado Plurinacional de Bolivia la Ley del Oro de Producción Nacional destinado al Fortalecimiento de las Reservas Internacionales, la cual tiene por objeto.

- Autorizar al BCB la compra de oro de producción nacional para el fortalecimiento de las Reservas Internacionales.

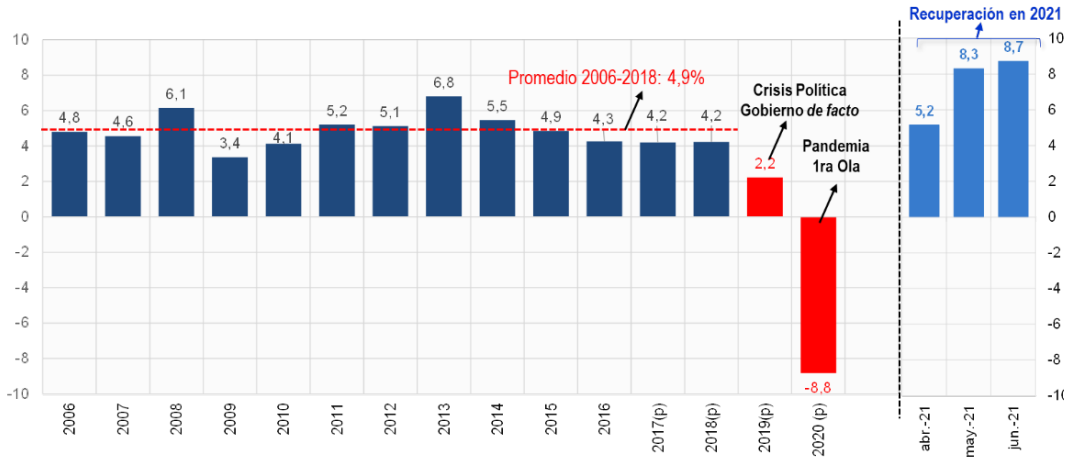
- Autorizar al BCB a efectuar operaciones financieras con las Reservas Internacionales de oro en los mercados internacionales.

La medida sitúa al BCB a la par de otros bancos centrales en el plano internacional, en procura de adoptar mecanismos de gestión más modernos y eficientes para el fortalecimiento genuino de las reservas internacionales. Cabe mencionar que las economías avanzadas y emergentes cuentan con esquemas de similar naturaleza.

3. Resultados alcanzados

El MESCP permitió a Bolivia tener un crecimiento sostenido, que en varios años fue de los mayores en la región. Este desempeño fue revertido por la crisis asociada a la incertidumbre política de 2019 que derivó en una administración no legítima (Gráfico 6).

Gráfico 6 | Bolivia: crecimiento del PIB real 2006-2020 y crecimiento del IGAE 2021
(En porcentaje)

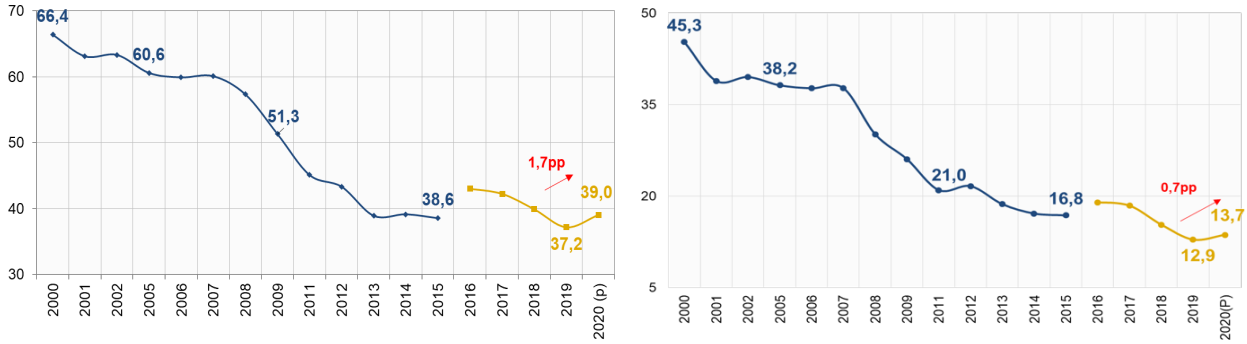


Fuente: Instituto Nacional de Estadística.

No obstante, este año con las políticas mencionadas se advierten signos de recuperación. A junio de 2021, se tiene un crecimiento del 8,7%, lo que indica que hasta finales de gestión se alcanzará sin dificultades la meta prevista en materia de crecimiento económico.

Asimismo, se evidenció un retroceso en los avances del país en materia social, con un incremento de la pobreza, ante la caída de los ingresos y la ausencia de medidas efectivas de protección social. Algo similar ocurrió con los indicadores de pobreza extrema, que aumentaron durante el periodo de la pandemia frente a la falta de certidumbre y una cuestionable gestión del gobierno *de facto* (Gráfico 7).

Gráfico 7 | Bolivia: tasas de pobreza moderada y extrema, 2000-2020
(En porcentaje)

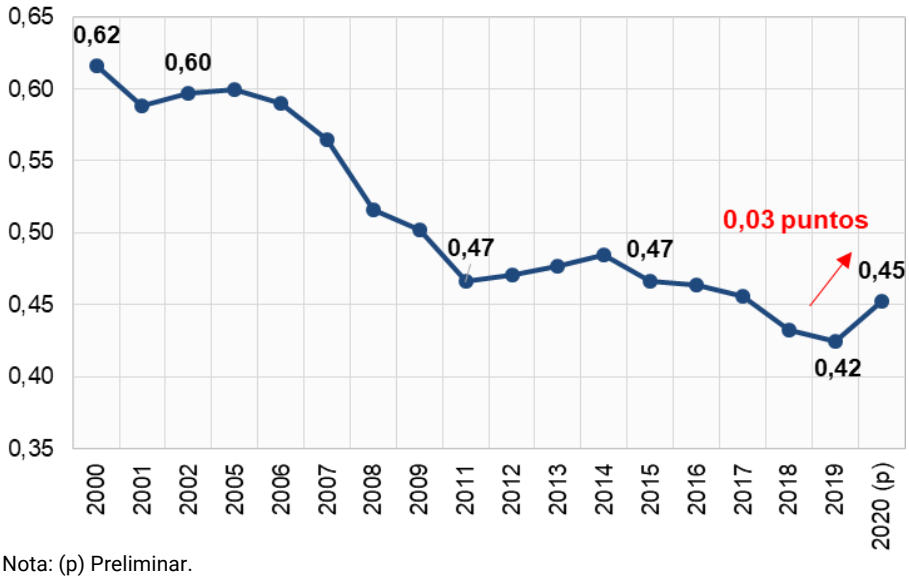


Notas: (p) Preliminar. A partir de 2016 se consideran las nuevas líneas de pobreza moderada y extrema estimadas por el INE.
Fuente: MEFP con base a datos del Instituto Nacional Estadística.

En esa línea, los logros de largo plazo en la reducción de la desigualdad fueron revertidos, observándose incrementos en 2020, que obedecieron en gran medida a la mala administración económica del gobierno inconstitucional. Asimismo, los incrementos en el porcentaje de personas de ingresos medios se vieron estancados, acrecentándose en contrapartida la participación de la población con ingresos bajos.

El índice de Gini, otro indicador importante para analizar la desigualdad, pasó de 0,62 en 2000 a 0,42 en 2019, una reducción importante en materia de desigualdad en Bolivia, y que fue afectada por el COVID-19 y el gobierno *de facto* (Gráfico 8).

Gráfico 8 | Índice de Gini, 200-2020 (Rango entre 0: igualdad y 1: desigualdad)

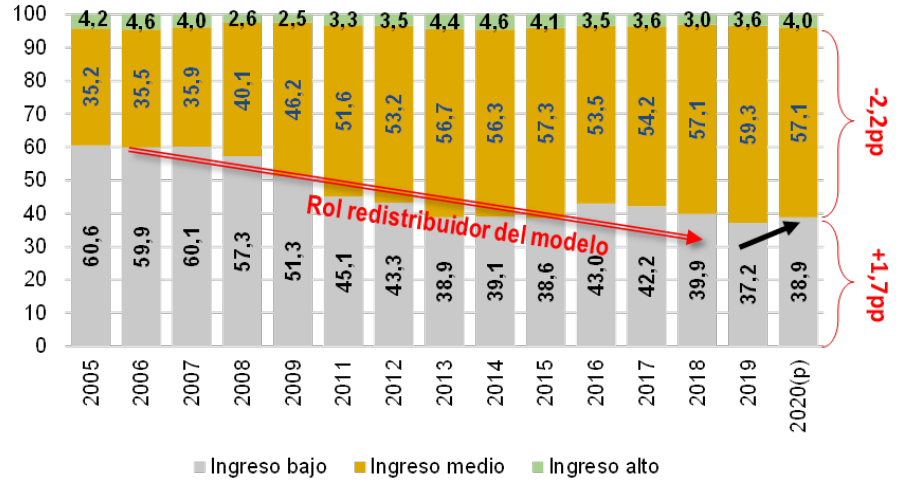


Nota: (p) Preliminar.
Fuente: MEFP con base a datos del Instituto Nacional Estadística y Unidad de Análisis de Políticas Sociales y Económicas (datos de la Encuesta de Hogares).

Lo propio pasó en términos de ingresos, al observar el tema redistributivo, la proporción de personas con niveles de ingresos bajos se redujo con el paso del tiempo de un 60,6% a un 37,2% en el

año 2017. Esta tendencia, fue afectada en 2020 por la pandemia y la incertidumbre política y social generada por un gobierno que no fue constitucional (Gráfico 9).

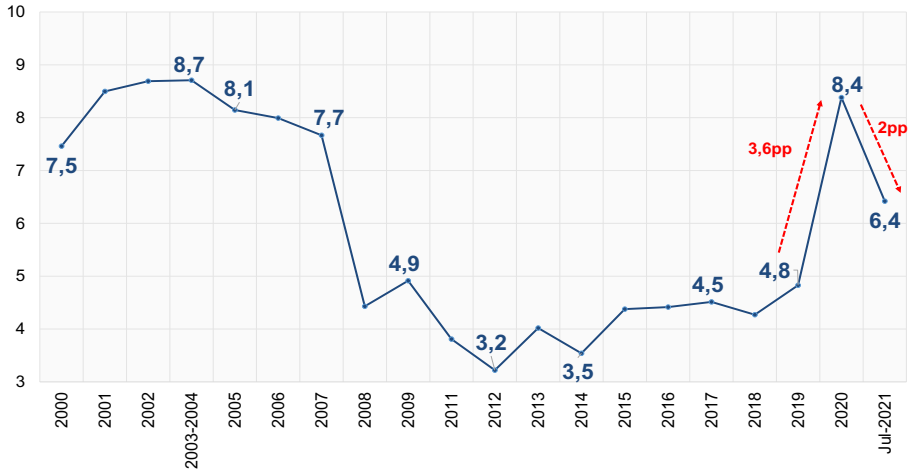
Gráfico 9 | Estrato de ingreso socioeconómico 2005-2020
(En porcentaje)



Nota: (p) Preliminar.
Fuente: MEFP con base a datos del Instituto Nacional Estadística y Unidad de Análisis de Políticas Sociales y Económicas (datos de la Encuesta de Hogares).

Los resultados alcanzados hasta 2019 permitieron revertir de manera sustancial los niveles de pobreza que existían en Bolivia previo al 2006. Además, se mantuvo la tasa de desempleo en niveles por debajo a los registrados en otros países de la región; lo que demostró la efectividad del modelo económico implementado en Bolivia. No obstante, en el periodo de la administración del gobierno *de facto* la tasa de desempleo se incrementó en casi el 100%. Sin embargo, a partir de noviembre de 2020, las medidas de reactivación del gobierno democrático repercutieron favorablemente en el mercado laboral, observándose nuevamente una mejora en los indicadores de empleo (Gráfico 10).

Gráfico 10 | Tasa de desempleo abierto urbano
(En porcentaje)



Fuente: MEFP con base a datos del Instituto Nacional de Estadística (Encuesta de Hogares y Encuesta Continua de Empleo).

4. Conclusiones

A partir de 2006 Bolivia implementó el MESCP, que le permitió alcanzar notables avances en materia económica y social, reduciendo significativamente los niveles de pobreza y desigualdad.

Bolivia enfrentó una crisis como la del COVID-19 en un escenario complejo; por una parte, aún se sentían los efectos de choques que afectaron los precios de bienes exportados y, por otra, una significativa inestabilidad política-social tras el ascenso de un gobierno *de facto*.

El retorno de un gobierno democrático en noviembre de 2020 otorgó certidumbre, adoptándose medidas de alto impacto para mitigar la crisis, enfrentar con solidez la pandemia y retomar la senda de crecimiento.

En virtud de dichas políticas, ya se observan resultados favorables, reflejados en una recuperación de la actividad económica y una mejora de los indicadores sociales, entre otros aspectos.

La experiencia boliviana en política monetaria muestra que es factible implementar una orientación contracíclica, que coadyuve a las políticas orientadas a la reactivación, apuntalando la dinamización del crédito, inversión y actividad, a la vez que se preserva la estabilidad macroeconómica y financiera.

A su turno, se logró que la política cambiaria otorgue mayor certidumbre, ante un escenario complejo y cambiante. Finalmente, la gestión de las expectativas cambiarias dio mayor espacio para políticas monetarias expansivas; sin dejar de lado las políticas para mantener la estabilidad de las reservas internacionales.

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Los retos de la banca central para los próximos años

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Resumen

En este artículo se presentan reflexiones sobre los retos de la banca central para los próximos años. Primero, se postulan un grupo de principios para una política monetaria exitosa. Luego se analiza la importancia del ciclo financiero y su relación con la política monetaria. Finalmente, se reflexiona sobre el control de la inflación post-COVID-19 y otros retos futuros como la dominancia fiscal y la creación de monedas digitales.

Clasificación JEL: E52, E58.

Palabras clave: política monetaria, inflación, ciclo financiero, COVID-19.

[*] Se agradece la colaboración de Erick Lahura en la elaboración de esta nota. Las opiniones vertidas en este artículo son del autor y no se corresponden necesariamente con las del BCRA o sus autoridades. Email: julio.velarde@bcrp.gob.pe.

The Challenges for Central Banking for the Next Years

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Abstract

This article reflects on the challenges facing central banking in the coming years. First, a set of principles for a successful monetary policy is postulated. Then, the importance of the financial cycle and its relationship with monetary policy is discussed. Finally, we reflect on post-COVID-19 inflation control and future challenges such as fiscal dominance and the creation of digital currencies.

JEL Classification: E52, E58.

Keywords: COVID-19, financial cycle, inflation, monetary policy.

1. Introducción

La pandemia del COVID-19 ha sido uno de los eventos más severos e inesperados que ha experimentado el mundo en los últimos años. A nivel mundial, los gobiernos respondieron con un conjunto de medidas sanitarias y económicas que buscaban minimizar tanto las pérdidas humanas como las económicas. En esta línea, muchos bancos centrales reaccionaron rápidamente asumiendo posiciones claramente expansivas con la finalidad de minimizar los efectos negativos sobre los mercados de bienes y, en particular, sobre los mercados financieros. A dos años de la pandemia el reto de los bancos centrales hacia adelante exige un manejo adecuado de este estímulo monetario en un contexto de recuperación de la actividad económica, fuertes presiones inflacionarias y desanclaje en algunos casos de las expectativas de inflación.

Pero este no es el único reto que tendrán que enfrentar los bancos centrales en un futuro cercano. También se ha observado el surgimiento de nuevas tendencias mundiales que marcarán la agenda y las acciones de las autoridades monetarias en los próximos años. Una de ellas, sin duda alguna, es la creación de monedas digitales emitidas por los bancos centrales (CBDC). Otro tema importante y de reciente discusión es la manera en que la desigualdad económica puede limitar la efectividad de la política monetaria. Finalmente, el cambio climático es otro de los factores que plantea retos futuros, no solo para los bancos centrales sino también para los responsables de política en todo el mundo.

2. Principios para una política monetaria exitosa

El éxito de nuestra política monetaria para enfrentar estos retos futuros dependerá de que podamos mantener un conjunto de principios básicos. Creo que cuando los objetivos son más precisos y claros, el banco central puede desempeñarse mejor pues los esfuerzos de los funcionarios del Banco pueden enfocarse a una tarea concreta. En el BCRP tenemos como objetivo único la estabilidad de precios, lo cual es consistente con un régimen de metas explícitas de inflación adoptado desde principios de este siglo.

Un elemento indispensable para lograr la estabilidad de precios es la credibilidad, la cual toma mucho tiempo en construirse y que, lamentablemente, puede desaparecer rápidamente. Esta credibilidad nos ha permitido tener la tasa de inflación más baja en la región en lo que va de este siglo e incluso en periodos como el de la crisis financiera tuvimos la segunda tasa de interés más baja entre los mercados emergentes y la más baja al inicio de la pandemia del coronavirus.

Otro principio importante es mantener ancladas las expectativas de inflación. Hacia finales del año 2021, muchos países han registrado elevados y persistentes niveles de inflación debido al incremento sostenido de los precios internacionales de alimentos. Sabemos que esta situación se debe a un choque de oferta y que, aunque subiéramos la tasa de interés a 20%, esto no afectará el precio del petróleo o de los alimentos. Sin embargo, lo que nos preocupa es que las expectativas se desvíen de la meta, como sucedió en la década de 1970 en economías desarrolladas.

Un tercer principio tiene que ver con la posición contracíclica de la política monetaria, esto es, la tasa de interés debe subir cuando la economía se sobrecalienta y debe disminuir cuando se debilita. Este principio lo aplicó William McChesney Martin Jr., el presidente de la Reserva Federal que más tiempo ha ocupado ese puesto, y se resume en su famosa frase: "el trabajo del Banco Central es quitar el licor cuando la fiesta recién está comenzando". La aplicación de este principio es complicada pues puede generar presiones políticas sobre el banco central, incluso en países como Estados Unidos donde su autonomía está reconocida, como le sucedió a William McChesney Martin con el presidente Lyndon Jonhson y a Arthur Burns con el presidente Richard Nixon.

El cuarto principio consiste en aplicar una estrategia de control de riesgos. El Banco Central tiene que ponerse siempre en el peor escenario: "desear lo mejor, pero prepararse para lo peor". Es muy importante diseñar los instrumentos para poder reaccionar con rapidez y efectividad ante nuevos escenarios.

El incumplimiento de estos principios básicos debilita la política monetaria y puede generar la tentación de seguir otro tipo de políticas para controlar la inflación, con consecuencias no deseadas.

3. El ciclo financiero

Un sesgo usual en la evaluación de la política monetaria es asumir que las fluctuaciones económicas se deben a choques exógenos; sin embargo, estas suelen ser endógenas, amplificadas por el ciclo financiero. Debido a esto, para un banco central es muy importante distinguir los ciclos financieros de los ciclos económicos, algo que a veces no es tan fácil.

Cuando hay euforia, el aumento de la tasa de interés necesario para detenerla probablemente sea muy grande. Por eso, lo recomendable es aplicar medidas macroprudenciales como el control de riesgos. Como lo señala Borio (2012), el ciclo financiero denota "interacciones entre percepciones de valor y riesgo, actitudes hacia el riesgo y restricciones financieras, las cuales se refuerzan mutuamente y se traducen en expansiones seguidas de contracciones". Y son estas interacciones las que "pueden amplificar las fluctuaciones económicas y posiblemente conducir a graves dificultades financieras y asignaciones económicas erradas".

Existe la tendencia a pensar que todo está bien, la cual está asociada a una confianza excesiva en que los mercados siempre asignan bien los recursos y se arreglan solos. Esta situación se experimentó en el Perú a finales de los años noventa. En el primer semestre de 1998, la expansión de crédito estuvo financiada 50% por líneas de corto plazo del exterior; obviamente era insostenible, pero la creencia era que los bancos del exterior sabían cuando prestar y que los bancos locales sabían cuánto podían prestarse y cuánto podían prestar localmente sin tanto riesgo. Esta confianza en que el mercado se arregla solo es un riesgo y es una de las razones por las cuales un banco central tiene que tomar medidas macroprudenciales.

La evidencia muestra que los auges financieros han precedido a las recesiones. Si no se toma en cuenta el ciclo financiero, la política monetaria puede exacerbar las fluctuaciones económicas, generando episodios de auge y expansión. La evidencia reciente nos muestra que las recesiones son

el resultado no tanto de las acciones de política monetaria sino de su inacción, el hecho de no actuar para moderar los ciclos financieros.

Antes de la crisis financiera internacional, el reconocimiento de la importancia del ciclo financiero y la política macroprudencial era casi nulo. Sin embargo, nuestra propia historia de crisis financieras en economías emergentes nos ha hecho internalizar mucho antes que en economías avanzadas la importancia del ciclo financiero. Y fue solo después de la crisis financiera internacional que el término macroprudencial se hizo muy popular. Si bien debemos incorporar la realidad de las finanzas en los modelos macroeconómicos, también debemos tener la capacidad de reaccionar rápidamente, ponernos en los peores escenarios y tomar decisiones con la teoría como guía y no como dogma de fe.

Tal como indique anteriormente, en el caso peruano, la política monetaria se conduce bajo un régimen de metas explícitas de inflación, con un rango meta entre 1 y 3 por ciento, pero que toma en cuenta explícitamente la necesidad de la estabilidad macrofinanciera. Progresivamente se ha ido reconociendo la utilidad de tener una meta expresada como un rango en vez de una meta puntual para anclar las expectativas. Respecto a la estabilidad macrofinanciera, esta se basa en el control de los riesgos de la dolarización de la economía. El riesgo de liquidez lo controlamos a través de la acumulación preventiva de reservas internacionales y encajes a obligaciones en moneda extranjera, mientras que el riesgo cambiario o efecto hoja de balance se enfrenta a través de las intervenciones cambiarias. Además, hemos introducido un esquema de desdolarización a través de la aplicación progresiva de encajes adicionales a los créditos en moneda extranjera, con el objetivo de desacelerar su crecimiento, pero no de manera abrupta.

En Perú, la intervención cambiaria y el uso de herramientas macroprudenciales como los encajes ha permitido moderar el ciclo financiero. La tasa de interés sigue siendo nuestro instrumento principal, pero nosotros hemos usado el encaje como un instrumento complementario para controlar la expansión del crédito cuando hemos preferido no subir la tasa de interés y atraer más capitales.

La posición de la academia y de la comunidad internacional sobre la intervención cambiaria ha cambiado mucho en los últimos años. La teoría consideraba que un régimen cambiario flexible con intervención cambiaria era insostenible. Sin embargo, la experiencia de muchos países, incluido el Perú, demostró que esto no era así. Es decir, la práctica se adelantó a la teoría. Nuestras economías son muy pequeñas en comparación a los fondos que manejan los mayores administradores de portafolios del mundo, y si no tratamos de moderar de alguna forma la volatilidad generada por esos flujos de capitales, estos pueden tener consecuencias enormes en la asignación de recursos. Además del BCRP, los bancos centrales asiáticos también han intervenido en sus mercados cambiarios para mitigar riesgos que consideran importantes para sus países. Estas experiencias han hecho que organismos internacionales como el BIS y el FMI reconozcan los beneficios de la intervención cambiaria (FM1, 2020).[1]

[1] FMI (2020), "Toward an Integrated Policy Framework". IMF Policy Paper N° 2020/046.

4. El control de la inflación post-Covid

El gran reto inmediato de los bancos centrales es el control de los elevados niveles de inflación que se vienen observando luego de la pandemia del Covid-19. Esta inflación ha sido generada por restricciones de oferta y una rápida recuperación de la demanda agregada luego de que se levantarán la mayoría de las medidas de confinamiento a nivel mundial, todo lo cual ha generado un aumento de precios, principalmente de alimentos y energía. Debemos estar siempre alertas pues existe el riesgo de que se lleguen a desanclar las expectativas y se genere un espiral inflacionario como ocurrió durante la década de 1970 en economías como Japón, Reino Unido y Estados Unidos. Esto no significa que debamos reaccionar exageradamente ante una inflación de oferta recesando la economía, pues el remedio sería peor que la enfermedad. Debemos ser prudentes y aprender de la historia.

5. Otros retos para el futuro

5.1. La dominancia fiscal

Los mayores niveles de deuda y de déficit como consecuencia de la pandemia del Covid-19 pueden generar presiones de dominancia fiscal en los próximos años. Los potenciales incrementos en las tasas de interés para controlar la inflación pueden causar presiones fiscales a través del mayor costo por el servicio de deuda. El riesgo es que la dominancia fiscal, como sucedió hace varios años, genere un aumento de la inflación, se acentúen los ciclos y se deterioren los servicios públicos. Si bien el nivel de endeudamiento del Perú es más bajo que en otros países de la región, este es un riesgo que tenemos presente.

5.2. Moneda digital del Banco Central (CBDC)

El volumen negociado de las criptomonedas ha llegado a ser mayor que el de algunas monedas nacionales. Sin embargo, su cotización es mucho más volátil, por lo que su uso como medio de pago podría afectar la potencia de transmisión de la política monetaria.

En realidad, me preocupan más las llamadas “monedas estables” que tratan de mantener la paridad con una moneda fuerte y que sean producidas por las grandes empresas tecnológicas mundiales. En este caso existe el riesgo de que los bancos centrales pierdan soberanía monetaria; además, se corre el riesgo de que la desdolarización en la que hemos avanzado muchos países se revierta. Por estas y otras razones muchos bancos centrales estamos trabajando en una moneda digital emitida por el Banco Central (CBDC). La forma del diseño de una moneda digital afectaría el mecanismo de transmisión de la política monetaria. Una alternativa es que la moneda digital solo reemplace al efectivo dado que su demanda no es muy grande por persona.

La emisión de las dos primeras monedas digitales en Las Bahamas y Jamaica es el inicio de una nueva tendencia. Definitivamente, todos los bancos centrales vamos a aprender de lo que hagan los otros bancos centrales al respecto.

6. Reflexiones finales

Mi experiencia de 15 años como banquero central me enseña que hay que actuar con prudencia, a nivel técnico y político. Considero que los bancos centrales debemos estar preparados para distintos escenarios, pues las crisis que se vienen siempre son diferentes a las anteriores. Necesitamos tener la agilidad para identificar oportunamente las crisis y poder reaccionar oportunamente.