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*Monetary Policy Rules*

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## *Monetary Policy Rules*

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# NON-TECHNICAL SUMMARY


## Research Question

What is the appropriate money rules to follow? Most of the time that this question is raised, the answer is given in terms of monetary aggregate: that consumer price inflation rate should be within certain limits and that aggregate output should follow certain paths. A frequently used rule is the Taylor rule, which determines a target financial interest rate as a function of changes in aggregate output and in the inflation rate.

## Contribution

Here I consider an economy where the government has two channels for injecting or withdrawing money from the economy: a policy of monetary transfers to or taxes from households handled by the fiscal authorities and another for injecting or withdrawing money from the financial system handled by the monetary authorities. Since the two channels produce different responses in the economy, this paper studies how different combinations of these policies with the same aggregate money growth give different macroeconomic results.

## Results

Results are that the utility of the unskilled is higher the higher the transfer rates and that of the skilled is lower. In general, at given transfer rates, the unskilled prefer higher inflation rates and the skilled lower. At higher positive rates of transfer to the unskilled both the unskilled and the skilled prefer higher inflation rates. This suggests that in countries where unskilled are the majority, transfers to the unskilled are likely to be a social choice outcome even at the cost of reduced total output. The paper also points out that concentrating on aggregate output and inflation as policy objectives can be problematic.

# Monetary policy rules

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May 14, 2021

## 1 Introduction

The object of this paper is to consider the effects on an economy of two alternative channels of monetary policy using a cash in advance model. One of the channels is simply giving money to households as was done in the Cooley-Hansen [2], Lucas and Stokey [10], McCandless [11] (Chapter 8), Svensson [14], and Walsh [15] (Chapter 3) cash-in-advance model of money. In their model, all households received lump sum transfers each period. Here I consider transfers that are a bit more like what occurs in practice, transfers are only given to less well off households, those that I will call the unskilled. Skilled households do not receive the transfers. The second channel is similar to central bank monetary policy, each period lump sum monetary transfers are given to or extracted from financial intermediaries (banks) as in Cooley-Hansen [2], McCandless [11] and [12]. At the beginning of each period, banks lend working capital to the firms so that the firms can pay their workers before they sell their goods. The funds their banks have available to lend are the bank deposits of the skilled and unskilled plus the transfers or minus the extractions made by the central bank. Banks make no profits in this model (that is easy to change) so if banks receive a transfer from the central bank they can charge the firms a lower interest rate than they pay out to their depositors. Note that deposits from either the skilled or unskilled workers can be negative (but not both). One can think of negative deposits as using a credit card to pay for consumption and that credit card debt is paid off at the end of each period.

Having a model with two channels of monetary policy that operate on the economy in fundamentally different ways allows one to think carefully about the effects of a monetary policy of sterilization of inflation through contraction of money on the financial side. In addition, having two groups of households, one unskilled, with lower wages and reduced opportunities for saving, and another skilled with higher wages and the ability to own and rent out capital in addition to holding bank deposits, permits a more careful consideration of the welfare effects of this type of policy. In addition, this kind of analysis helps explain why different countries, those with more or fewer unskilled workers, will choose to follow different policies with respect to a politically optimal inflation rate.

The literature on direct monetary transfers to households (such as those listed above) has fairly unambiguous results: lump sum monetary transfers to households results in lower incentives to work, a reduction in the amount of labor offered at each wage, lower aggregate output and a smaller capital stock, lower consumption and reduced welfare. This reduction in welfare and output is sometimes referred to as an aggregate inflation tax. Monetary transfers to the financial system (via reductions in interest rate (as in Cooley and Quadrini [3]) or injections of money that result in a reduction in the financial interest rate (McCandless [11]) is also unambiguous if banks are allowed to lend out those injections[1]: output, the capital stock, consumption and welfare increase. Having two types of consumers makes the results more ambiguous, since a transfer to just the unskilled has a smaller effect (if not everyone is unskilled) on output and unskilled wages so that consumption can increase for the unskilled even though they work somewhat less. However, the unambiguous improvement for the unskilled comes with a welfare decline for the skilled, since with less unskilled labor, the marginal products of both skilled labor and capital are smaller. This results in a smaller capital stock (to get the marginal product of capital up to the equilibrium rental rate) and reduced utility for the skilled households. Whether there is a social welfare gain for the economy depends on how the welfare of the unskilled households is weighed against the welfare of the skilled households. From a social choice perspective, if the majority of the households are skilled, the way they vote will result in monetary emissions through the central bank and if a majority of the households are unskilled, monetary expansion will be via fiscal transfers.

There is a substantial recent literature on two and heterogeneous agent New-Keynsean models of monetary policy, for example: Bilbiie [1], Debortoli and Gali [4], Gornemann [7], Kaplan, Moli and Violante [8], and Nuño [13]. These papers use a New-Keynesian model (al. la. Woodford [16] or Gali [6]) with monetary policy where the policy interest rate is determined by a Taylor rule. These models do not have a well defined banking system (although many have a mutual fund type financial market) most do not have money in the model. What is new in this paper is the use of a well defined banking system, two different clearly defined methods by which new money can enter the economy, money and interest rates are connected via central bank policy operating with the banking system, and an analysis of what happens depending on how money enters the economy. This last is not a minor issue. Central banks are often called upon to sterilize money that entered circulation via the treasury, fiscal, policy.[2] This paper can look directly at sterilization policies and see how it effects the poorer and better off households separately.

[1] In Fuerst [5] and Lucas [9], transfers from the monetary authorities are passed on to bank owners and are not lent to fims. This comes from thier assumption that competition among banks implies that marginal cost equal marginal revenue and both deposit and lending interest rates are not effected by monetary injections, which is unlikely.

[2] There are a number of legal paths by which the treasury of a country can obtain new money from the central bank, often by issuing new government bonds that the central banks then hold and in some cases are forced to hold bonds that cannot be sold to the public.

In this paper, banks take deposits of money from both the unskilled and skilled families. They can also make in-period consumption loans to the families which are paid off at the end of the period with income earned during the period. Such lending, if it occurs, is relatively small. The other lending is to the firms as working capital, since goods need to be produced and the workers paid before the goods are sold. These loans are paid off at the end of the period. In addition, banks may receive money transfers from or be required to make money transfers to the central bank. In most developing countries, the vast majority of bank loans are relatively short term loans for working capital. In the United States, the average maturity of commercial loans is only 8 months, which suggests that working capital loans make up a large fraction of commercial loans there. To keep things simple, banks have no operating costs (this can be added without changing any basic results) and pay all interest and principle income back to the depositors.

Finally, this paper suggests some problems with simply using monetary aggregates as a basis for determining monetary policy. If different monetary channels have profoundly different effects on the economy, as they do in the model presented here, it is not only the aggregate inflation rate (money issue rate) but also the way that the money issue is divided between the various channels that matters. Consider as an example two cases of stationary states where the aggregate money stock is constant.[3] In one case, neither the fiscal nor the monetary authorities add money to the economy. In the other case, the fiscal authorities make lump sum transfers of money to a small subset of the households and the monetary authorities sterilize this money emission by removing the same amount of money from the financial sector, raising interest rates. In this second case, real wages and output are lower than in the first case, but utility can be lower for the households who don't receive the transfers and higher for those that do.

In section 2, I describe the model, in section 3 I solve numerically for stationary states (there can be more than one), and in section 4 I present some conclusions.

## 2 The model

There are two types of households in this model: one with unskilled labor and the other with skilled. A fraction $N_u$ of the house are unskilled and the rest, $N_s = 1 - N_u$, are skilled. To keep things simple, the unskilled households can only save by holding deposits in the banking system while the skilled households can hold both bank deposits and physical capital that they rent out to firms. The time $t$ sub-utility functions of all households are the same:

$$U_i(t) = \log(c_i(t) - Sub) + B\log(1 - l_i(t)),$$

where the time t utility of family $i$ is determined by the amount their consumption, $c_i(t)$, is above a subsistence level, $Sub$, plus the utility of their leisure,

[3] This example will be worked out in the results section.

$1 - l_i(t)$, which we write as one minus the fraction of their time spent working, $l_i(t)$. The households hold cash over from the previous period and the unskilled may get a positive or negative transfer of cash from the government.

## 2.1 The unskilled households

The $N_u$ unskilled households start each period with some cash they have saved from the previous period, $m_u(t-1)$, and receive a lump sum transfer of cash, $\Delta m_u(t)$, from the government at the beginning of each period and which they can spend in the period. The transfer can be negative, in which case they pay a lump sum tax. They decide how much labor to provide to the market at a nominal wage of $W_u(t)$. The budget constraint of an representative unskilled family is

$$P(t)\, c_u(t) + m_u(t) = W_u(t)\, l_u(t) + m_u(t-1) + \Delta m_u(t) + (r^n(t) - 1)\, d_u(t)$$

where $r^n(t)$ is the gross one period interest rate paid on deposits at banks and $d_u(t) \geq 0$ are their deposits in banks during that period. We assume that the unskilled do not own capital. The cash in advance constraint for unskilled households is

$$P(t)\, c_u(t) = m_u(t-1) + \Delta m_u(t) - d_u(t).$$

Subtracting the cash in advance constraint from the budget constraint, we end up with a flow constraint of

$$m_u(t) = W_u(t)\, l_i(t) + r^n(t)\, d_u(t).$$

The unskilled households solve the infinite horizon Legrangean of

$$\max_{\{c_u, l_u, m_u, n_u\}_0^\infty} \sum_{j=0}^{\infty} \beta^j \left[ \begin{array}{c} \log(c_u(t+j) - Sub) + B\log(1 - l_u(t+j)) \\ +\lambda_{u1}(t+j)\left[m_u(t+j) - W_u(t+j)\, l_u(t+j) - r^n(t+j)\, d_u(t+j)\right] \\ +\lambda_{u2}(t+j)\left[P(t+j)\, c_u(t+j) - m_u(t+j-1) - \Delta m_u(t+j) + d_u(t+j)\right] \end{array} \right],$$

where $\beta$ is the one period discount factor and $\lambda_{u1}$ and $\lambda_{u2}$ are the Legrangean multipliers. The resulting first order conditions are

$$\begin{aligned} \frac{\partial}{\partial c_u} &= \frac{1}{c_u(t+j) - Sub} + \lambda_{u2}(t+j)\, P(t+j) = 0, \\ \frac{\partial}{\partial l_u} &= -\frac{B}{1 - l_u(t+j)} - \lambda_{u1}(t+j)\, W_u(t+j) = 0, \\ \frac{\partial}{\partial m_u} &= \lambda_{u1}(t+j) - \beta\lambda_{u2}(t+j+1) = 0 \text{ and} \\ \frac{\partial}{\partial d_u} &= -\lambda_{u1}(t+j)\, r^n(t+j) + \lambda_{u2}(t+j) = 0. \end{aligned}$$

These simplify, removing the multipliers, to the two first order equations,

$$\begin{aligned} \frac{W_u(t+j)}{P(t+j)} &= \frac{B(c_u(t+j) - Sub)}{(1 - l_u(t+j))} r^n(t+j), \text{ and} \\ r^n(t+j) &= \frac{1}{\beta} \frac{P(t+j+1)(c_u(t+j+1) - Sub)}{P(t+j)(c_u(t+j) - Sub)}. \end{aligned}$$

The budget constraint and the cash in advance constraint make up the rest of the model that comes from the unskilled households. These are

$$\begin{aligned} m_u(t) &= W_u(t)\, l_u(t) + r^n(t)\, d_u(t) \text{. and} \\ P(t)\, c_u(t) &= m_u(t-1) + \Delta m_u(t) - d_u(t). \end{aligned}$$

If all unskilled households are alike, then we define the aggregate variables $M_u(t) = N_u m_u(t)$, $L_u(t) = N_u l_u(t)$, $D_u(t) = N_u d_u(t)$, $C_u(t) = N_u c_u(t)$.

## 2.2 Skilled households

The $N_s = 1 - N_u$ skilled households solve the same maximization problem but under different constraint. First, the skilled households do not receive transfers of cash from the government. Second, they can hold physical capital and earn rents on that capital. The budget constraint of the skilled is

$$\begin{aligned} P(t)\, c_s(t) + m_s(t) + P(t)\, k_s(t+1) &= W_s(t)\, l_s(t) + P(t) r(t)\, k_s(t) + P(t)(1-\delta)\, k_s(t) \\ &\quad + m_s(t-1) + (r^n(t) - 1)\, d_s(t) \end{aligned}$$

where $k_s(t)$ is the physical capital they rented out at time $t$ and $\delta$ is the rate of depreciation so $(1-\delta)\, k_s(t)$ is the amount of that physical capital that remains at the end of period $t$. The cash in advance constraint for the skilled families is

$$P(t)\, c_s(t) = m_s(t-1) - d_s(t).$$

Taking the cash in advance constraint out of the budget constraint, the flow budget constraint that remains is

$$m_s(t) + P(t)\, k_s(t+1) = W_s(t)\, l_s(t) + P(t) r(t)\, k(t) + P(t)(1-\delta)\, k(t) + r^n(t)\, d_s(t).$$

The infinite horizon Lagrangean for the skilled households is

$$\max_{\{c_s, l_s, k_s, m_s, n_s\}_0^\infty} \sum_{j=0}^{\infty} \beta^j \left[ \begin{array}{c} \log(c_s(t+j) - Sub) + B \log(1 - l_s(t+j)) \\ +\lambda_{s1}(t+j)\, [m_s(t+j) + P(t+j)\, k_s(t+j+1) - W_s(t+j)\, l_s(t+j) \\ -P(t+j) r(t+j)\, k_s(t+j) - P(t+j)(1-\delta)\, k_s(t) - r^n(t+j)\, s_s(t+j)] \\ +\lambda_{s2}(t+j)\, [P(t+j)\, c_s(t+j) - m_s(t+j-1) + s_s(t+j)] \end{array} \right].$$

The first order conditions that come from the maximization problem of the skilled households are

$$\begin{aligned} \frac{\partial}{\partial c_s} &= \frac{1}{c_s(t+j) - Sub} + \lambda_{s2}(t+j)\, P(t+j) = 0, \\ \frac{\partial}{\partial l_s} &= -\frac{B}{1 - l_s(t+j)} - \lambda_{s1}(t+j)\, W_s(t+j) = 0, \\ \frac{\partial}{\partial k_s} &= \lambda_{s1}(t+j)\, P(t+j) - \beta \lambda_{s1}(t+j+1)\, [P(t+j+1) r(t+j+1) + P(t+j+1)(1-\delta)] = 0 \\ \frac{\partial}{\partial m_s} &= \lambda_{s1}(t+j) - \beta \lambda_{s2}(t+j+1) = 0 \quad \text{and} \\ \frac{\partial}{\partial d_s} &= -\lambda_{s1}(t+j)\, r^n(t+j) + \lambda_{s2}(t+j) = 0. \end{aligned}$$

The three Euler equations that come from this are

$$\begin{aligned}\frac{W_s(t+j+1)(1-l_s(t+j+1))}{W_s(t+j)(1-l_s(t+j))} &= \beta\left[r(t+j+1)+(1-\delta)\right]\frac{P(t+j+1)}{P(t+j)},\\ \beta &= \frac{BP(t+j+1)(c_s(t+j+1)-Sub)}{W_s(t+j)(1-l_s(t+j))},\\ r^n(t+j) &= \frac{W_s(t+j)(1-l_s(t+j))}{BP(t+j)(c_s(t+j)-Sub)}.\end{aligned}$$

The rest of the equations in the model that come from skilled households are their budget equation and cash in advance constraint,

$$m_s(t)+P(t)k_s(t+1)=W_s(t)l_s(t)+P(t)r(t)k_s(t)+P(t)(1-\delta)k_s(t)+r^n(t)d_s(t),$$

and

$$P(t)c_s(t)=m_s(t-1)-d_s(t).$$

If all skilled households are alike, then we define $M_s(t)=N_s m_s(t)$, $L_s(t)=N_s l_s(t)$, $D_s(t)=N_s d_s(t)$, $C_s(t)=N_s c_s(t)$, $K_t=N_s k_s(t)$. The last equality holds because only the skilled households hold capital.

## 2.3 Firms

There is one good in this economy that is produced by a unit mass of perfectly competitive firms. The production function of representative firm j is

$$Y_t(j)=A_t K_t(j)^{\theta} L_{tu}(j)^{\phi} L_{ts}(j)^{1-\theta-\phi}.$$

Note that in a competitive economy, $\theta$ is equal to the fraction of output that is paid to capital, $\phi$ isthe fraction of output paid to unskilled workers, and $1-\theta-\phi$ is the fraction of output paid to skilled workers. Both skilled and unskilled workers are paid before the goods are sold, so the firm managers have to borrow working capital from the banks to cover this expense. They pay back loan plus interest to the bank at the end of the period, after they have sold their goods. Rents on capital are also paid at the end of the period. The real profits of the firm at time $t$ are

$$\begin{aligned}\pi_t(j) &= Y_t(j)-r_t^f\frac{W_u(t)}{P_t}L_{tu}(j)-r_t^f\frac{W_s(t)}{P_t}L_{ts}(j)\\ &\quad -\Omega_s\left(L_{ts}(j)-L_{t-1,s}(j)\right)^2-r(t)K_t(j),\end{aligned}$$

where $\pi_t(j)$ are the profits of firm $j$ at time $t$ and the nominal cost of using each type of labor is equal to the nominal wage for that type. There is an adjustment cost for changing the quantity of skilled labor being used by the firm, $\Omega_s\left(L_{ts}(j)-L_{t-1,s}(j)\right)^2$, meant to capture the idea that finding good skilled labor is difficult so that there are search costs to increase the amount of skilled labor used and that once employed, skilled labor has some firm specific skills that are lost if they are let go.

Firm managers maximize the firm's value, which is equal to the discounted value of expected current and future profits, or

$$V_t(j) = E_t \sum_{i=0}^{\infty} \beta^i \pi_{t+i}(j).$$

The first order conditions that come from value maximization, subject to the production function, are

$$\begin{aligned}
\frac{\partial V_t(j)}{\partial L_{tu}(j)} &= 0 = \phi A_t K_t(j)^{\theta} L_{tu}(j)^{\phi-1} L_{ts}(j)^{1-\theta-\phi} - r_t^f \frac{W_u(t)}{P_t}(t) \\
\frac{\partial V_t(j)}{\partial L_{ts}(j)} &= 0 = (1-\theta-\phi) A_t K_t(j)^{\theta} L_{tu}(j)^{\phi} L_{ts}(j)^{-\theta-\phi} - r_t^f \frac{W_s(t)}{P_t} \\
&\quad +2\Omega_s \left(E_t L_{t+1,s}(j) - 2L_{ts}(j) + L_{t-1,s}(j)\right) \\
\frac{\partial V_t(j)}{\partial K_t(j)} &= 0 = \theta A_t K_t(j)^{\theta-1} L_{tu}(j)^{\phi} L_{ts}(j)^{1-\theta-\phi} - r(t).
\end{aligned}$$

These can be rearranged to become the Euler equations

$$\begin{aligned}
r_t^f \frac{W_u(t)}{P_t} &= \phi A_t K_t(j)^{\theta} L_{tu}(j)^{\phi-1} L_{ts}(j)^{1-\theta-\phi} \\
r_t^f \frac{W_s(t)}{P_t} &= (1-\theta-\phi) A_t K_t(j)^{\theta} L_{tu}(j)^{\phi} L_{ts}(j)^{-\theta-\phi} + 2\Omega_s \left(E_t L_{t+1,s}(j) - 2L_{ts}(j) + L_{t-1,s}(j)\right) \\
r(t) &= \theta A_t K_t(j)^{\theta-1} L_{tu}(j)^{\phi} L_{ts}(j)^{1-\theta-\phi}.
\end{aligned}$$

## 2.4 Banks

Banks accept nominal deposits from the households (both skilled and unskilled), make one period consumption loans to the skilled, and lend to firms for working capital. Loans are made at the beginning of the period when the technology and money shocks are known and are repaid at the end of the period. There is therefore no risk for the banks in this model. One could change the timing of the knowledge of the shocks (for instance, where a shocks value is revealed only after loans were made) but that complication is unnecessary for what we want to show here. Working capital is used in this paper to pay the salaries of both the skilled and unskilled workers. Very little bank lending in developing countries is made for the purchase of physical capital, except for lending for the purchase of vehicles with the vehicle as security for the loan. Even in developed countries, a very large fraction of commercial lending is for working capital. Average maturity of comercial bank loans in the United States has been around 8 months.

To keep things simple, banks are cooperative banks where all of a bank's earnings in each period are paid as interest to the depositers in that period. The central bank's monetary policy operates with the central bank making transfers to or taxes on the deposits of banks. If the transfers are positive, they are lent out to firms as working capital. If the transfers are negative (taxes) this reduces the amount that banks can lend out. Since the banks bear no risk, the banks hold no reserves and the sum of net deposits and transfers from the central bank are lent. Banks operate under two restrictions. As competetive banks, they make zero profits, so interest paid on aggregate deposits equals revenue from loans. The aggregate version of the zero profits condition is

$$r^n(t)\,D(t) = r^f(t)\left[D(t) + \Delta M^{CB}(t)\right],$$

where aggregate deposits are $D(t) = D_u(t) + D_s(t) = \int_0^{N_u} d_{u,i}(t)\,di + \int_0^{N_s} d_{s,i}(t)\,di$, and $d_{u,i}(t)$ are the deposits made by the representative unskilled family $i$ in period $t$ and $d_{s,i}(t)$ are deposits made by skilled family $i$ in the same period. $\Delta M^{CB}(t)$ is the monetary tranfer to or tax on the banking system in period $t$. If all skilled families are alike and all unskilled families are alike, then aggregate deposits are equal to $D(t) = D_u(t) + D_s(t) = N_u d_u(t) + N_s d_s(t)$ In addition, banks have the condition that

$$D(t) + \Delta M^{CB}(t) = W_u(t)\,L_u(t) + W_s(t)\,L_s(t),$$

so they lend out all they receive to the firms for working capital.[4] As mentioned above, the loans to firms are only used for hiring labor.

### 2.5 Policy rules

The model has two channels whereby money can enter or leave the economy. The first is by direct payments in cash to (or from) the unskilled workers, a government subsidy (or tax) to the poorer members of society. The second is by money transfers between the central bank and the banking system. While direct money transfers to banks is not a common central bank policy in the world, lowering interest rates on in-period loans to banks from the central bank generates essentially the same result. Direct transfers are simpler.

The aggregate money holdings the the unskilled bring into period $t$ are equal to

$$M_u(t-1) = \int_0^{N_u} m_{u,i}(t-1)\,di$$

and the aggregate money holdings that the skilled bring into period $t$ are equal to

$$M_s(t-1) = \int_0^{N_s} m_{s,i}(t-1)\,di$$

so the total money brought over from period $t-1$ is equal to $M(t-1) = M_u(t-1) + M_s(t-1)$. Let $g^f(t)$ be the gross growth rate of money generated by the fiscal transfers to the unskilled. In a stationary state $g^f(t)$ will be a constant. If fiscal transfers is the only way that the money stock increases, then $M(t) = g^f(t)M(t-1)$. The gross rate of money growth caused by central

[4] It is fairly easy to add operating costs for the banks to this last equation, perhaps making the costs a function of the amount lent. Leaving this out has not qualitative difference in the results.

bank transfers is measured the same way, $\Delta M^{CB}(t) = \left(g^{CB}(t) - 1\right) M(t-1)$. When both fiscal and central bank money growth occurs, total gross money growth follows the rule

$$M(t) = \left[g^f(t) + g^{CB}(t) - 1\right] M(t-1) = g(t) M(t-1).$$

### 2.6 Experiments

We want to compare the effects of the different methods of introducing money into the economy. To do that we chose a gross growth rate for money, $\overline{g}$, and first solve the economy with the money growth coming only from fiscal policy and then solve the economy for the growth only from monetary policy. Then we solve the economy for that same gross growth rate of money but with a fiscal growth rate larger than $\overline{g}$ and with a monetary policy that pulls money out of the economy so that the total gross growth rate of money is exactly $\overline{g}$.

These three economies are solved for stationary states. We are interested in comparing inflation rates, output levels, wages and comsumption of the skilled and unskilled families. We are also interest in how the welfare of both groups of households changes with different combinations of inflation and transfers.

## 3 Stationary States

A stationary state for this model is an equilibrium where all real variables have the same period each period, where real variables are defined as those measured in terms of goods. Any stochastic shocks are equal to zero every period. Nominal variables appear divided by the price level so that they can be expressed in real terms: the money stock divided by the price level is real balances and real balances must stay constant in a stationary state. That being the case all nominal variables must grow or shrink by the same amount (at the rate of inflation) so that real balances, real bank deposits, real wages and the real value of fiscal and monetary transfers stay constant.

The stationary state version of the equations that come from the unskilled are

$$\begin{aligned}
\frac{W_u}{P} &= Br^n \frac{(c_u - Sub)}{(1 - l_u)} \\
r^n &= \frac{\Pi}{\beta} \\
\frac{m_u}{P} &= \frac{W_u}{P} l_u + r^n \frac{d_u}{P} \\
c_u &= \frac{1}{\Pi} \frac{m_u}{P} + \frac{\Delta m_u}{P} - \frac{d_u}{P}.
\end{aligned}$$

The stationary state version of the equations that come from the decisions of the skilled are

$$\begin{aligned}
r &= \frac{1}{\beta} - (1-\delta) \\
\frac{W_s}{P} &= B\frac{\Pi}{\beta}\frac{(c_s - Sub)}{(1-l_s)} \\
r^n &= \frac{W_s}{P}\frac{(1-l_s)}{B(c_s - Sub)} = \frac{\Pi}{\beta} \\
\frac{m_s}{P} &= \frac{W_s}{P}l_s + (r-\delta)k_s + r^n\frac{d_s}{P} \\
c_s &= \frac{1}{\Pi}\frac{m_s}{P} - \frac{d_s}{P}.
\end{aligned}$$

The equations that come from the firms' decisions are

$$\begin{aligned}
Y &= AK^{\theta}L_u^{\phi}L_s^{1-\theta-\phi} \\
r^f\frac{W_u}{P} &= \phi AK^{\theta}L_u^{\phi-1}L_s^{1-\theta-\phi} = \phi\frac{Y}{L_u} \\
r^f\frac{W_s}{P} &= (1-\theta-\phi)AK^{\theta}L_u^{\phi}L_s^{-\theta-\phi} = (1-\theta-\phi)\frac{Y}{L_s} \\
r &= \theta AK^{\theta-1}L_u^{\phi}L_s^{1-\theta-\phi} = \theta\frac{Y}{K}.
\end{aligned}$$

Since the capital stock is constant in a stationary state, the adjustment costs equal zero.

The equations from the behavior of the banks are

$$\begin{aligned}
r^n\frac{D}{P} &= r^f\left[\frac{D}{P} + \frac{\Delta M^{CB}}{P}\right] \\
\frac{D}{P} + \frac{\Delta M^{CB}}{P} &= \frac{W_u}{P}L_u + \frac{W_s}{P}L_s.
\end{aligned}$$

The equilibrium conditions are that $K = N_s k_s$, $D = N_u d_u + N_s d_s = D_u + D_s$, $L_u = N_u l_u$, $L_s = N_s l_s$, $\frac{\Delta M^f}{P} = \frac{N_u \Delta m_u}{P}$,

$$Y = N_u c_u + N_s c_s + (1-\delta)N_s k, = C_u + C_s + (1-\delta)K$$

and, given that $\overline{g}$ is the constant gross growth rate of money,

$$\frac{M}{P} = \frac{M}{\Pi P} + \frac{\Delta M^{CB}}{P} + \frac{\Delta M^f}{P} = \frac{M}{\Pi P} + (\overline{g}-1)\frac{M}{\Pi P} = \frac{\overline{g}M}{\Pi P},$$

so

$$\Pi = \overline{g}.$$

Therefore, in a stationary state the gross inflation rate equals the gross growth rate of money, independent of whether money enters the economy from the fiscal or monetary side.

Using the above aggregation conditions, we can rewrite the cash in advance conditions and budget constraints for the skilled and unskilled workers in aggregate terms by multiplying through by the population of each group and get

$$\begin{aligned}
\frac{M_u}{P} &= \frac{W_u}{P} L_u + r^n \frac{D_u}{P}, \\
C_u &= \frac{1}{\Pi} \frac{M_u}{P} + \frac{\Delta M^f}{P} - \frac{D_u}{P}, \\
\frac{M_s}{P} &= \frac{W_s}{P} L_s + (r-\delta) K + r^n \frac{D_s}{P}, \\
C_s &= \frac{1}{\Pi} \frac{M_s}{P} - \frac{D_s}{P}.
\end{aligned}$$

To remove the last individual variables from the set above, we multiply the right hand side of the first order conditions by $1 = \frac{N_i}{N_i}$, for $i = u, s$, which ever is appropriate, to get

$$\begin{aligned}
\frac{W_u}{P} &= B r^n \frac{(C_u - N_u \cdot Sub)}{(N_u - L_u)} = B \frac{\Pi}{\beta} \frac{(C_u - N_u \cdot Sub)}{(N_u - L_u)} \\
\frac{W_s}{P} &= B \frac{\Pi}{\beta} \frac{(C_s - N_s \cdot Sub)}{(N_s - L_s)}
\end{aligned}$$

## 3.1 Set of equations for the stationary state

The stationary state version of the model has 23 variables, 21 equations and 2 variables chosen exogenously as policy variables. The 23 variables are $C_u$, $L_u$, $\frac{M_u}{P}$, $\frac{D_u}{P}$, $\frac{\Delta M^f}{P}$, $C_s$, $L_s$, $\frac{M_s}{P}$, $\frac{D_s}{P}$, $K$, $\frac{W_u}{P}$. $\frac{W_s}{P}$ , $r$, $r^f$, $\Pi$, $Y$, $r^n$, $\frac{D}{P}$, $\frac{\Delta M^{CB}}{P}$, $\frac{M}{P}$, $df$, $dCB$, and $\overline{g}$.

The full set of equations for finding the stationary state at the aggregate level are, from the decisions of the two households,

$$r = \frac{1}{\beta} - (1-\delta) \tag{1}$$

$$r^n = \frac{\Pi}{\beta} \tag{2}$$

$$\frac{M_u}{P} = \frac{W_u}{P} L_u + r^n \frac{D_u}{P}, \tag{3}$$

$$C_u = \frac{1}{\Pi} \frac{M_u}{P} + \frac{\Delta M^f}{P} - \frac{D_u}{P}, \tag{4}$$

$$\frac{M_s}{P} = \frac{W_s}{P} L_s + (r-\delta) K + r^n \frac{D_s}{P}, \tag{5}$$

$$C_s = \frac{1}{\Pi} \frac{M_s}{P} - \frac{D_s}{P}. \tag{6}$$

$$\frac{W_u}{P} = B\frac{\Pi}{\beta}\frac{(C_u - N_u \cdot Sub)}{(N_u - L_u)} \tag{7}$$

$$\frac{W_s}{P} = B\frac{\Pi}{\beta}\frac{(C_s - N_s \cdot Sub)}{(N_s - L_s)} \tag{8}$$

$$\Pi = \overline{g}, \tag{9}$$

from the firms

$$Y = AK^{\theta}L_u^{\phi}L_s^{1-\theta-\phi} \tag{10}$$

$$r^f\frac{W_u}{P} = \phi AK^{\theta}L_u^{\phi-1}L_s^{1-\theta-\phi} = \phi\frac{Y}{L_u} \tag{11}$$

$$r^f\frac{W_s}{P} = (1-\theta-\phi)\,AK^{\theta}L_u^{\phi}L_s^{-\theta-\phi} = (1-\theta-\phi)\,\frac{Y}{L_s} \tag{12}$$

$$r = \theta AK^{\theta-1}L_u^{\phi}L_s^{1-\theta-\phi} = \theta\frac{Y}{K}, \tag{13}$$

from banks,

$$r^n\frac{D}{P} = r^f\left[\frac{D}{P} + \frac{\Delta M^{CB}}{P}\right] \tag{14}$$

$$\frac{D}{P} + \frac{\Delta M^{CB}}{P} = \frac{W_u}{P}L_u + \frac{W_s}{P}L_s, \tag{15}$$

and the equilibrium equations

$$\frac{M}{P} = \frac{M_u}{P} + \frac{M_s}{P}, \tag{16}$$

$$\frac{D}{P} = \frac{D_u}{P} + \frac{D_s}{P}. \tag{17}$$

We might like to include a national income accounting identity of

$$Y = C_u + C_s + \delta K.$$

but it is not an independent equation since it can be derived from the other budget constraints.

The combination of government fiscal and central bank policies determine two of the gross growth rate of money, $\overline{g}$, net growth rate of money going to banks,

$$dCB = \overline{g}\frac{\Delta M^{CB}}{P}/\frac{M}{P}, \tag{18}$$

and net growth rate of money going to the unskilled as tranfers,

$$df = \overline{g}\frac{\Delta M^{f}}{P}/\frac{M}{P}. \tag{19}$$

Since there are only two ways of increasing the money supply in this model, the third policy variable is determined by

$$\overline{g} - 1 = df + dCB. \tag{20}$$

### 3.2 Getting values for the stationary state

Since the stationary state is found numerically, we need to calibrate the parameters of the model. Common values for a quarterly macro model for a country similar to Argentina might be

| $\beta$ | $\delta$ | $\theta$ | $\phi$ | $A$ | $B$ | $N_u$ | $N_s$ | $Sub$ |
|---|---|---|---|---|---|---|---|---|
| .99 | .025 | .36 | .25 | 1 | 1.2 | .6 | .4 | .1 |

.

Given a choice for $\overline{g}$ and either $df$ or $dCB$, the 23 equations in the model can be reduced to a search over 8 variables in 7 equations with the values of all the other variables determined from the values of these 8. The search is done[5] over values for $\frac{M_u}{P}$, $\frac{D_u}{P}$, $L_u$, $\frac{W_u}{P}$, $\frac{M_s}{P}$, $\frac{D_s}{P}$, $L_s$, $\frac{W_s}{P}$, and the 8 equations that are not used to determine the values of the others but are checked for fit are equations numbers 4, 6, 7, 8, 11, 12, and 13. Since we are short one equation, we can proceed in two ways: invent another equation (for example, make the interest paid to or received from the bank by the unskilled depends on the amount $\frac{D_u}{P}$) or we can look for stationary states for a range of values for $\frac{D_u}{P}$. First we consider a range of values for bank deposits or credits for the unskilled households and find the equilibrium values for the rest of the variables given that value. Then we consider a possible function relating the bank interest rate paid to or by the unskilled and let that function determine the appropriate value for $\frac{D_u}{P}$.

Multiple stationary states exist. The least interesting is the "dead" economy solution where all real variables have a value of zero. The system of equations holds for zeros for all real variables. Not an especially useful solution but it exists. Many growth models have an equilibrium with a zero real value for money.

As mentioned above, different values of $\frac{D_u}{P}$ can generate a different stationary state equilibrium, with slightly different distributions of wealth between the skilled and unskilled. Figure 1 shows a range of stationary states as functions of exogenously determined values of $D_u/P$s. Table xx shows the calculated values for three stationary states, with $D_u/P = \{-0.1, 0.0, 0.1\}$, or cases where the unskilled borrow from a bank, do not use a banks, and save in a bank. Since the rental rate on capital (equation 1) gives a gross rental rate of $r+1-\delta = 1.010101$, a no-arbitrage condition implies that real returns on capital and on bank deposits will be equal in a stationary state. In stationary state equilibria where the unskilled hold more deposits, they work less, and the marginal products of skilled labor and capital decline. In order for capital to offer the same gross return as, the aggregate quantity of capital must decline. While the amounts are small, the more deposits the higher the consumption and utility of the unskilled families and the lower the utility and consumption of the skilled families, whose holdings of capital also decline slightly.

[5] The search was done in Scilab using the command $fsolve$, which solves for local solutions of sets of non-linear equations. Precision at each solution was at least $10^{\cdot 12}$.

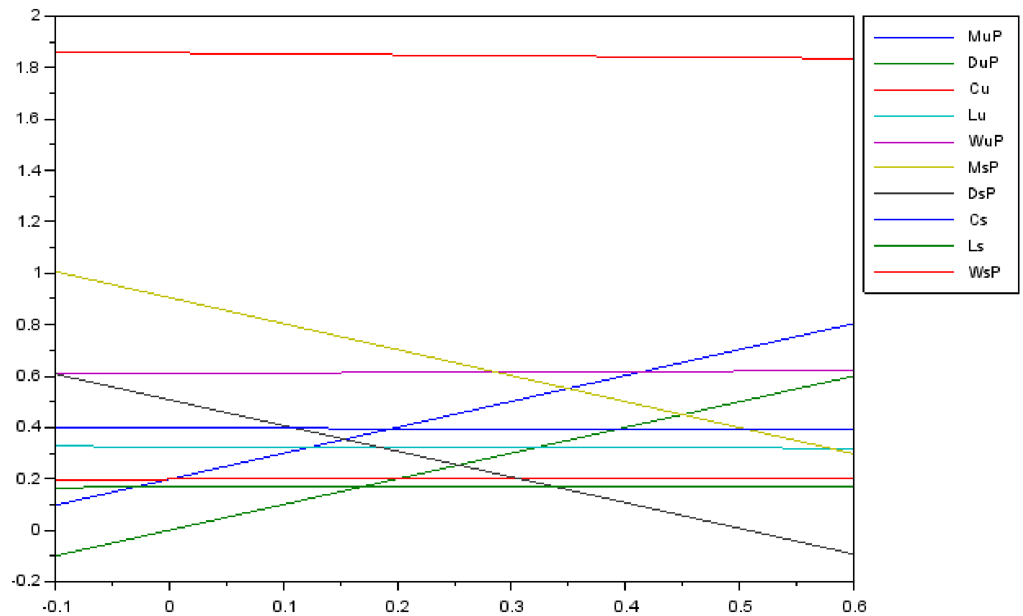


Figure 1: Stationary state equilibria with no inflation and a range of Du/Ps given.

| | | | |
|---|---|---|---|
| $\overline{g}$ | 1 | 1 | 1 |
| $df$ | 0 | 0 | 0 |
| $Sub$ | .1 | .1 | .1 |
| $Y$ | 0.8015424 | 0.8013236 | 0.8011089 |
| $M_uP$ | 0.0973717 | 0.1983276 | 0.2992846 |
| $D_uP$ | $-0.1$ | 0.0 | 0.1 |
| $C_u$ | 0.1973717 | 0.1983276 | 0.1992846 |
| $L_u$ | 0.3262028 | 0.3251295 | 0.3240624 |
| $W_u/P$ | 0.6081547 | 0.6099956 | 0.6118404 |
| $M_s/P$ | 1.0065103 | 0.9052529 | 0.8040003 |
| $D_s/P$ | 0.6078573 | 0.5077186 | 0.4075826 |
| $C_s$ | 0.398653 | 0.3975343 | 0.3964177 |
| $L_s$ | 0.1663385 | 0.1666156 | 0.1668937 |
| $W_s/P$ | 1.8605161 | 1.8569149 | 1.8533241 |
| $K$ | 8.2207115 | 8.2184668 | 8.2162651 |
| $r^n$ | 1.010101 | 1.010101 | 1.010101 |
| $r^f$ | 1.010101 | 1.010101 | 1.010101 |
| $U_u$ | $-2.4156898$ | $-2.4040605$ | $-2.3925165$ |
| $U_s$ | $-0.7542187$ | $-0.7587665$ | $-0.7633252$ |

In order to get $D_u/P$ determined (which we will also need for the dynamic equations) we add a supply equation. This equation is rather ad hoc, in the sense that we are not detailing the risk taking of the banks. We assume that the banks charge a higher real interest rate to the unskilled families the more they borrow and pay them a lower interest rate the more they want to save. Recall that the expected real interest rate is the nominal rate divided by the exécted inflation rate, which equals the actual inflation rate in a stationary state. That equation can be expressed as

$$\frac{r_t^{n,u}}{E_t\pi_t} = \omega - \psi\frac{D_u}{P},$$

where $r_t^{n,u}$ is the interest rate between the banks and the unskilled families depending on those families choice of real deposits. Since in a stationary state, $\overline{r_t^{n,u}} = \overline{r^n} = 1.010101$, the unskilled families choice of real deposits (or borrowing) is equal to

$$\overline{D_u/P} = \frac{\omega}{\psi} - \frac{\overline{r^{n,u}}}{\pi\psi} = \frac{\omega}{\psi} - \frac{\overline{r^n}}{\pi\psi}.$$

If we want the real deposits of the unskilled families (something we could determine from the data) to be 0.1, for example, then

$$\begin{aligned} 0.1 &= \frac{\omega - 1.010101/\pi}{\psi}. \text{ or} \\ \psi &= \frac{\omega - 1.010101/\pi}{0.1}. \end{aligned}$$

Given a value for $\overline{D_u/P}$, we can calculate how the utility of the unskilled and skilled families depend on the policy variables, on $\overline{g}$ and either $df$ or $dCB$.

Recall that $\overline{g} = \overline{\pi}$ in a stationary state, so we can consider a given inflation rate and compare utilities under different choices of $df$ or $dCB$.

Table 2 Economy with DuP = .1, gbar =1

| | | | |
|---|---|---|---|
| $\overline{g}$ | 1 | 1 | 1 |
| $df$ | $-0.1$ | 0 | 0.1 |
| $Sub$ | .1 | .1 | .1 |
| $Y$ | 0.910297 | 0.8011089 | 0.7120456 |
| $M_uP$ | 0.3807209 | 0.2992846 | 0.242418 |
| $D_uP$ | 0.1 | 0.1 | 0.1 |
| $C_u$ | 0.1414255 | 0.1992846 | 0.2315659 |
| $L_u$ | 0.4435063 | 0.3240624 | 0.242853 |
| $W_u/P$ | 0.6306805 | 0.6118404 | 0.5822776 |
| $M_s/P$ | 1.0122329 | 0.8040003 | 0.6490612 |
| $D_s/P$ | 0.4767642 | 0.4075826 | 0.3511521 |
| $C_s$ | 0.5354687 | 0.3964177 | 0.2979092 |
| $L_s$ | 0.1683255 | 0.1668937 | 0.1654844 |
| $W_s/P$ | 2.5922924 | 1.8533241 | 1.3330336 |
| $K$ | 9.3361109 | 8.2162651 | 7.3028216 |
| $r^n$ | 1.010101 | 1.010101 | 1.010101 |
| $r^f$ | 0.8136056 | 1.010101 | 1.2588507 |
| $U_u$ | $-3.6099376$ | $-2.3925165$ | $-1.874501$ |
| $U_s$ | $-0.4413174$ | $-0.7633252$ | $-1.079588$ |

Table 3 Economy with DuP = .1, gbar = 1.1

| | | | |
|---|---|---|---|
| $\overline{g}$ | 1.1 | 1.1 | 1.1 |
| $df$ | $-0.1$ | 0 | 0.1 |
| $Sub$ | .1 | .1 | .1 |
| $Y$ | 0.9089633 | 0.8064922 | 0.7230096 |
| $M_uP$ | 0.4197481 | 0.3341439 | 0.2737883 |
| $D_uP$ | 0.1 | 0.1 | 0.1 |
| $C_u$ | 0.1483153 | 0.2037672 | 0.2356331 |
| $L_u$ | 0.4343017 | 0.3226729 | 0.2459498 |
| $W_u/P$ | 0.7106512 | 0.691204 | 0.6614244 |
| $M_s/P$ | 1.0462651 | 0.8365254 | 0.6802931 |
| $D_s/P$ | 0.4235629 | 0.3645395 | 0.3164535 |
| $C_s$ | 0.5275872 | 0.3959381 | 0.3019947 |
| $L_s$ | 0.1701937 | 0.1692035 | 0.1683139 |
| $W_s/P$ | 2.8289752 | 2.0562883 | 1.5077567 |
| $K$ | 9.3224326 | 8.271477 | 7.4152695 |
| $r^n$ | 1.1111111 | 1.1111111 | 1.1111111 |
| $r^f$ | 0.7362721 | 0.9040062 | 1.1111111 |
| $U_u$ | $-3.4601298$ | $-2.354812$ | $-1.861521$ |
| $U_s$ | $-0.4670686$ | $-0.776621$ | $-1.078437$ |

Table 2 shows the values in stationary states for an economy with a constant money supply. The first column gives the values where the unskilled are taxed 10% of the money stock and that same amount of money is injected into the banking system. The second column shows the values for an economy no taxes or transfers to the unskilled and no transfers or taxes on the banking system. In the third column, the banks are taxed 10% of the money supply and that same amount of money is transfered to the unskilled families. The results are clear: output ($Y$) is highest when the transfers go to the banks and the financial interest rate is the lowest. Wages for both the unskilled and the skilled are highest and the labor supplyed by both groups is the highest. Wages are not that much higher for the unskilled since they have to work much longer to get money to pay for consumption and the tax. In particular, consumption is the lowest in this case for the unskilled and highest for the skilled, in part because they hold more capital and get a much higher wage given their increased marginal product with both more capital and more unskilled labor. Utility for the unskilled families is the lowest in this case and that for the skilled (capital owning) families is the highest. This kind of policy is unlikely to occur except under the most draconian of governments.

The middle column is one with no money injection neither through transfers to the unskilled nor to the banking system. Money supply is constant. This is a policy that one often hears recommended, under the argument that with no inflation everyone can plan better (although in stationary states, there are no shocks and planning is not much of an issue). Since the unskilled are not taxed, they have higher consumption and work less than in the case above. However, there is no subsidy given to bank lending so there is less demand for both skilled and unskilled labor, consequently, output is smaller.

The right-most column of Table 2 is an example of complete sterilization of fiscal side transfers to unskilled families by withdrawing the injected money from the economy through the financial sector. Financial interest rates are the highest, real wages, both skilled and unskilled labor demand and consumption of the skilled families are the lowest, as is output. However, consumption among the unskilled is the highest and their utility is the highest (with highest consumption and leisure).

Table 3 gives stationary states for the same economy as in Table 2 except that the gross money growth rate (and the inflation rate) is now 1.1. This economy shows a similar pattern of changes as the money growth channel shifts from the financial sector to transfers to the unskilled families. However, with the higher inflation rate, at each value of fiscal taxes or transfers to the unskilled households wages for both the skilled and unskilled are higher and consumption for unskilled households is higher. Output is lower when the unskilled pay a money tax but higher in the other two cases. In each of the three cases fiscal policies, compared to the case with no money growth, the utility of the unskilled households goes up, while that of the skilled goes down for the cases of a money tax or no tax or transfer on the unskilled, it is higher in the case where the unskilled receive the transfer.

The above analysis is for an economy where the utility functions of both the skilled and unskilled families are logarithmic in consumption (and in leisure).

Next we consider how sensitive the results are to changes in the elasticity of substitution of consumption for the unskilled households. The one period sub-utility function for an unskilled household is now a standard CES type of the form

$$U_u = \frac{\left(\frac{C_u}{N_u}\right)^{1-\eta} - 1}{1-\eta} + B \log\left(1 - \frac{L_u}{N_u}\right).$$

I consider cases where $\eta = .5$ and 2. and compare these to the log case (the limit as $\eta \to 1$). Recall that the elasticity of substitution is equal to $1/\eta$. Figures 4 (to be found at the end of the paper) shows total output (highest lines) and total consumption for both the unskilled (the lowest lines) and the skilled (middle lines) for three levels of money creation: constant money (the green lines, a gross money growth rate of 1.1 (red line) and a gross money growth rate of 1.2 (the blue line). The x axis are the values for *df*. In all cases, total output and total consumption of the skilled workers decline and total consumption of the unskilled workers increases as cash transfers to the unskilled workers are larger the higher is *df*. For any given *df*, consumption for the unskilled workers is higher with higher money creation (inflation). For the skilled workers, when *df* is high, their consumption is highest when the money growth rate is higher and for low (negative) *df* their consumption is highest with no inflation. Notice that the crossing point occurs at a higher df when $\eta$ is higher (when substitution is more inelastic). Total output is higher with higher inflation rates except for very negative values of  and for the lower values of $\eta$.

Figure 5 (to be found at the end of the paper) shows the stationary state utility levels for both the skilled (who also own capital) and the unskilled for a range of *df* from $-.1$ to .1 and for gross money growth rates (which equal the gross inflation rate) of $g = 1.0$, 1.1, and 1.2. As should be clear from the graphs, higher fiscal transfers, higher *df*'s, generate higher utilities for the unskilled households and lower utilities for the skilled households over the range of *df*'s considered. The unskilled households have higher utility at higher inflation rates (among those considered) independent of the value of *df*. For the skilled households, lower inflation results in higher utility for any but the highest values of *df* and the set of values of *df* for which the skilled get higher utility with higher inflation is larger the more inelastic is the elasticity of substitution of consumption of the unskilled. For economies where the unskilled have a combination of an inelastic rate of substitution of consumption and a high fiscal monetary transfer, higher inflation is Pareto optimal.

# 4 Conclusions

The standard results in a Cooley-Hansen type cash-in-advance model is that direct cash transfers from the government to the households reduces the labor supply and end up reducing both output and household utility. In some models where there exists a banking system (Lucas, Fuerst, for example), a monetary policy that operates via transfers of money from the central bank to the banks has a similar result because their assumption about the results of a perfectly competitive banking sector is that marginal costs are set equal to marginal returns so the interest rates charged to the firms are always the same as the interest rate paid to the depositors adn the money transfered to the banks is passed on to depositors (owners of mutual banks) as dividends. If instead, one assumes that the assumption of perfectly competitive banking sector means that the banks make not profits (otherwise their would be entry), if the deposit interest rate is fixed, transfers from the central bank end up lowering bank lending rates. This second assumption seems more like real world monetary policy where central banks set interest rates and provide funds to banks at that rate. Zero profits then imply that lending rates decline if the central bank lowers its bank rate. When the monetary injections are used as working capital, they work to reduce the cost of some factor of production, more of that factor is hired and generates more output.

In this paper, I look at both of these channels of monetary injections with a additional condition that only a fraction of the workers (the least productive) receive transfers from the fiscal authorities, those with less other income. I call these workers the unskilled. The unskilled households can save in the financial system but do not acquire physical capital to rent out. The other, skilled, workers do not get direct transfers but can save via bank deposits and via holding physical capital. Under those conditions, transfers to the unskilled households can result in substantial improvements in their consumption and utility, but at the cost of reduced consumption and utility for the skilled households and reduced aggregate output. I show that this is true over a range of transfer si<es, over a range of elasticities of substitution of consumption for the unskilled households, and over a range of inflation (money growth) rates.

Not surprisingly, the utility of the unskilled is higher at higher transfer rates and that of the skilled is lower. In general, at given transfer rates, the unskilled prefer higher inflation rates (higher than that generated by the tranfers they receive from the fiscal authorities) and the skilled prefer lower. At high transfer rates, utility is higher for both groups with higher money issue (since then more money is given to the banks to finance working capital).

As a social choice question, whether transfers are given to the unskilled families dependes on the weights given to the skilled and unskilled in the government's preferences. If the unskilled make up a majority of the electorate and vote, transfers to the unskilled are likely to be a social choice outcome. The results of this paper suggest that in countries where skilled workers are a majority, one would be less likely to see transfers to the unskilled. Historical evidence indicates as more modestly skilled workers got the vole, in spite of efforts by the land and capital owners to prevent it, government transfers to them increased.

Finally, this paper points to a weakness on the use of aggregate output as a target variable for monetary policy. In this economy, maximizing aggregate output would imply imposing a large monetary tax on the poorest sector of the economy and simutanously making large monetary transfers to the financial sector. The results of this policy is minimizing consumption for the unskilled and maximizing it for the skilled. This is very likely an unworkable policy result.

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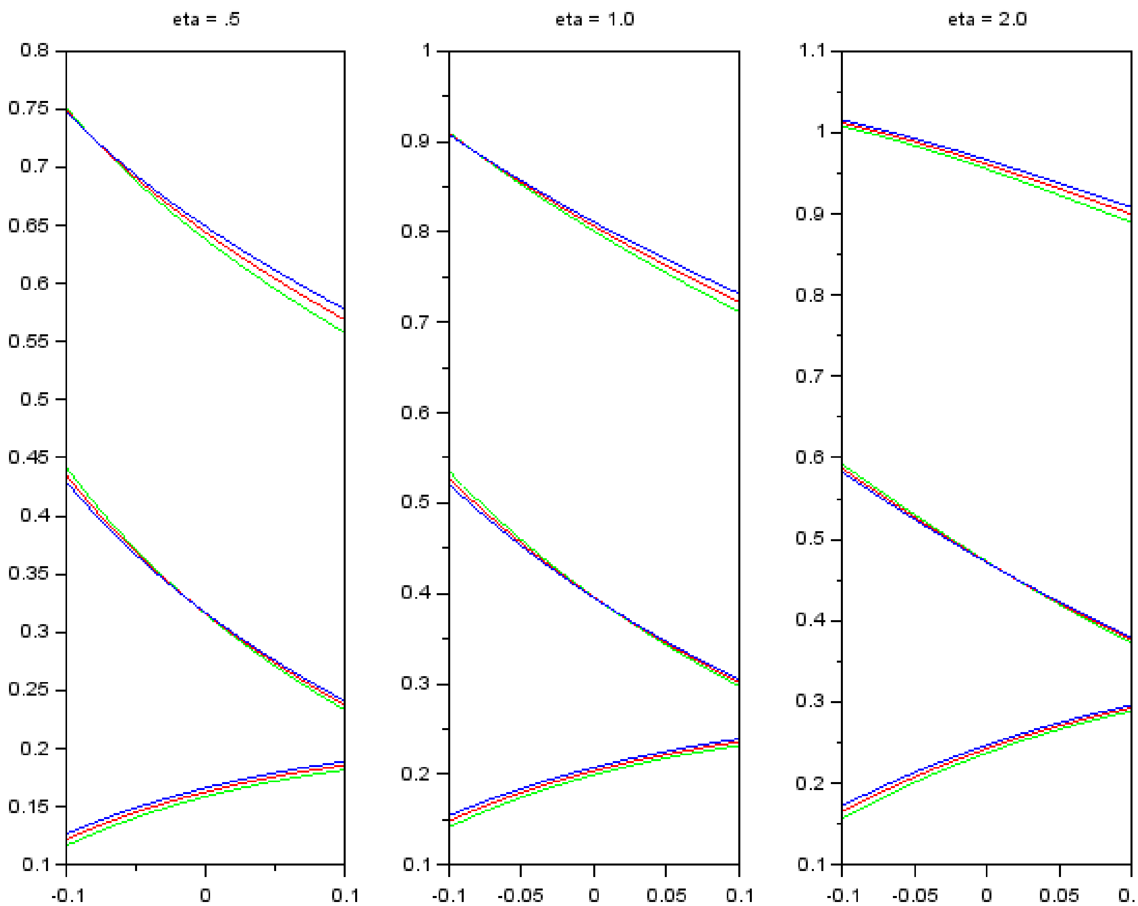


Figura 4: Output (top), consumption of the sillled (center), and consumption of the unskilled (bottom) as functions of eta, df and inflatión (g = 1, green, g = 1,1, red, and g = 1,2, blue)

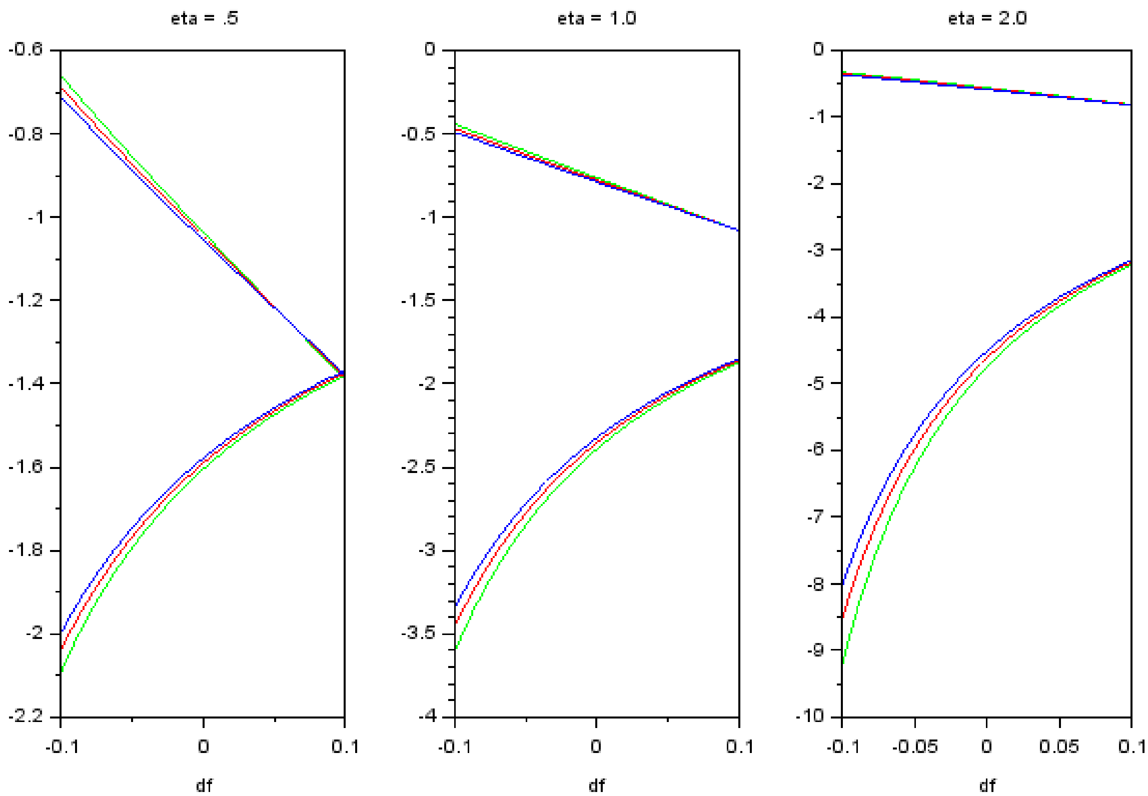


Figura 5: skilled's utility (top) and unskilled's utility (bottom) as function of eta, df, and inflatión (g = 1, green, g = 1,1, red, y g 0 1,2, blue)