



Sterilization of short-term capital inflows— through lower interest rates?

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Abstract

Reductions in international interest rates are a major cause of capital flows to emerging economies. Increases in domestic interest rates are a frequent policy response to the resulting price increases. This is often unsuccessful. The paper suggests a theoretical explanation based on distinctive features of emerging financial markets, including imperfect asset substitutability and imperfect capital mobility for some sectors of the economy. It concludes that the appropriate policy response to capital inflows may be lower interest rates.

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1. Introduction

This paper reconsiders the theoretical case for sterilization of short-term capital inflows in small open emerging economies with predetermined exchange rates. Fernandez-Arias (1996) shows that lower US interest rates were a major factor behind the surge in capital flows to these economies in the early 1990s. An often observed policy response to the resulting upward pressures on the price level was capital inflow sterilization, i.e. the open market sale of government bonds at very high interest rates. Because this resulted in higher borrowing costs it affected domestic production. Worse, it led to further inflows while the ultimate objective of

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controlling inflation and real exchange rate appreciation was rarely achieved. This was documented by Calvo et al. (1993) and Reinhart and Reinhart (1998).

The paper suggests an explanation for these episodes, which is that the link between high interest rates and the price level may have been misunderstood. This is quite a general proposition, consider e.g. the following quote by Lucas (1996: p. 666): “Central bankers and even some monetary economists talk knowledgeably of using high interest rates to control inflation, but I know of no evidence from even one economy linking these variables in a useful way, . . .” More specifically, the paper provides two explanations for why high interest rates may in fact raise the price level. Both of them are highly plausible for emerging markets. First, as in Calvo and Vegh (1990, 1995), short-term sterilization bonds have monetary characteristics. An attempt to reduce high-powered money alone, through bond sales at temporarily high interest rates, raises consumption demand. Second, some domestic banks and their borrowers do not have access to international capital markets. Higher domestic bond interest rates can then be shown to result in higher real lending interest rates and therefore reduced output supply. This theory raises the possibility that the appropriate policy response to short-term capital inflows may be lower interest rates.

The economics literature has demonstrated that under certain conditions sterilization is irrelevant for the determination of equilibrium prices and quantities. Under predetermined exchange rates, the assumptions required for this result are perfect capital mobility and perfect asset substitutability. In the simplest model, sterilization is then just an exchange between private and government portfolios of domestic bonds for foreign bonds. Backus and Kehoe (1989) provide more general irrelevance results based on spanning conditions. However, their conditions are restrictive and unlikely to be satisfied for a typical emerging economy. This may be one reason why the empirical literature, which tends to support the irrelevance hypothesis for developed markets (Obstfeld, 1990), cannot reject that sterilization has some effect in emerging markets (Montiel, 1993; Schadler et al., 1993).

Imperfect asset substitutability is one of the key features of the model. Following Calvo and Vegh (1990, 1995), short-term domestic bonds are assumed to be imperfect substitutes for international bonds because they yield transactions services. In emerging markets the bulk of government debt is indeed of very short maturity. It can often be used to settle larger transactions, as collateral for repo transactions, or as the asset backing for money market accounts. For empirical evidence on the liquidity of financial assets other than cash, see Arrau et al. (1995) and Easterly et al. (1995). In the macroeconomics literature, the idea of liquid bonds is used by, e.g., Friedman (1969), Barro (1974), Poterba and Rotemberg (1987), Fried and Howitt (1983), Barnett et al. (1992), and Bansal and Coleman (1996).

Imperfect access of at least a large subset of domestic banks to international capital markets is also supported by the empirical evidence, see e.g. Kumhof (2001). Reasons may include lack of international creditworthiness or government

control of foreign borrowing.¹ Furthermore, there is strong empirical evidence that many emerging market firms depend heavily on domestic banks for financing. Rojas-Suarez and Weisbrod (1995) show that in 1992, for the majority of Latin American countries, more than 75% of net credit to the private sector was provided by banks. Chinn and Dooley (1997) show that standard arbitrage tests for capital mobility fail when domestic lending interest rates are used.

The assumption of predetermined exchange rates ostensibly applies to a diminishing number of emerging economies. However, as shown by Calvo and Reinhart (2002) and Reinhart (2000), and despite official declarations to the contrary, central banks in emerging economies continue to manage and resist large swings in nominal exchange rates. For practical purposes, the theory presented here is therefore applicable to future as well as past capital inflow episodes.

The rest of the paper is organized as follows. Section 2 describes the model. Section 3 analyzes the behavior of the economy under temporarily lower international interest rates and a policy response of temporarily higher domestic interest rates. Section 4 concludes.

2. The model

Consider a small open economy which consists of a government and representative, price-taking households, firms and banks. Households have perfect access to international capital markets at the constant real international interest rate r . They choose optimal paths for tradables and nontradables consumption and for their asset holdings. Their holdings of domestic bank deposits and domestic government bonds serve transactions purposes. Firms, which produce nontradables, do not have access to international capital markets. They choose optimal intermediate inputs of tradables and nontradables and borrow from banks. Banks, which also do not have access to international capital markets, arise for two reasons in this model.² First, to purchase intermediate inputs firms must borrow in advance from domestic banks. Second, households' transactions technology requires the use of bank deposits for consumption purchases. The government determines the exchange rate, the nominal interest rate on its bonds, the minimum reserve ratio on bank deposits, and lump-sum transfers to households.

Lower/upper case letters represent real/nominal quantities. The real exchange rate is $e_t = E_t P_t^* / P_t$, where E_t is the nominal exchange rate, in units of domestic currency per unit of foreign currency, P_t^* is the foreign currency price level of tradables, and P_t is the price level of nontradables. Also, $\varepsilon_t = \dot{E}_t / E_t$, $\pi_t^* = \dot{P}_t^* / P_t^*$, and $\pi_t = \dot{P}_t / P_t$. It is assumed that the exchange rate is fixed $\varepsilon_t = 0 \forall t$, and that foreign prices P_t^* are exogenous. Domestic nontradables prices P_t are for simplicity

¹ While foreign borrowing by private firms is hard for a government to control, it is relatively easy to control the foreign borrowing of domestic banks. This was demonstrated e.g. by Indonesia throughout the 1990s, and by Brazil during its 1998/1999 currency crisis.

² For other macroeconomic models incorporating banks, see Fuerst (1992), Edwards and Vegh (1997).

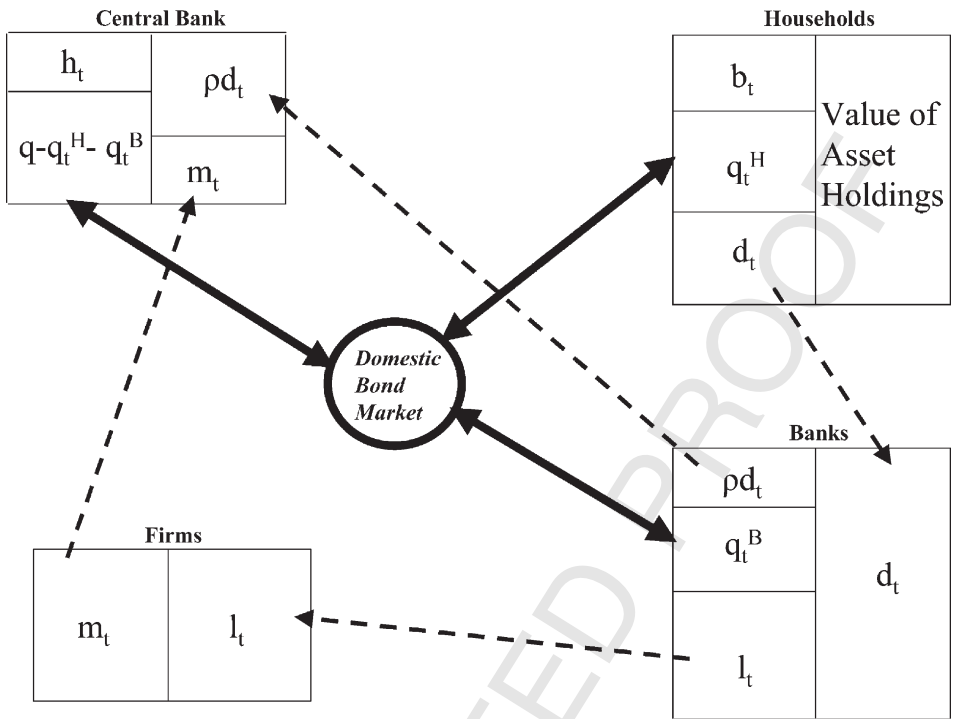


Fig. 1. Balance sheets of economic agents.

assumed to be flexible. The effects of expansionary interest rate shocks and policies will therefore manifest itself in discrete upward jumps of this price level. Throughout the paper time subscripts 0 refer to the initial steady state, $t \in (-\infty, 0)$, time subscripts 1 to the period of the temporary shock of duration T , $t \in [0, T)$, and time subscripts 2 to the final steady state $t \in [T, \infty)$. Finally, note that Fig. 1 at the end of this section summarizes the structure of all agents' asset holdings with the help of balance sheets.

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2.1. International interest rate shock and sterilization

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Uncovered interest parity is assumed to hold. Given the fixed exchange rate this implies that the nominal international interest rate is $i_t = r + \pi_t^*$. The economy is assumed to be subject to a temporary exogenous shock in the form of a decline of international inflation π_t^* of duration T :

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$$\begin{aligned} i_0 = i_2 = r + \pi^* & \quad (\text{where } \pi^* > 0), \\ i_1 = r. & \end{aligned} \tag{1}$$

It will be shown that this shock results in temporary capital inflows and price level increases. The typical policy response of a government which attempts to sterilize these inflows can be represented as a simultaneous increase in the nominal

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interest rate on its bonds i_t^q :

$$\begin{aligned} i_0^q &= i_2^q = i_L^q, \\ i_1^q &= i_H^q > i_L^q. \end{aligned} \tag{2}$$

2.2. Banks

Banks are price-takers in the markets for deposits d_t and loans l_t . To raise/invest marginal funds, banks sell/buy government securities q_t^B . The central bank is committed to selling or buying effectively unlimited quantities of these securities at the interest rate i_t^q .³ Minimum reserves, at the constant rate ρ , have to be kept on domestic deposits. By the bank balance sheet identity,

$$q_t^B = (1 - \rho)d_t - l_t. \tag{3}$$

A constant spread s on loans represents the real costs of loan monitoring.⁴ Nominal (real) deposit and loan interest rates are i_t^d (r_t^d) and i_t^l (r_t^l). Profits Π_t^B , distributed to households lump-sum, are linear in the real returns on loans and government securities, the real cost of deposits, and the inflation tax on minimum reserves. The minimum reserve constraint is binding because reserves are unremunerated. The maximization problem is similar to Diaz-Gimenez et al. (1992):

$$Max_{l_t, d_t} \Pi_t^B = (i_t^l - \pi_t^* - s)l_t + (i_t^q - \pi_t^*)((1 - \rho)d_t - l_t) - (i_t^d - \pi_t^*)d_t - \pi_t^* \rho d_t, \tag{4}$$

subject to $l_t, d_t \geq 0$.

For an optimum to exist with strictly positive d_t and l_t requires that, given i_t^q , π_t^* , s , and ρ , the following zero profit conditions hold:

$$i_t^d = i_t^q(1 - \rho), \tag{5}$$

$$i_t^l = i_t^q + s. \tag{6}$$

To rule out infinite capital inflows, $i_t^q < i_t$ must hold. To rule out infinite arbitrage profits for households borrowing from banks, $i_t^l = i_t^q + s > i_t$ must hold. The range within which i_t^q can vary is therefore $(i_t - s, i_t)$. For emerging markets, this wedge is often of the order of several hundred basis points.

2.3. Households

The lifetime utility at time 0 of the representative household is given by $\int_0^\infty [u(c_t) + v(c_t^*)]e^{-\beta t} dt$, where c_t^* and c_t represent consumption of tradables and nontradables. The instantaneous utility functions $u(\cdot)$ and $v(\cdot)$ are assumed to be

³ This requires two further assumptions. First, when banks' desired holdings are negative, the central bank will lend to them at i_t^l . Second, when banks' desired holdings cannot be satisfied from the outstanding stock of government securities, the central bank itself will issue additional securities at i_t^l .

⁴ Two assumptions make the lending technology incentive compatible. First, intermediate inputs are owned by the bank, or equivalently pledged to the bank as collateral. Second, their value is greater than or equal to the loan amount.

increasing, strictly concave and twice continuously differentiable. The subjective discount rate β is positive and constant, and it is assumed that $\beta = r$ to rule out inessential dynamics. Households have a choice between three assets, foreign bonds b_t with nominal interest rate i_t , domestic deposits d_t with nominal interest rate i_t^d , and domestic bonds q_t^H with nominal interest rate i_t^q . Total assets are $a_t = b_t + d_t + q_t^H$. The two domestic assets jointly enter a liquidity-in-advance constraint $L(d_t, q_t^H) \geq c_t$, which means that positive quantities of d_t and q_t^H are held even if they are dominated in return. Following Poterba and Rotemberg (1987) foreign bonds, the highest-yielding asset, are chosen as the numeraire in defining L .⁵ It is assumed that the constraint holds with equality, which is verified in equilibrium because, from the previous subsection, $i_t > i_t^q > i_t^d$. The liquidity production function $L(d_t, q_t^H)$ is assumed to be homogenous of degree one, concave and twice continuously differentiable. Households receive lump-sum profit distributions Π_t^B and Π_t^F from banks and firms (the latter expressed in terms of nontradables), a constant endowment income y^* of tradables, and non-interest lump-sum government transfers g_t . Their flow budget constraint is:

$$\dot{b}_t = rb_t + y^* + \Pi_t^B + \frac{\Pi_t^F}{e_t} + g_t + d_t(i_t^d - \pi_t^*) + q_t^H(i_t^q - \pi_t^*) - c_t^* - \frac{c_t}{e_t} - \dot{d}_t - \dot{q}_t^H. \tag{7}$$

The lifetime budget constraint is obtained from (7) by imposing the transversality condition $\lim_{t \rightarrow \infty} a_t e^{-rt} = 0$. The household, taking as given the paths $\{y_t^*, \Pi_t^B, \Pi_t^F, g_t, i_t^d, i_t^q, r_t, E_t, P_t, P_t^*\}_{t=0}^\infty$, has the following objective function:

$$\max_{\{c_t, c_t^*, d_t, q_t^H\}_{t=0}^\infty} \int_0^\infty [u(c_t) + v(c_t^*)] e^{-\beta t} dt, \quad \text{subject to} \tag{8}$$

$$L(d_t, q_t^H) = c_t^* + \frac{c_t}{e_t}, \tag{9}$$

$$\begin{aligned} a_0 + \int_0^\infty \left(y^* + \Pi_t^B + \frac{\Pi_t^F}{e_t} + g_t \right) e^{-rt} dt \\ = \int_0^\infty \left(c_t^* + \frac{c_t}{e_t} + d_t(i_t - i_t^d) + q_t^H(i_t - i_t^q) \right) e^{-rt} dt. \end{aligned} \tag{10}$$

⁵ To see this, note that liquidity-in-advance is a special case of liquid assets entering the utility function directly. One can always redefine preferences to exclude the asset which gives the least utility.

The first-order necessary conditions for this problem are:

$$\frac{v'(c_t^*)}{u'(c_t)} = e_t, \quad (11)$$

$$v'(c_t^*) = \lambda \left(1 + \frac{(i_t - i_t^d)}{L_{d_t}} \right) \equiv \lambda p_t, \quad (12)$$

$$\frac{L_{q_t}}{L_{d_t}} = \frac{i_t - i_t^d}{i_t - i_t^d} \equiv X_t, \quad (13)$$

where λ is the constant multiplier of the lifetime budget constraint. Eq. (11) equates the marginal rate of substitution between tradables and nontradables to their relative price, the real exchange rate. Eq. (12) states that the marginal utility of tradables consumption is equal to the marginal utility of wealth λ times the effective price of tradables consumption p_t . The latter consists of the market price (unity) plus the marginal cost of producing the liquidity services needed to purchase a unit of the consumption good. Eq. (13) states that at the optimum the marginal rate of substitution between bonds and deposits is equal to the ratio of their opportunity costs. Using homogeneity of degree zero of L_{d_t} and L_{q_t} this implicitly defines a function Ψ such that

$$\frac{d_t}{q_t^H} = \Psi(X_t), \quad \text{where } \Psi'(X_t) > 0. \quad (14)$$

This expresses the relative demand of bank deposits to government bonds as an increasing function of the relative opportunity cost of bonds to deposits.

2.4. Firms (nontradables producers)

Real exchange rate appreciations in response to expansionary demand shocks characterize many capital inflow episodes. As shown in Vegh (1992), this is to a significant extent due to increased demand for factors of production. Further, a sterilization response affects domestic production, because in practice it leads to higher lending interest rates in emerging economies. To study these effects, the model is completed with a production sector which is subject to a borrowing-in-advance constraint from domestic banks. In a typical emerging economy many of the larger tradables producers have access to international capital markets while nontradables producers are heavily dependent on domestic banks. Only the latter are therefore modelled as being subject to the constraint.

As pointed out by Erceg and Levin (1996), in many existing models of small open economies with endogenous production⁶ large real exchange rate appreciations are the result of exogenous limits on the adjustment speed of the capital stock in nontradables production. The present model is symmetric in holding the capital stock constant in both sectors. It focuses instead on the choice of tradable (n_t^*) versus

⁶ E.g. Rebelo and Vegh (1995), Roldos (1995) and Uribe (1997).

nontradable (n_t) intermediate inputs when working capital has to be financed through bank loans. It is thus a model of firms' short-run behavior, where working capital can be adjusted quickly while structures and plant are fixed. In this environment the nontradables supply response depends on the bank lending interest rate.

Firms must obtain cash m_t in advance of input purchases, by obtaining loans l_t from domestic banks. They therefore have to satisfy the borrowing-in-advance constraint

$$l_t \geq \gamma \left(\frac{n_t}{e_t} + n_t^* \right), \quad (15)$$

where

$$m_t = l_t. \quad (16)$$

It is assumed that the constraint (15) holds with equality, which is verified in equilibrium because $i_t^l > 0$ by (6). The following assumptions are made: To insure incentive compatibility of lending, $\gamma \leq 1$. The cost of the bank spread s is paid out of tradables and nontradables output in proportion to the shares of n_t^* and n_t/e_t in total inputs. The production function $f(n_t) + g(n_t^*)$ is separable in n_t and n_t^* , increasing, strictly concave and twice continuously differentiable.

Taking as given i_t^l and e_t , firms maximize profits Π_t^F :

$$\max_{n_t, n_t^*} \Pi_t^F = f(n_t) + g(n_t^*) - (1 + \gamma i_t^l)(n_t + n_t^* e_t). \quad (17)$$

First-order conditions are:

$$f'(n_t) = 1 + \gamma i_t^l, \quad (18)$$

$$g'(n_t^*) = (1 + \gamma i_t^l) e_t. \quad (19)$$

Therefore:

$$\frac{g'(n_t^*)}{f'(n_t)} = e_t. \quad (20)$$

According to Eqs. (18) and (19), for any given real exchange rate an increase in the nominal lending rate reduces the demand for tradable and nontradable inputs and therefore total nontradables output. Eq. (20) has a similar interpretation to the consumption rule (11)—an appreciated real exchange rate is associated with the use of relatively more tradable intermediate inputs.

2.5. Government

The government maintains a fixed nominal exchange rate E and minimum reserve ratio ρ , and determines the paths of non-interest lump-sum transfers g_t and the domestic bond interest rate i_t^q . To introduce the concept of central bank domestic credit it is instructive to distinguish the central bank and the treasury. The treasury issues a constant real stock of debt q , and real central bank domestic

credit represents the part of this debt held by the central bank $q - q_t^B - q_t^H$. It is therefore the result of private sector portfolio decisions. Government revenue consists of interest income on foreign exchange reserves h_t and seigniorage on domestic liabilities. Expenditure comprises interest paid on domestic debt and lump-sum transfers. The budget constraint is:

$$\dot{h}_t = rh_t + \pi_t^*(\rho d_t + m_t + q_t^H + q_t^B) - i_t^q(q_t^H + q_t^B) - g_t + \rho \dot{d}_t + \dot{m}_t + \dot{q}_t^H + \dot{q}_t^B \quad (21)$$

After imposing the transversality condition $\lim_{t \rightarrow \infty} h_t e^{-rt}$ one obtains the government's lifetime budget constraint:

$$\begin{aligned} h_0 + \int_0^\infty (r + \pi_t^*) [\rho d_t + m_t + q_t^H + q_t^B] e^{-rt} dt \\ = \rho d_0 + m_0 + q_0^H + q_0^B + \int_0^\infty [i_t^q(q_t^H + q_t^B) + g_t] e^{-rt} dt. \end{aligned} \quad (22)$$

2.6. Equilibrium

A *government policy* is defined as a list of time paths $\{i_t^q, g_t, E_t, \rho_t\}_{t=0}^\infty$ such that, given the paths $\{d_t, m_t, q_t^H, q_t^B, r_t, P_t^*\}_{t=0}^\infty$, the constraint (22) holds. An *allocation* is a list of time paths $\{b_t, h_t, c_t^*, c_t, d_t, q_t^H, q_t^B, m_t, l_t, n_t^*, n_t, y_t^*\}_{t=0}^\infty$, and a *price system* is a list of time paths $\{i_t^l, i_t^d, r_t, s_t, P_t, P_t^*\}_{t=0}^\infty$. The economy's net foreign assets, its state variable, are given by $F_t = b_t + h_t$. The equilibrium is defined as follows.

A perfect foresight equilibrium given F_0 is an allocation, a price system, and a government policy such that (a) given the price system and the government policy, the allocation solves the household's problem (8)–(10) and the firm's problem (17), (b) given the government policy, the allocation and the price system are such that the zero profit conditions (5) and (6) for the banking sector are satisfied, and (c) the nontradable goods market clears,

$$c_t = f(n_t) + g(n_t^*) - n_t(1 + \gamma s) . \quad (23)$$

Combining Eqs. (3), (4), (7), (15)–(17), (21) and (23), the equilibrium current account path can be derived as:

$$\dot{F}_t = rF_t + y^* - c_t^* - n_t^*(1 + \gamma s) . \quad (24)$$

The transversality conditions on households and the government also imply that the economy's lifetime constraint is

$$F_0 + \frac{y^*}{r} = \int_0^\infty [c_t^* + n_t^*(1 + \gamma s)] e^{-rt} dt. \quad (25)$$

Finally, it is straightforward to show that none of the variables in this economy exhibit any transitional dynamics. From (1), (2), (5) and (6), i_t^l , i_t^d , i_t^q and π_t^* are constant in the three subperiods $(-\infty, 0)$, $[0, T)$, and $[T, \infty)$, with jumps at 0 and T . The same is true, by Eq. (12) together with linear homogeneity of $L(d_t, q_t^H)$ and

Eq. (14), for c_t^* , and by Eqs. (18) and (6), for n_t . By differentiating Eqs. (11), (19) and (23), one obtains $-(u''/u')g'n_t^* = (g''/g')\dot{n}_t^*$, which implies $\dot{n}_t^* = 0$, $\dot{c}_t = 0$, $\dot{e}_t/e_t = 0$, and therefore $\pi_t = \pi_t^* \forall t$.

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3. Interest rate policy and the price level

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For the economy described above, the overall price level \tilde{P}_t can be defined as the consumption based price index based on the utility function in (8), which is increasing in P_t^* and P_t . For example, for a Cobb–Douglas consumption aggregator, $u(c_t) + v(c_t^*) = (1 - \gamma)\ln c_t + \gamma \ln c_t^*$, and $\tilde{P}_t = (P_t)^{1-\gamma}(EP_t^*)^\gamma$. This section analyzes the consequences for \tilde{P}_t of the interest rate changes (1) and (2). Because P_t^* is continuous, a discrete real appreciation is associated with an upward jump in \tilde{P}_t . The following analysis therefore focuses on the real exchange rate, which by (11) and (23) will in general depend on changes in tradables demand and nontradables production. The intertemporal substitution condition for tradables demand, from (12), is:

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$$\frac{v'(c_1^*)}{v'(c_2^*)} = \frac{p_1}{p_2}. \tag{26}$$

Eq. (5) implies that $\partial X_t/\partial i_t > 0$ and $\partial X_t/\partial i_t^q < 0$. Therefore:

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$$\frac{\partial p_t}{\partial i_t} = \frac{L_{d_t} - (i_t - (1 - \rho)\bar{i})L_{dd_t}\Psi'(X_t)\frac{\partial X_t}{\partial i_t}}{L_{d_t}^2} > 0, \text{ and} \tag{27}$$

$$\frac{\partial p_t}{\partial i_t^q} = \frac{-(1 - \rho)L_{d_t} - [i_t - (1 - \rho)\bar{i}]L_{dd_t}\Psi'(X_t)\frac{\partial X_t}{\partial i_t^q}}{L_{d_t}^2} < 0. \tag{28}$$

The decrease in international inflation temporarily lowers the opportunity cost of both domestic assets, and thereby the effective price of consumption. As a result households wish to temporarily increase their consumption of tradables. For a given level of nontradables output, the resulting current account deficit and portfolio reallocation towards domestic assets cause capital inflows. By (11) the result is a real appreciation and a higher \tilde{P}_t . By (6), (18) and (19) there is no interest rate effect of changes in international inflation on nontradables output. However, by (19) the real exchange rate appreciation raises nontradables output and thereby reduces the final size of the appreciation.

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When the government in response to the increase in the price level pursues the sterilization policy (2), it succeeds by (14) in lowering holdings of deposits relative to bonds, because their relative opportunity cost increases. But more importantly this policy unambiguously leads to further increases in the price level. By (28) it increases the extent of expansionary intertemporal substitution in tradables consumption. And by (6), (18) and (19) net output of nontradables $f(n_t) + g(n_t^*) - n_t(1 + \gamma s)$ now falls for any given real exchange rate. This is because, when dom-

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estic banks do not have access to international capital markets, a change in the government determined interest rate i_t^q directly affects banks' marginal funding costs and therefore firms' borrowing costs. And higher lending rates have a contractionary effect on the net output supply that is available, by (23), for nontradables consumption. The combined effect of increased tradables demand and reduced nontradables supply is that the overall price level \tilde{P}_t must rise more sharply, which is the opposite of what the policy aims to accomplish.

In fact, in this environment lower domestic bond interest rates are required to offset the effect of lower international interest rates on the price level. The intuition can be stated most clearly in terms of the domestic–foreign interest differential. The shock to international inflation narrows this differential in favor of domestic rates, thereby leading to expansionary capital inflows. To prevent the resulting upward pressure on prices, the government would have to restore the differential, which could be done most directly by raising the rate of currency depreciation ε_t . But in practice this is often ruled out because credibility of exchange rate policy requires maintenance of an existing peg in the face of temporary shocks. This is reflected in the model's assumption that $\varepsilon_t = 0 \forall t$. However, under imperfect asset substitutability lower interest rates on domestic bonds are a feasible alternative. The often observed increase in domestic bond rates would under the assumptions of the model reflect two misconceptions on the part of the policymaker. First, on the demand side it amounts to targeting the wrong monetary aggregate, d_t instead of $L(d_t, q_t^H)$. Temporarily raising i_t^q does raise the relative opportunity cost of d_t , but it lowers the overall opportunity cost of domestic liquidity versus foreign bonds and thereby increases tradables demand and the price level \tilde{P}_t .⁷ Second, on the supply side it assumes that the negative investment response will exceed the negative output response. When interest rate shocks are temporary, and the main response is to working capital as opposed to fixed investment, the opposite will be true. This reduces net nontradables output, which also raises the price level. The current account effects of sterilization are ambiguous in this environment. It temporarily increases imports of consumption goods, but the effect on imports of intermediate inputs is ambiguous by (19).

4. Conclusion

This paper suggests an explanation for the frequent failure of domestic high interest rate policies in counteracting the price level increases associated with temporary capital inflows into emerging economies. The explanation is based on two highly plausible and empirically supported assumptions about emerging financial markets, imperfect asset substitutability and imperfect capital mobility for part of

⁷ The result is comparable to introducing temporary interest payments on cash in a cash-in-advance economy.

the domestic banking system. The conclusion is that lower interest rates may be required to reduce price level pressures.

The model does of course make a deliberately strong case, and rather than suggesting that lower domestic bond interest rates are always and necessarily the appropriate tool to fight price level increases, the conclusion should be interpreted in the light of the quote by Lucas (1996) in the Introduction: The effect of higher interest rates on economic activity is complex and not completely understood, and a presumption that they must reduce prices⁸ is not warranted.

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⁸ Or, in a sticky price model, inflation.

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