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Home-Product Bias, Capital Mobility, and the Effects of Monetary Policy Shocks in Open Economies

by

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Abstract

This paper uses a dynamic general equilibrium two-country optimizing model to analyze the consequences of international capital mobility for the effects of monetary policy in open economies. The model shows that the difference between the short-run output effects of monetary policy shocks in a world of high capital mobility and those in a world of low capital mobility decreases if households have a home-product bias in preferences. This result implies that, in contrast to conventional wisdom derived from the textbook Mundell-Fleming model, the empirically observed integration of international financial markets need not result in a significant change in the propagation of monetary policy shocks if households have a strong bias for consuming home products.

Keywords: Monetary Policy; Capital mobility; Home-product bias

JEL classification: F32, F36, F41

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1. Introduction

One of the key implications of the by-now classic workhorse model of international macroeconomics developed by Fleming (1962) and Mundell (1963) is that the international mobility of capital plays a key role for the effectiveness of monetary policy in open economies. In its most widely used basic textbook form, the Mundell-Fleming model implies that, in a system of floating exchange rates and with financial capital being mobile across countries, a monetary expansion brings about a depreciation of the exchange-rate which, in turn, stimulates aggregate demand. A central result of the model is that this effect tends to be stronger the higher is the degree of international capital mobility. In consequence, the model predicts that the effect of monetary policy on output is an increasing function of the degree of international capital mobility.

Although the Mundell-Fleming model is a static model which lacks explicit microeconomic foundations, recent research has shown that this key implication of the model is in principle compatible with modern micro-founded open economy dynamic general equilibrium models. Much of the recent research on open economy dynamic general equilibrium models has used the two-country sticky-price 'new-open economy macroeconomic' (NOEM) model developed by Obstfeld and Rogoff (1995). Using a variant of the Obstfeld-Rogoff model, Sutherland (1996) has argued that moving from a regime of low to a regime of high international capital mobility increases the short-run output effect of monetary policy. Thus, as in the Mundell-Fleming model, international capital mobility tends to strengthen the power of monetary policy to affect output at business-cycle frequencies.

In this paper, I show that this result has to be qualified if one relaxes the assumption that households have identical preferences across countries, an assumption on which most NOEM models developed in the international macro and finance literature are built. This assumption is clearly at variance with the results reported in much of the recent international trade literature. In particular, there is ample empirical evidence showing that the degree of home-

bias in international trade is substantial (see, e.g., McCallum, 1995). Hypothesizing 'iceberg' costs for international trade or, equivalently, a home-product bias in preferences is one of the hypotheses that have been emphasized in the recent literature to explain this empirical result (see Obstfeld and Rogoff, 2001).

If one hypothesizes that the home bias in international trade is induced by 'iceberg' costs of shipping goods across borders, only a fraction of every unit of a foreign good a home country imports arrives in the home country. In consequence, only a fraction of every unit of exports of the foreign country can be added to the consumption index of the importing country. An equivalent way of thinking about the home bias in international trade is to hypothesize a home-product bias in preferences. This hypothesis formalizes the idea that households tend to be more familiar with the goods produced at home than with the products produced abroad and, therefore, tend to prefer to consume home-produced goods over foreign-produced goods for a given vector of relative prices.

Regardless of the specific interpretation of the home bias in international trade, if one seeks to capture this empirical regularity in an optimizing open economy dynamic general equilibrium model, one can no longer invoke the assumption that households residing in different countries derive utility from identical baskets of goods. Thus, relaxing the assumption of identical preferences in macroeconomic models of open economies allows accounting for the home bias in international trade.

Extending a standard NOEM model to incorporate a home-product bias in international trade means that the model is extended to incorporate a specific form of incomplete goods market integration. The implications of imperfect goods market integration in a NOEM model for the propagation of shocks in a regime of high and of low capital mobility have recently also been analyzed by Senay (1998). Senay has developed an extension of Sutherland's (1996) model in which national goods markets are segmented and firms pursue a pricing-to-market policy. Thus, she changes the price-setting mechanism used by firms. She finds that

increasing the degree of international capital market integration does not result in a fundamental change in the short-run output effects of a monetary policy shock in the version of her model featuring complete goods market segmentation and pricing-to-market. Of course, assuming pricing-to-market and, thereby, changing the price-setting mechanism used by firms in a sticky-price model constitutes a significant change of the structure of the model. In this paper, I show that a result complementary to Senay's result can be obtained upon carrying out a minor modification of Sutherlands' model. In fact, extending Sutherland's model by incorporating a home-bias in international trade requires adding just one additional parameter to households' preferences.

I show that if one assumes a home-bias in international trade and, thereby, relaxes the assumption of identical preferences across countries, the link between the degree of international capital mobility and the short-run output effect of monetary policy becomes weaker than in the basic Mundell-Fleming model. Though the result of the Mundell-Fleming model that the short-run output effect of monetary policy tends to be larger in a world of high international capital mobility still holds, the home-product bias in preferences implies that the *difference* between the short-run output effects of monetary policy in a regime of high and the effects in a regime of low capital mobility tends to vanish. The model I study in this paper shows that if the home-product bias in preferences is significant, the short-run output effect of monetary policy in a regime of high capital mobility may come close to the effect monetary policy has in a regime of low capital mobility. Thus, unlike in the Mundell-Fleming model, moving from a regime of low to a regime of high capital mobility in a world with significant cross-country differences in preferences may have only relatively small effects with respect to the output effect of a monetary policy shock at business-cycle frequencies. This result has the important implication that, depending on the degree of households' home-bias in preferences, the empirically observed ongoing integration of international financial markets can but need

not result in significant changes in the way monetary policy shocks propagate through the economy.

To derive this result, I draw on the modeling approach recently suggested by Warnock (2000) and extend Sutherland's (1996) model by incorporating a home-product bias in preferences. Using a variant of the prototype NOEM model developed by Obstfeld and Rogoff (1995) with perfect capital mobility, Warnock has shown that allowing for a home-product bias in households' preferences has significant implications for the dynamic response of the open economy to monetary policy shocks. For example, because the home-product bias gives rise to international differences in preferences, monetary policy can cause movements of the real exchange rate. This implies that, in line with empirical evidence, the model allows for short-run and long-run deviations from purchasing power parity. Moreover, taking into account that households' preferences may exhibit a home-product bias implies that monetary policy shocks can generate the type of exchange rate overshooting familiar from the classic analysis of Dornbusch (1976). Furthermore, Warnock shows that the response of the trade balance to a monetary policy shock is sensitive to the degree of households' home-product bias. In particular, the response of the trade balance to a monetary policy shock tends to be smaller the more pronounced is the home-product bias in households' preferences.

In this paper, I explore the implications of these results for the impact of international capital mobility for the short-run output effect of monetary policy in a regime of high and in a regime of low international capital mobility. The key to the central result of this paper lies in the fact that the home-product bias in preferences makes it possible that a monetary policy shock results in a short-run international real interest rate differential even in a regime of high capital mobility. Because the movement in the real interest rate is reflected in the movements of consumption, consumption tends to move closer with output, implying that the current account becomes less responsive to a monetary policy shock in a regime of high capital mobility. A close co-movement of consumption and output is also characteristic of a regime

of low capital mobility, in which impediments to cross-border capital flows reduce the amount of international borrowing and lending and, therefore, the magnitude of the response of the current account to monetary policy shocks. As a result, the *difference* between the output effect of a monetary policy shock in a regime of high and in a regime of low capital mobility is decreasing in the extent to which households' preferences exhibit a bias for consuming domestically produced goods.

I organize the remainder of the paper as follows. In Section 2, I lay out the theoretical model I use to derive the results reported in this paper. In Section 3, I use impulse response functions and numerical simulations to analyze the effects of monetary policy shocks under alternative assumptions regarding the degree home-product bias and international capital mobility. In Section 4, I offer some concluding remarks.

2. The Model

The model I use in this paper is an extension of the NOEM model developed by Sutherland (1996). The basic building blocks of Sutherlands' model are the same as those in the workhorse NOEM model developed by Obstfeld and Rogoff (1995). This guarantees that I use a consensus model in my analysis and that the results I derive do not hinge upon uncommon and arbitrary assumptions. I extend Sutherland's model by assuming that households have a home-product bias in preferences. This assumption implies that the households residing in different countries in general do not have identical preferences.

In all other respects, the structure of the model is rather standard in the NOEM literature: The world is made up of two countries, Home and Foreign. Each country is inhabited by infinitely-lived identical households. The total world population is normalized to one. One-half of the worlds' population resides in the Home country and one-half resides in the Foreign country. The households form rational expectations and maximize their expected lifetime

utility. In addition, each country is populated by a continuum of firms. The households in each country own the respective domestic firms. The firms sell differentiated products in a monopolistically competitive goods market. Firms cannot change the prices of their products continuously, implying that goods prices are sticky. The assumption of sticky goods prices implies that the model can be used for monetary policy analysis. To produce differentiated goods, firms hire labor in a perfectly competitive labor market. There is no migration of households across countries.

2.1 Households' Preferences and Pricing Structure

Households seek to maximize the present value of their expected lifetime utility. In the case of a household residing in the Home country, the expected lifetime utility is defined as $U_t = E_t \sum_{s=t}^{\infty} \beta^{s-t} u_s$, with $0 < \beta < 1$ denoting a subjective discount factor and E_t denoting the conditional expectations operator. The period-utility function, u_t, is of the form

$$u_t = \left(\sigma/(\sigma-1)\right)(C_t)^{(\sigma-1)/\sigma} + \chi(M_t/P_t)^{1-\varepsilon}/(1-\varepsilon) - N_t^{\mu}/\mu, \qquad (1)$$

where $\mu > 1$, $\sigma > 0$, $\varepsilon > 0$, and $\chi > 0$. In the period-utility function, C_t denotes a real consumption index, N_t denotes the households' labor supply (i.e., hours worked), and M_t / P_t denotes the end-of-period real money holdings, where M_t is the supply of Home outside money (there is no currency substitution), and P_t is the aggregate Home price index defined below.

The aggregate consumption index, C_t, is a CES aggregate defined over consumption goods produced in the Home economy, C_t^h, and in the Foreign economy, C_t^f:

$$C_t = \left[\int_0^{1/2} \alpha^{1/\theta} (C_t^h(z))^{(\theta-1)/\theta} dz + \int_{1/2}^{1} (2-\alpha)^{1/\theta} (C_t^f(z))^{(\theta-1)/\theta} \right]^{\theta/(\theta-1)}, \quad (2)$$

where θ denotes the intratemporal elasticity of substitution between consumption goods. Goods are indexed by z, where $z \in (0,1/2)$ denotes a Home and $z \in (1/2,1)$ denotes a Foreign good. As in Warnock (2000), the parameter $\alpha \in (0,2)$ captures the home-product bias in preferences. If $\alpha \in (1,2)$, then households have a bias for domestically produced goods. In contrast, if $\alpha \in (0,1)$, then, for a given vector of relative prices, households prefer goods produced abroad over goods produced in their home country. If $\alpha = 1$, there is no home-product bias in preferences at all and the model collapses to the model developed by Sutherland (1996).

The optimal consumption allocation of consumption spending over Home and Foreign products can be derived as in Warnock (2000). The result is:

$$C_t^h(z) = \alpha \left(P_t^h(z) / P_t \right)^{-\theta} C_t, \quad (3)$$

$$C_t^f(z) = (2-\alpha) \left(P_t^f(z) / P_t \right)^{-\theta} C_t. \quad (4)$$

Analogous expressions can be derived for the consumption allocation of Foreign households. In equations (3) and (4), $P_t^h(z)$ denotes the Home currency price of a Home good and $P_t^f(z)$ denotes the Home currency price of a Foreign good. The price index P_t is of the form

$$P_t = \left[\int_0^{1/2} \alpha (P_t^h(z))^{1-\theta}\, dz + \int_{1/2}^{1} (2-\alpha)(P_t^f(z))^{1-\theta}\, dz \right]^{1/(1-\theta)}. \qquad (5)$$

The Foreign price index is given by a similar formula. In addition, it is assumed that the law-of-one-price holds for each differentiated good. In contrast to Obstfeld and Rogoff (1995) and Sutherland (1996), however, the model features differences in preferences across countries, so that this assumption in general does not imply that purchasing power parity holds as well.

2.2 International Financial Markets

The structure of international financial markets is as in Sutherland (1996). To introduce the possibility of imperfect international capital mobility, it is assumed that, when making their optimal portfolio choice, households have to take into consideration that international financial markets are not perfectly integrated. While households have free access to the capital market of their respective home country, they incur transaction costs when initiating cross-border capital movements. Thus, Home (Foreign) households can trade at no costs in the financial assets denominated in Home (Foreign) currency but have to pay transaction costs when trading in financial assets denominated in Foreign (Home) currency. As in Obstfeld and Rogoff (1995), the only financial assets traded in international financial markets are one-period bonds.

For a Home household, the real transaction costs, Z_t, of building up or unwinding positions in Foreign currency denominated nominal bonds are given by

$$Z_t = 0.5\psi\, I_t^2, \qquad (6)$$

where $\psi > 0$ is a positive constant that captures the degree of international capital mobility. If $\psi = 0$, international financial markets are perfectly integrated and the degree of international capital mobility is high. In contrast, if $\psi > 0$, international financial markets are integrated only imperfectly and the degree of international capital mobility is relatively low. The variable I_t denotes the level of real funds transferred by Home households from the Home to the Foreign bond market. Both Z_t and I_t are denominated in terms of the consumption aggregate, C_t.

2.3 The Households Budget Constraint

Home households receive interest income on their holdings of Home and Foreign nominal bonds, profit income for the ownership of Home firms, and labor income for hours worked. Households decide how much to consume, decide on the optimal allocation of their wealth across Home and Foreign bonds, and decide how much domestic outside money they want to hold. In addition, they receive real transfers from the government and incur the transaction costs for cross-border capital movements. The dynamics of Home households' Home bond holdings, obey the following budget constraint:

$$D_t = (1+R_{t-1})D_{t-1} + M_{t-1} - M_t + w_t N_t - P_t C_t - P_t I_t - P_t Z_t + \widetilde{\Pi}_t + P_t T_t, \tag{7}$$

where D_t denotes the quantity of Home currency denominated nominal bonds, R_t denotes the nominal interest rate on Home bonds between period t and $t+1$, T_t denotes real lump-sum transfers (expressed in terms of C_t), w_t denotes the nominal wage rate the household earns in a perfectly competitive domestic labor market, and $\widetilde{\Pi}_t$ denotes the nominal profit income the

household receives from domestic firms. The dynamics of the Home households' Foreign bond holdings can be described by the following difference equation:

$$F_t = (1 + R^*_{t-1})F_{t-1} + P^*_t I_t\,, \tag{8}$$

where R^*_t denotes the nominal foreign interest rate paid for holding a nominal Foreign bond between period t and period $t+1$. An asterisk denotes a Foreign variable.

The first-order (and transversality) conditions for the Home and Foreign households' problem are identical to those given in Sutherland (1996) and are not restated here for the sake of brevity.

2.4 Price Setting

Each profit-maximizing Home firm hires labor to produce a differentiated good indexed by z according to the production function $y_t(z) = N_t(z)$. The firm's nominal profits are given by $\widetilde{\Pi}_t(z) = P^h_t(z)y_t(z) - w_t y_t(z)$, where the demand-determined output level can be read off the demand curve for its good in the monopolistically competitive goods market. The demand curve is given by

$$y_t(z) = \frac{1}{2}(P^h_t(z)/P_t)^{-\theta}\alpha\left(C_t + Z_t\right) + \frac{1}{2}(P^h_t(z)/(S_t P_t^*))^{-\theta}(2-\alpha)\left(C_t^* + Z_t^*\right). \tag{9}$$

Each firm has monopoly power on the market for the differentiated good it produces. It, therefore, treats the price it charges for its product as a choice variable. In consequence, one has to specify a price setting mechanism. I follow Sutherland (1996) and assume that firms set

prices according to a discrete-time variant of the price setting mechanism suggested by Calvo (1983).

According to this price adjustment mechanism, each firm has to take into account when setting its profit-maximizing price that there is a positive probability $0 < \gamma < 1$ that it cannot revise its price setting decision made in period $s < t$ in period t. Firms, therefore, set the current price of their product so as to maximize the expected present value, $V_t(z)$, of current and future real profits, where period s, $s > t$, profits are weighted by the probability that the current period price will still be in force in period s. Thus, firms maximize

$$\max_{P_t^h(z)} V_t(z) = E_t \sum_{s=t}^{\infty} \gamma^{s-t} R_{t,s} \tilde{\Pi}_s(z) / P_s \,, \tag{9}$$

where $R_{t,s} \equiv \Pi_{j=s}^{t} (1 + r_j)^{-1}$ denotes the market real discount factor and r_t denotes the real interest rate. Carrying out the maximization in equation (9), the profit-maximizing price can be expressed as

$$P_t^h(z) = \left(\frac{\theta}{\theta - 1} \right) \frac{E_t \sum_{s=t}^{\infty} \gamma^{s-t} R_{t,s} (Q_s / P_s)(1/P_s)^{-\theta} w_s}{E_t \sum_{s=t}^{\infty} \gamma^{s-t} R_{t,s} (Q_s / P_s)(1/P_s)^{-\theta}} \,, \tag{10}$$

where $Q_t \equiv \left(\alpha (C_t + Z_t) + (2 - \alpha)(C_t^* + Z_t^*)(P_t / (EP_t^*))^{-\theta} \right) / 2$. An analogous expression can be derived for the profit-maximizing Foreign currency price charged by Foreign firms for their products.

2.5 The Government Sector

The Home and Foreign governments finance real transfers by seignorage. The period-budget constraint for the Home government can, thus, be written as

$$T_t = (M_t - M_{t-1}) / P_t \tag{11}$$

The Home money supply evolves according to the following stochastic difference equation

$$\hat{M}_t = \xi \hat{M}_{t-1} + \varepsilon_{M,t}, \tag{12}$$

where a hat over a variable denotes deviations from the initial steady-state, $\varepsilon_{M,t}$ denotes a serially uncorrelated stochastic disturbance term, and the parameter $\xi \in [0,1]$ governs the persistence of the money supply process. Analogous equations hold for the Foreign government.

2.6 Definition of Equilibrium and Model Solution

Following the NOEM literature, I focus on a symmetric monopolistic competition equilibrium in each countries. The symmetric monopolistic competition equilibrium is defined as an allocation $\{C_t, y_t, P_t^h, P_t, i_t, w_t, N_t, I_t, D_t, F_t, C_t^*, y_t^*, P_t^{f*}, P_t^*, i_t^*, w_t^*, N_t^*, I_t^*, D_t^*, F_t^*, S_t\}$ that satisfies for all $t = 0,1,.....,\infty$ the following five conditions: (i) the labor markets in each country clear, (ii) the optimality conditions for consumption and asset holding are satisfied,

(iii) the household and government budget constraints for each country are satisfied, (iv) the markets for Home and Foreign bonds are in equilibrium, (v) firms price settings decisions and the money supply processes obey equations (10) and (12) and their respective foreign counterparts.

To solve for the vector of endogenous variables, I solve the model numerically. In a first step, log-linearize the model around a symmetric flexible-price steady state in which the Home and Foreign holdings of bonds are zero (Obstfeld and Rogoff, 1995). In a second step, I calibrate the model. The calibration of the model is given in Table 1. The parameters, including the parameters describing the degree of capital mobility, are as given in Sutherland (1996). This guarantees that the results I report in this paper can be compared with those reported by Sutherland. In a third and final step, I simulate the model numerically in order to explore how the home-product bias in preferences changes the consequences of international capital mobility for the effects of monetary policy shocks.[1] When simulating the model, I follow Sutherland (1996) and assume that the innovation terms in the Home and Foreign money supply processes are perfectly negatively correlated, i.e., monetary policy shocks are asymmetric. Though this is certainly an overly restrictive assumption, I invoke this assumption in order to make my results comparable to those reported by Sutherland.

— Insert Table 1 about here.—

3. Home-Product Bias, Capital Mobility, and Monetary Policy

The impulse response functions depicted in Figure 1 visualize the impact of a permanent unit asymmetric monetary policy shock on key Home variables. To compute the impulse responses plotted in this figure, I assume that there is no home-product bias in preferences

[1] I used Paul Klein's algorithm "solve.k" in Matlab in order to find the solution of the system. This solution determines the paths of the endogenous variables of the model in terms of the predetermined and exogenous state variables of the model. For details, see Klein (2000).

($\alpha = 1$). In this case, my model collapses to the model developed by Sutherland (1996). Thus, the impulse responses plotted in Figure 1 are identical to the impulse responses to a monetary policy shock implied by Sutherland's model. These impulse responses serve as a benchmark against which I can assess how the home-product bias in preferences changes the macro-dynamic effects triggered by monetary policy shocks.

— Insert Figure 1 about here.—

In a world in which there are no impediments to cross-country capital flows, the permanent asymmetric monetary policy shock leaves interest rates unaffected because the funds supplied by Home households are always in balance with the funds Foreign households want to borrow. The nominal exchange rate, being the present discounted value of future cross-country differentials in fundamentals, jumps instantaneously to its new steady state level. Because firms adjust the prices of their products only sluggishly, the depreciation of the nominal exchange rate results in a change in the terms of trade. The terms of trade are defined as the ratio of the Home currency price of Foreign products and the Home currency price of Home products. The depreciation of the nominal exchange rate brings about an increase in the terms of trade, implying that the relative price of Foreign products increases. The increase in the terms of trade results in a demand-determined short-run increase in Home output. Given the permanent nature of the monetary policy shock, there is a one-time step-jump of consumption to its new steady state level. Upon comparing the time-profile of consumption with the time-profile of output, it can be seen that Home runs a current account surplus in the aftermath of the monetary policy shock. Also note that the assumption that the law-of-one price holds for each differentiated good together with the assumption that preferences are identical across countries implies that the real exchange rate does not change in the aftermath of the monetary policy shock.

Things are different in a world in which households incur transaction costs for undertaking positions in the international bond market. The intuition is that with the international bond market being imperfectly integrated, the impact of the monetary policy shock on the current account and, thus, on the expected dynamics of the foreign asset position is directly reflected in the condition of uncovered interest rate parity. In the case of Home households, the log-linear form of this condition can be written as

$$(1-\beta)(\hat{i}_t - \hat{i}_t^*) = E_t(\hat{S}_{t+1} - \hat{S}_t) + \tilde{\psi} E_t(\hat{I}_{t+1} - \hat{I}_t) \qquad (13)$$

where $\hat{i}_t$ denotes the Home nominal interest rate and $\tilde{\psi} \equiv \psi \overline{C}_0$ ($\overline{C}_0$ denotes the level of consumption in the pre-shock steady state). Equation (13) shows that, at any point in time, the international nominal interest rate differential is proportional to the sum of the expected rate of change of the exchange rate and the expected rate of change of the cross-border flow of funds. The effect of the expected rate of change of the cross-border flow of funds on the international nominal interest rate differential is absent in a world of high capital mobility ($\tilde{\psi} = 0$).

What are the implications of the imperfect integration of international bond markets for the short-run effects of monetary policy shocks? The monetary policy shock implies that Home runs a current account surplus. Because the net foreign asset position rapidly reaches its post-shock steady-state level, the expected rate of change of the cross-border flow of funds is negative, implying that, for a given nominal interest rate differential, the expected rate of depreciation of the exchange rate is positive. In consequence, the exchange rate undershoots its post-shock steady-state value. This, in turn, implies that the exchange-rate induced expenditure switching towards Home products is relatively weak, so that the short-run output effect of the monetary policy shock is comparatively smaller in a regime of low capital

mobility than in a regime of high capital mobility. Also note that, because prices are sticky, the movement in the nominal interest rate translates, by the Fisher parity condition, into a corresponding movement in the real interest rate. The resulting stronger co-movement of output and consumption implies that the effect of the monetary policy shock on the current account is smaller if the degree of capital mobility is low.

Things are different if households have a home-product bias in preferences (see Figure 2). Three points are worth noting. First, because households' preferences are now different across countries, movements in the nominal exchange rate trigger movements in the real exchange rate. Thus, a Home monetary expansion brings about a real depreciation of the Home currency. Second, as in the Dornbusch (1976) model, the nominal exchange rate can overshoot its post-shock steady-state value in the short-run. As is well-known in the NOEM literature, this overshooting of the exchange rate arises because the calibration of the model implies that the elasticity of utility with respect to real balances satisfies the inequality $1/\varepsilon < 1$. Third, with a home-bias in preferences, a nominal and a real interest rate differential can arise in a world of low, but also in world high capital mobility.

— Insert Figure 2 about here.—

The third point is important for the *difference* in the magnitude of the short-run output effect of a monetary policy shock in a regime of high and in a regime of low capital mobility. To see this, note that the decline in the Home real interest rate in a world of high capital mobility, made possible by the home-bias in preferences, results in a relatively sharp short-run increase of Home households consumption. In fact, a comparison with the impulse responses depicted in Figure 1 shows that, for the numerical parameter values used to generate Figure 2, the short-run increase in Home consumption under high capital mobility more than doubles if one allows for a home-product bias in preferences. A direct implication of this strong

response of consumption to the monetary policy shock is that the magnitude of the current account surplus the Home economy is running in the aftermath of the monetary policy shock is a declining function of the degree of the home-bias in preferences.

Why is this important? To see the importance of this point, note that the transaction costs for undertaking positions in international financial markets characteristic of a regime of low capital mobility are a central determinant of the level of funds transferred from the Home to the Foreign economy, and vice versa. This level of funds invested in the international bond market, in turn, determines the magnitude of the short-run current account imbalances caused by monetary policy shocks. Because high transaction costs imply a low level of international capital flows, the effect of the monetary policy on the current account is in general small if capital mobility is low. As a result, the effect of the monetary policy shock on the terms of trade and output in a world of low capital mobility falls short of the corresponding effect arising in a world of high capital mobility. If preferences are identical across countries, this explains the impact of a variation in the degree of capital mobility on the short-run output effect of monetary policy.

If there is a home-product bias, the fact that a real interest differential can arise even if capital mobility is high implies that the relative importance of the transaction costs for undertaking positions in the international bond market for the *difference* between the short-run output effect of monetary policy in a regime of low as compared to a regime of high capital mobility declines. Rather, the effect of the real interest rate on Households' consumption spending implies that the current account imbalance caused by the monetary policy shock in a regime of high capital mobility comes relatively closer to the current account imbalance caused in a world of low capital mobility. In consequence, the *difference* in the short-run output effects of monetary policy under high and under low capital mobility tends to decline as the home-product bias in preferences increases.

How strong is this effect? Figure 2 indicates that the overshooting of the nominal exchange rate and the ensuing strong movement of the terms of trade arising if capital mobility is high may counter the impact of the home-product bias on the difference between the short-run output effects of monetary policy shocks under high and low capital mobility. This warrants a more detailed quantitative assessment of the implications of the home-product bias on the short-run output effect of monetary policy in a regime of high and in a regime of low capital volatility. To analyze more closely the quantitative significance of the effects caused by the home-product bias in households preferences, I plot in Figure 3 the *ratio* of the impact effects of a unit asymmetric permanent monetary policy shock on output under high and under low capital mobility on the vertical axis as a function of the home-product bias parameter, α , on the horizontal axis.

— Insert Figure 3 about here.—

The message conveyed by the figure is that the effect of the home-product bias on the relative magnitude of the short-run output effect of monetary policy in a regime of high and in a regime of low capital mobility can be substantial. In fact, if the parameter capturing households' home-product bias in preferences approaches its upper limit, the importance of capital mobility for the short-run output effect of monetary policy rapidly declines. Hence, in contrast to conventional wisdom derived from the textbook Mundell-Fleming model, the integration of international financial markets need not result in a significant change in the propagation of monetary policy shocks if households have a strong bias for consuming home products.[2]

[2] Also note from Figure 3 that the difference between the short-run output effects of monetary policy in a regime of high and a regime of low capital mobility also tend to vanish if there is a substantial foreign-product bias in preferences. The possibility of a foreign-product bias, however, is counterfactual and is not pursued further in this paper.

4. Conclusions

What are the implications of international financial market integration for monetary policy? The traditional textbook version of the Mundell-Fleming model implies that the output effects of monetary policy tend to increase in a world of high capital mobility. The central drawback of the Mundell-Fleming model, however, is that it is a static model without fully articulated microeconomic foundations. The class of so-called NOEM models in the tradition of the model developed by Obstfeld and Rogoff (1995) is not subject to these drawbacks. A recent study based on a NOEM model conducted by Sutherland (1996) has shown that the insight from the Mundell-Fleming world may still apply if one uses an optimizing general equilibrium model for monetary policy analysis.

The central message that was conveyed by the analysis in this paper is that the implications of international capital mobility for the short-run effects of monetary policy in a standard NOEM model are sensitive to the degree of home bias in international trade. Specifically, if one captures the empirical regularity of a home bias in international trade by invoking the assumption that households' preferences exhibit a substantial degree of home-product bias, then the importance of variations in the degree of capital mobility for the short-run output effects of monetary policy shocks rapidly declines. A direct implication of this result is that the integration of the world's financial markets may leave the way in which monetary shocks propagate through the economy largely unaffected if households have a strong bias for consuming home products.

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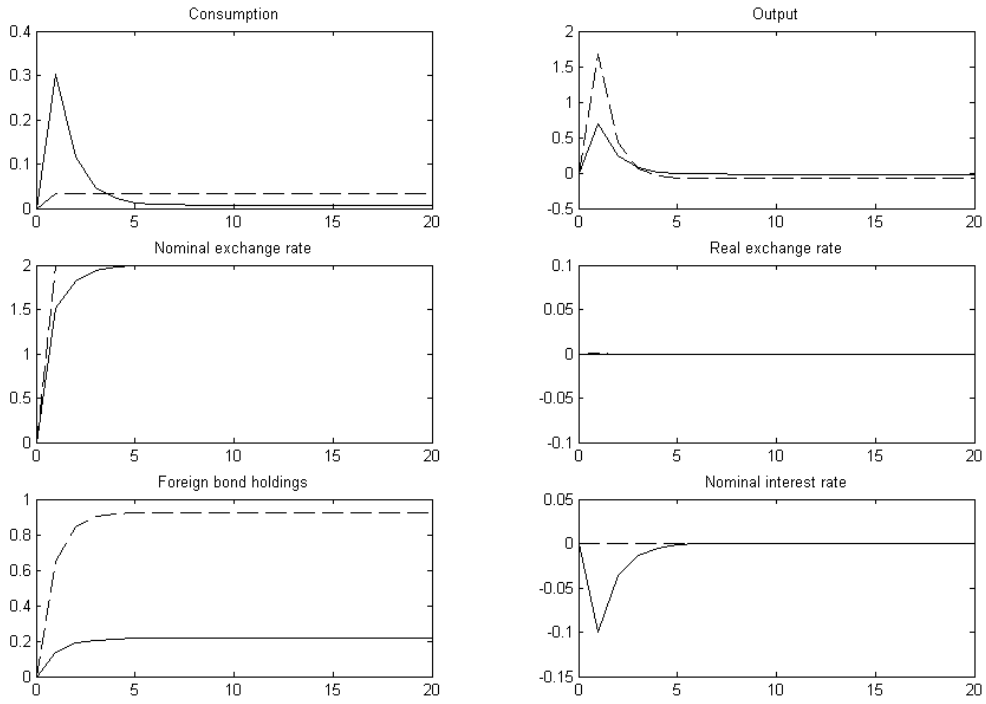
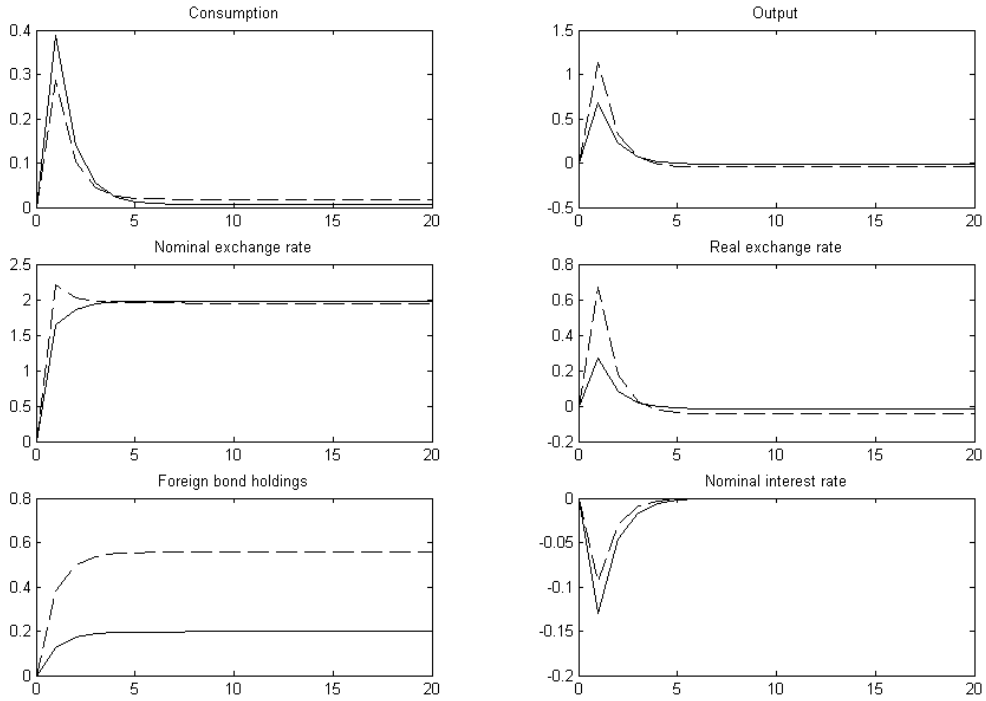
Figures and Tables

Figure 1 – International capital mobility and the dynamic macroeconomic effects of a unit monetary policy shock ($\alpha = 1$)



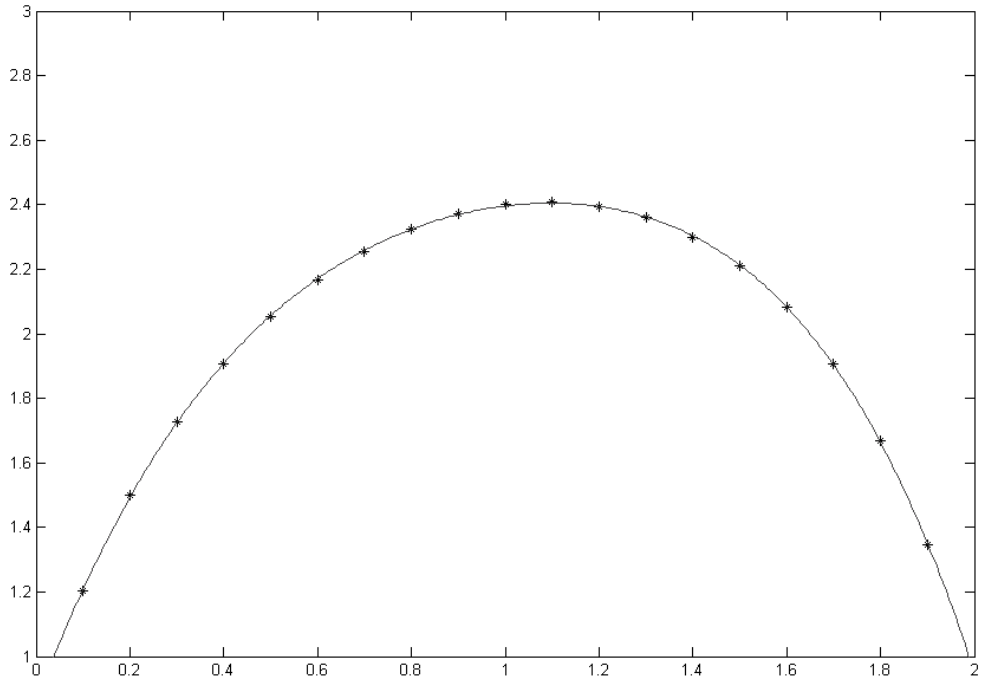
Note: The figure plots the responses of key Home variables to a unit asymmetric permanent monetary policy shock. Dashed lines denote impulse responses obtaining if capital mobility is high and solid lines obtain if capital mobility is low. The parameter capturing the degree of the home-product bias assumes the value $\alpha = 1.0$. Consumption, output and the real exchange rate are measured as percentage deviations from the steady state. Bond holdings are measured as percentage deviations from the steady state consumption level. The interest rate is measured in terms of percentage point deviations from the steady state.

Figure 2 – International capital mobility and the dynamic macroeconomic effects of a unit monetary policy shock ($\alpha = 1.8$)



Note: The figure plots the responses of key Home variables to a unit asymmetric permanent monetary policy shock. Dashed lines denote impulse responses obtaining if capital mobility is high and solid lines obtain if capital mobility is low. The parameter capturing the degree of the home-product bias assumes the value $\alpha = 1.8$. Consumption, output and the real exchange rate are measured as percentage deviations from the steady state. Bond holdings are measured as percentage deviations from the steady state consumption level. The interest rate is measured in terms of percentage point deviations from the steady state.

Figure 3 – Home-Product Bias, Capital Mobility, and the Short-Run Output Effect of Monetary Policy Shocks



Note: The figure plots the ratio of the impact effects of a unit asymmetric permanent monetary policy shock on output under high and under low capital mobility on the vertical axis as a function of the home-product bias parameter, α , on the horizontal axis. To generate the figure, the home-product bias parameter α was changed in discrete steps. The resulting vector of output ratios (*) was then transformed into a continuous function by fitting a 5th order polynomial (solid line). The output effect of monetary policy is measured in terms of percentage deviations from the steady state.

Table 1 — The calibrated parameters

Parameter	*Value*	*Description*
β	0.95	Subjective discount factor
σ	0.75	Intertemporal elasticity of substitution
θ	6.0	Elasticity of substitution between differentiated goods
μ	1.4	Elasticity of utility with respect to hours worked
ε	9.0	Inverse of the elasticity of utility with respect to real balances
$\tilde{\psi}$	5 (0)	Transaction costs for cross-border capital movements in the case of low (high) capital mobility

Note: For parameter values, see Sutherland (1996).