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Abstract

Given the importance of economic integration and the concern for macroeconomic stabilisation, it is important to understand how increasing integration alters the effectiveness of government policy tools. This paper aims to determine how increasing goods and financial market integration changes the effectiveness of fiscal and monetary policy. Expansionary monetary and fiscal policies are analysed under different degrees of goods and financial market integration in a dynamic general equilibrium framework. Simulations show that the effectiveness of fiscal and monetary policy change significantly depending on the presence of incompletely integrated goods and/or financial markets. While financial market integration increases the effectiveness of monetary policy, it diminishes the effectiveness of fiscal policy. Goods

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market integration increases the e®ectiveness of both monetary and ¯scal policy.

Key words: Policy e®ectiveness, pricing-to-market, goods market integration, ¯nancial market integration

JEL Classi¯cation: F31, F36, F41

1 Introduction

The real and nominal e®ects of monetary and ¯scal policy have until recently been analysed within the framework developed by Mundell (1963, 1964) and Fleming (1962). Since the early 1960s the Mundell-Fleming model has constituted the main policy paradigm for analysing monetary and ¯scal policy issues in an open economy setting. Dornbusch's (1976) model presents a perfect foresight extension of the static Mundell-Fleming model and explicitly accounts for the e®ect of expected exchange rate movements, which is a crucial determinant of capital °ows. The Dornbusch (1976) model incorporates expectations and enables a more tractable analysis of the movements in output, in°ation and the exchange rate, and the interaction between monetary and ¯scal policy. One of the most important ¯ndings of Dornbusch (1976) was that sticky output prices in a model with expected exchange rate movements associated with interest rate di®erences could give rise to exchange rate overshooting. The exchange rate overshooting in the Dornbusch model is a direct result of the discrepancy of adjustment speeds in goods and ¯nancial markets. Financial markets adjust instantly whereas goods markets adjust only slowly over time. Many variants of the Mundell-Fleming-Dornbusch model showed that the e®ectiveness of macroeconomic policies depended critically on whether the economy is operating under ¯xed or °exible exchange rates and also the degree of capital mobility.[1]

Although the Mundell-Fleming-Dornbusch framework has played a dominant role in shaping the literature on open economy macroeconomics it has certain important methodological drawbacks. The most fundamental is that these models lack explicit choice theoretic foundations and thus with their ad hoc speci¯cations of the price determination process, they lack the mi-

[1] Frenkel and Rodriguez (1982) argue that exchange rate overshooting in a model with ¯xed prices depends crucially on the assumption of perfect capital mobility. For lower degrees of capital mobility undershooting in the exchange rate is likely.

crofoundations of aggregate supply. These models also disregard the role of intertemporal budget constraints which is central in the analysis of the current account and exchange rate dynamics. Moreover, they fail to provide an explicit account of how monetary policy a®ects production decisions, especially when nominal rigidities are present. Most fundamentally, due to their lack of microfoundations these models are unable to provide any well-de¯ned welfare criteria by which to evaluate the e®ectiveness of alternative macroeconomic policies. These factors have greatly limited the Mundell-Fleming-Dornbusch type models' relevance in policy oriented discussions of open economy macroeconomics.

A major conceptual advance in open economy macroeconomics overcoming these drawbacks have been made by recent models concentrating on the intertemporal approach to the current account with market imperfections.[2] Amongst the most signi¯cant contributions in this ¯eld is a paper by Obstfeld and Rogo® (1995) which explores exchange rate dynamics and the international monetary transmission mechanism in a fully worked-out intertemporal general equilibrium model with nominal rigidities and monopolistic competition. This approach essentially forms a new paradigm in international macroeconomic theory which is better equipped to explain the e®ects of macroeconomic policies on output and exchange rates. The signi¯cance of this new approach lies with its ability to rigorously address important issues in international ¯nance like the international transmission of macroeconomic policies and sources of current account imbalances while explicitly accounting for the presence of imperfections in the economic system.

Given that Mundell-Fleming-Dornbusch type models' policy conclusions depend greatly on assumptions regarding the degree of capital mobility and the responsiveness of goods' prices, the objective of this paper will be to investigate these factors in a model, such as the Obstfeld and Rogo® model, which has a richer, more coherent theoretical framework and which is competent in addressing policy oriented issues. Obstfeld and Rogo® (1995) assume purchasing power parity (PPP) and no impediments to trade in the goods market and integrated world capital markets where countries may borrow and lend as much as they like. This paper therefore uses the model presented in Senay

[2] Although dynamic optimizing models have been used in theoretical open economy macroeconomics for many years they have not provided a useful framework for analysing policy transmission.

(1998) which is a modi¯ed version of the Obstfeld and Rogo® (1995) model, allowing for imperfect capital mobility and imperfect goods market integration. Imperfect capital mobility is represented by the presence of adjustment costs to foreign asset stock changes.[3] Imperfect goods market integration is represented by the presence of price discrimination by ¯rms across export markets. Since there is widespread evidence that real exchange rates feature large, persistent and systematic departures from the law of one price[4] some form of goods market frictions such as the presence of price discrimination across export markets, i.e. pricing-to-market(PTM) by imperfectly competitive ¯rms may exist.[5] The presence of PTM means that the forces enabling spatial arbitrage are absent thus the price of the same good can diverge across markets. In this paper PTM indicates incomplete goods market integration and the e®ects of price discrimination according to market destination on policy e®ectiveness is analysed.[6]

The paper will aim to understand the implications of imperfect ¯nancial market integration and incomplete goods market integration for the e®ectiveness of monetary and ¯scal policies and their stabilizing roles.[7] Section 2 describes the model, Section 3 presents dynamic solution paths, Section 4 concludes the paper.

[3]Sutherland (1996) investigates the e®ects of ¯nancial market integration on the volatility of macroeconomic variables treating ¯nancial market integration as the reduction of trading frictions between national ¯nancial markets.

[4]Froot and Rogo® (1995) and Rogo®' s (1996) survey of PPP shows that the law of one price fails quite notably even for goods that are commonly traded in international markets.

[5]Price discrimination across export markets correlated with exchange rate movements has received widespread interest and a large theoretical literature presenting partial equilibrium analyses of PTM has evolved, see Dornbusch (1987), Krugman (1987), Dixit (1989), Giovannini (1988), Kasa (1992), Knetter (1989, 1993) and Marston (1990).

[6]Betts and Devereux (1996) develop a model combining PTM with imperfectly competitive ¯rms and sticky prices and show that PTM coupled with sticky nominal prices, limits the degree of pass-through from changes in exchange rates to prices, mitigates the expenditure switching role of exchange rate changes and magni¯es the response of the exchange rate to spending shocks.

[7]Several market imperfections coexist in the model, where imperfect competition and nominal rigidities are more incidental to the analysis, PTM and adjustment costs to foreign assets preventing perfect integration in markets are the central imperfections focussed upon.

2 The Model

There are two countries of equal size, home and foreign. Foreign country variables are denoted with an asterisk. They are inhabited by a continuum of infinitely lived individual consumers and producers. Households consume a group of differentiated, perishable goods of total measure unity. These goods, produced by firms, are indexed by z on the unit interval. Home country firms produce fraction n goods and foreign firms produce $1 - n$ goods.

The degree of goods market integration is represented by the extent of PTM in the economy. The model assumes that each PTM good is sold exclusively by an individual firm in an imperfectly competitive setting where all firms are price setters. This rules out the possibility of individuals engaging in trade in PTM goods and arbitraging away price differentials between the two countries. The presence of such goods market frictions represents incomplete goods markets integration in this framework. Fraction s of firms price discriminate across countries and set prices independently for the home and foreign country, these are called PTM firms. The remaining $1 - s$ of firms produce non-PTM goods which are traded freely by consumers in both countries. Price differences in non-PTM goods may be arbitraged away so firms set a single international price. The share of PTM and non-PTM firms is identical in both countries. The degree of non-PTM firms in the economy is taken to represent the degree of goods market integration achieved by the two countries. Complete PTM ($s = 1$) implies goods markets are totally segregated. When $s = 0$, all goods are non-PTM goods and goods markets are completely integrated and PPP holds.

2.1 Households

2.1.1 Preferences and Pricing Structure

Consumers in both countries have identical preferences, defined over a consumption index, real money balances and labour supply. A representative home agent maximizes a utility function that depends on consumption C, real money balances M/P and labour supplied N:

$$U_t = \sum_{s=t}^{\infty} \beta^{s-t} \left[\frac{\sigma}{\sigma - 1} C_s^{\frac{(\sigma - 1)}{\sigma}} + \frac{\chi}{1 - \varepsilon} \left(\frac{M_s}{P_s} \right)^{1 - \varepsilon} - \frac{\kappa}{\mu} N_s^{\mu} \right] \tag{1}$$

with $0 < \beta < 1$, $\sigma > 0$, $\varepsilon > 0$ and $\mu > 1$ and is a shock variable indicating the effects of changes in labour effort on household utility. Letting $c(z)$ be a home individual's consumption of good z and θ be the elasticity of demand for consumption goods, the consumption index C is:

$$C = \left[\int_0^1 c(z)^{\frac{(\theta-1)}{\theta}} dz\right]^{\frac{\theta}{(\theta-1)}} \tag{2}$$

Domestic consumers face a consumer price index defined as:

$$P_t = \left\{\int_0^n p_t(z)^{1-\theta} dz + \int_n^{n+(1-n)s} p_t^*(z)^{1-\theta} dz + \int_{n+(1-n)s}^1 [E_t q_t^*(z)]^{1-\theta} dz\right\}^{\frac{1}{(1-\theta)}} \tag{3}$$

The home country's CPI is made up of a combination of $p_t(z)$ representing the home currency price of the domestically produced good, $p_t^*(z)$ the domestic currency price of a foreign PTM good, and $q_t^*(z)$ the foreign currency price of a foreign non-PTM good. So, p represents home currency prices and q represents foreign currency prices. Prices without asterisks are for home goods and those with asterisks are for foreign goods. E_t is the exchange rate in terms of the domestic unit cost of foreign currency.

2.1.2 Households' Interaction with Financial Markets

World capital markets are assumed to be imperfectly integrated, so individuals cannot trade freely in foreign financial assets. Individuals divide their wealth holdings between holdings of domestic currency, domestic bonds and foreign bonds. Home consumers have free access to domestic financial markets and may trade domestic bonds freely without incurring any costs of adjustment. Holdings of foreign bonds are however subject to adjustment costs. This paper adopts Sutherland's (1996) approach of assuming the presence of adjustment costs for foreign asset holdings. Adjustment costs represent imperfect financial integration and the reduction of these costs signifies increasing integration of financial markets.

Following Sutherland (1996a) adjustment costs are assumed to be convex in the form of:

$$Z_t = \frac{\phi}{2} I_t^2 \tag{4}$$

where I_t is the amount of funds transferred from the domestic to the foreign financial market. The effects of financial integration is considered by looking at economic disturbances under different degrees of financial integration, represented as different values of ϕ in (4).

Given the above setting for their interactions with financial markets and that consumers receive income from wages $w_t N_t$ and profits Π_t on their ownership of domestic firms and pay T_t taxes, holdings of domestic and foreign bonds are governed by the flow budget constraints:

$$D_t = (1 + i_{t-1}) D_{t-1} + M_{t-1} - M_t + w_t N_t - P_t C_t - P_t I_t - P_t Z_t + \Pi_t - P_t T_t \quad (5)$$

$$F_t = \left(1 + i^*_{t-1}\right) F_{t-1} + \frac{1}{E_t} P_t I_t \quad (6)$$

2.1.3 Households' Maximization Problem

Domestic households maximize lifetime utility (1) subject to their holdings of wealth in forms of domestic currency, domestic bonds and foreign bonds. The first order conditions are:

$$C_{t+1} = C_t \left[\beta (1 + i_t) \frac{P_t}{P_{t+1}}\right]^{\sigma} \quad (7)$$

$$\frac{M_t}{P_t} = \left[\frac{\chi}{C_t^{-\frac{1}{\sigma}}} \left(\frac{1 + i_t}{i_t}\right)\right]^{\frac{1}{\epsilon}} \quad (8)$$

$$N_t = \left(\frac{C_t^{-\frac{1}{\sigma}}}{P_t} \frac{w_t}{{}_t}\right)^{\frac{1}{(\eta - 1)}} \quad (9)$$

$$(1 + i_t)(1 + \phi I_t) = \frac{E_{t+1}}{E_t} (1 + \phi I_{t+1})(1 + i^*_t) \quad (10)$$

Equation (7) is the standard consumption Euler equation. The household's demand for each differentiated good of each type is:

$$c_t(z) = \left[\frac{a_t(z)}{P_t}\right]^{-\theta} C_t \quad (11)$$

$a_t(z)$ can be $p_t(z)$, $p_t^{¤}(z)$ or $[E_t q_t^{¤}(z)]$ depending on the type of good demanded.

A household's optimal money demand schedule is given by (8) which equates the marginal rate of substitution of composite consumption for real money balances to the opportunity cost of holding real balances. Household's optimal labour supply decision is shown by (9), this equates the marginal disutility of labour e®ort to the marginal utility of the real wage. Labour markets are assumed to be completely segregated and real wages determined by market clearing in each labour market.

Equation (10) shows the household's optimal allocation of wealth between domestic and foreign bonds, taking into consideration the costs related to transferring wealth from one ¯nancial market to the other. With integrated capital markets, where there are no costs of adjustment (Á = 0), equation (10) directly implies uncovered interest parity, as in Obstfeld and Rogo® (1995).

Introducing imperfections in ¯nancial and goods markets has not a®ected the household's optimal demand for real balances (8), nor its optimal labour supply decision (9).[8] The main e®ect of introducing imperfect capital mobility is apparent in the household's wealth allocation between domestic and foreign bonds, which no longer implies uncovered interest parity. Introducing imperfectly integrated goods markets, represented by PTM, a®ects consumers' demand for speci¯c goods, as apparent in equation (11). But households' intertemporal consumption stream, given by (7), is left unchanged since it is based on a composite consumption index of all goods.

2.2 Firms

2.2.1 Firms and Price Determination

There are two types of ¯rms, PTM ¯rms which price discriminate according to market destination and non-PTM ¯rms which set a single international price. Both types produce di®erentiated goods by using domestic labour as the only input. All ¯rms have an identical linear production technology, $Y_t(z) = N_t(z)$ where $Y_t(z)$ is total output of the ¯rm and $N_t(z)$ is total employment.

[8] These and the consumption Euler equation (7) are in fact identical to those in Obstfeld and Rogo® (1995), Betts and Devereux (1996) and Sutherland (1996).

Total output of a domestic PTM firm is made up of output sold domestically, y_t^D and output for sales to the foreign country y_t^F. With G_t the level of domestic government expenditures, total domestic demand for good z is

$$y_t^D(z) = \left[\frac{p_t(z)}{P_t}\right]^{-\theta} (C_t + Z_t + G_t) \tag{12}$$

and there is a similar expression for $y_t^F(z)$. Total output of the non-PTM firm is made up of output sold domestically, y_t^D as in (12) and output for sales to the foreign country y_t^N. Total foreign demand for a domestically produced non-PTM good is given by

$$y_t^N(z) = \left[\frac{p_t(z)}{P_t^* E_t}\right]^{-\theta} (C_t^* + Z_t^* + G_t^*) \tag{13}$$

In a monopolistically competitive goods market each firm, having some degree of monopoly power, sets prices of its good separately to maximize its profits. PTM firms separately choose $p_t(z)$, the nominal price of their good for the home market and $q_t(z)$, the nominal price of their good in the foreign market. Non-PTM goods producers set a single international price since these goods can be traded by individuals and price differentials can thus be arbitraged away.

The presence of nominal rigidities which involve sluggish price adjustment makes the present dynamic optimizing open economy model more realistic both theoretically and empirically. Prices are sticky in that some firms cannot immediately respond to economic disturbances by changing prices within the period under consideration. Instead these firms respond to disturbances by meeting market demand at preset prices.[9]

The specific form of sluggish price adjustment considered here is that described by Calvo(1983), which assumes that firms change their prices after time intervals of random length. In other words, the specific time period between price changes is a random variable.[10] Though Calvo's model is

[9] This is profitable for firms since prices are above marginal cost.

[10] Although the underlying source of price stickiness is not explicitly modelled here, the rationalization for it could be that firms are bound by contracts which can only be renegotiated intermittently. Another rationalization for price stickiness is the presence of "menu costs" which may deter producers from changing prices in the face of small demand shocks. The Calvo model is consistent with both interpretations of price stickiness.

one of continuous time, following Rotemberg (1987), Sutherland (1996) and Kollmann (1996) a discrete time version of this model is presented. The probability that a given firm changes its price at any particular period is taken to be a constant, $(1 - \gamma)$. Accordingly the probability that a given firm will leave its price at the previous predetermined level is γ. Given the law of large numbers the proportion of firms leaving their price levels unchanged is therefore γ, and a proportion $(1 - \gamma)$ reset their prices at a new optimal level.

Prices of PTM goods are preset in the buyer' s currency, so foreign currency price of the seller' s good will not automatically change with movements in exchange rates. Foreign currency prices of non-PTM goods, set in seller' s own currency, change with movements in exchange rate.

2.2.2 Firms' Maximization Problem

The specific nature of nominal rigidities assumed above coupled with imperfect goods market integration represented by the presence of PTM, makes the profit maximizing problem of the firm more complicated. In the absence of nominal rigidities, PTM firm z would maximize:

$$\Pi_t^P(z) = \left[\frac{p_t(z)}{P_t}\right]^{-\theta}(C_t + Z_t + G_t)\left[p_t(z) - w_t\right] + \left[\frac{q_t(z)}{P_t^*}\right]^{-\theta}(C_t^* + Z_t^* + G_t^*)\left[E_t q_t(z) - w_t\right] \tag{14}$$

The first part of the above equation represents profits from domestic sales of good z, $\Pi_t^D(z)$; and the second profits from sales of the good to the foreign country, $\Pi_t^F(z)$. Total profits of firm z can thus be expressed as $\Pi_t^P(z) = \Pi_t^D(z) + \Pi_t^F(z)$.

However, the presence of nominal rigidities, in the form of Calvo price inertia introduces a dynamic dimension to the firm's optimization problem in the sense that prices chosen by the firm in one period may still be in force in further periods and thus have influences on the profits of the firm in future periods. In this case the firm must maximize the discounted value of all its current and future profits taking into account the probability of the current price being in force. This is done by weighting each future period by the probability the firm will leave its price unchanged, namely γ. In this case an individual domestic firm z maximizes:

$$V_t^P(z) = \sum_{s=t}^{\infty} \gamma^{s-t} R_{t;s} \Pi_s^D(z) + \sum_{s=t}^{\infty} \gamma^{s-t} R_{t;s} \Pi_s^F(z) \tag{15}$$

where $R_{t;s}$ is the discount factor defined as $R_{t;s} = (1/(1+r_t))(1/(1+r_{t+1}))\ldots(1/(1+r_s))$. The first order conditions of the domestic PTM firm z are

$$p_t(z)(\theta - 1) \sum_{s=t}^{\infty} \gamma^{s-t} R_{t;s} \frac{C_t + Z_t + G_t}{P_s^{-\theta}} = \theta \sum_{s=t}^{\infty} \gamma^{s-t} R_{t;s} \frac{C_t + Z_t + G_t}{P_s^{-\theta}} w_s \tag{16}$$

and

$$q_t(z)(\theta - 1) \sum_{s=t}^{\infty} \gamma^{s-t} R_{t;s} \frac{C_t^* + Z_t^* + G_t^*}{P_s^{*-\theta}} E_t = \theta \sum_{s=t}^{\infty} \gamma^{s-t} R_{t;s} \frac{C_t^* + Z_t^* + G_t^*}{P_s^{*-\theta}} w_s \tag{17}$$

The structure of pricing behaviour by firms implies that firms who do change their price in period t, will all change it to the same levels p_t and q_t in domestic and foreign currency respectively. The number of firms who last set their prices at period $t-1$, $(1-\gamma)\gamma$ again will have set it at the same levels p_{t-1} and q_{t-1}

A non-PTM firm's maximization problem is very similar to the PTM firm's. Non-PTM firms determine a single price for their good to be charged both in the domestic and foreign country. In the absence of nominal rigidities, non-PTM firm z maximizes:

$$\Pi_t^{NP}(z) = \left[\frac{p_t(z)}{P_t}\right]^{-\theta} (C_t + Z_t + G_t)\,[p_t(z) - w_t] + \left[\frac{p_t(z)}{P_t^* E_t}\right]^{-\theta} (C_t^* + Z_t^* + G_t^*)\,[p_t(z) - w_t] \tag{18}$$

The first part of (18) represents profits from domestic sales of good z, $\Pi_t^D(z)$, and the second profits from sales of the good in the foreign country, $\Pi_t^N(z)$. Total profits of non-PTM firm z is $\Pi_t^{NP}(z) = \Pi_t^D(z) + \Pi_t^N(z)$. Introducing nominal rigidities in the form of Calvo price inertia leads to the following profit equation, i. e. the non-PTM counterpart of equation (15):

$$V_t^{NP}(z) = \sum_{s=t}^{\infty} \gamma^{s-t} R_{t;s} \Pi_s^D(z) + \sum_{s=t}^{\infty} \gamma^{s-t} R_{t;s} \Pi_s^N(z) \tag{19}$$

Since non-PTM ¯rms set a single international price for their good, the ¯rst order condition of non-PTM ¯rm z leads to a price setting condition for $p_t(z)$ which is exactly the same as (16).

2.3 Government

Government in each country prints money and collects taxes to ¯nance G_t which is a composite of domestic and foreign goods de¯ned like households' consumption. Purchases are ¯nanced totally by lump sum taxes and money printing. The domestic government budget constraint is:

$$P_t G_t = P_t T_t + M_t - M_{t-1} \tag{20}$$

2.4 Equilibrium Conditions

Equilibrium in the world economy is a set of consumption, output, exchange rate, prices and wages enabling market clearing in goods, labour, money and bond markets i.e. set of variables that:

i: satisfy the optimal evolution of intertemporal consumption given by the Euler equation in each country, ii: clear the money market in both countries at each period with the level of domestic money supply determined exogenously by the government, iii: clear labour markets at each period, iv: satisfy conditions for optimal wealth allocation between domestic and foreign bonds, v: satisfy conditions for optimal price setting by domestic and foreign ¯rms at each time period for both PTM and non-PTM goods, vi: satisfy the intertemporal budget constraint for each country, with present discounted values of total consumption, government expenditure and adjustment costs in each country being equal to the present discounted values of total labour and pro¯t income.

3 Analysis of Dynamic Solution Paths

The e®ects of expansionary monetary and ¯scal policies in the form of increases in the domestic country' s money supply and government expenditure on macroeconomic variables such as consumption, output, the nominal exchange rate and current account are analysed under four different combinations of goods and financial market integration. The analysis seeks to understand how different degrees of integration in goods and financial markets affects these variables and thus the effectiveness of monetary and fiscal policy.

Since no closed-form solution to the model may be obtained, numerical simulations of the model in its calibrated and log-linearized form are presented. The dynamics of the model are analysed in terms of deterministic solution paths. The shocks considered are permanent, and asymmetric in that they are country specific, i.e. only the domestic country policy variables are changed. Expansionary monetary and fiscal policy in the form of increases in the domestic country' s money supply and government expenditures are considered. In each case the domestic country policy variable is increased by 1 per cent.

The effectiveness of monetary and fiscal policies is analysed under different degrees of capital mobility, i.e. financial market integration (FMI) and PTM, i.e. goods market integration (GMI). This will be done by changing the value of ϕ in the cost function, complete FMI is represented by $\phi = 0$ and incomplete FMI by $\phi = 5$, and by varying s, the share of PTM firms in the economy. Only two extreme cases of PTM are considered, the case of complete GMI when $s = 0$ implying full PPP, and the case of incomplete GMI when $s = 1$, implying full PTM. Thus the following four cases are considered:

Case 1: Complete GMI, Complete FMI $s = 0; \phi = 0$

Case 2: Incomplete GMI, Complete FMI $s = 1; \phi = 0$

Case 3: Complete GMI, Incomplete FMI $s = 0; \phi = 5$

Case 4: Incomplete GMI, Incomplete FMI $s = 1; \phi = 5$

The parameter values used in the simulation are taken from Hairault and Portier (1993) and Sutherland (1996) and are:

$$\beta = 1/1.05; \varepsilon = 9.0; \chi = 1.0; \mu = 1.4; \sigma = 0.75; \theta = 6.0; \gamma = 0.5$$

Dynamic adjustment paths of domestic macroeconomic variables are presented in Figures 1 and 2. In each panel of each figure there are four plots illustrating the above four cases. Case 1 of complete GMI and FMI, is represented by the plot marked with dots, Case 2 of incomplete GMI and complete FMI, by the plot of empty circles, Case 3 of complete GMI and incomplete FMI, by the plot of squares. Case 4 with incomplete GMI and FMI, by the plot of triangles.

3.1 Monetary Policy Effects

This section presents the effects of a permanent domestic monetary expansion on variables such as consumption, output, the exchange rate and current account under different degrees of goods and financial market integration. The domestic money supply is increased by 1 per cent and the foreign money supply is left unchanged. Figure 1 presents the dynamic response of domestic country variables only.

Before considering the differences between the four cases it is useful to begin by summarizing the general effects of a monetary expansion in this model. A domestic monetary expansion leads to a depreciation of the nominal exchange rate. In the short run, while prices are fixed by nominal contracts, the depreciation leads to a fall in the relative price of domestic goods and therefore a rise in demand and an expansion of domestic output. In the long run contracts are redrawn and domestic prices rise and output falls back towards its long run equilibrium level. Consumption also rises in the short run, but the incentive to smooth consumption implies that consumption rises by less than output in the short run so the domestic economy runs a current account surplus (i.e. domestic residents accumulate assets).

FIGURE 1 ABOUT HERE

Now consider the effects of goods market integration. Goods market integration affects macroeconomic variables and the effectiveness of monetary and fiscal policy mainly through the effects of exchange rate pass-through. The responsiveness of domestic goods prices to exchange rate movements is one of the main channels through which the effectiveness of monetary policy is determined. The extent to which the exchange rate depreciation induced by the monetary expansion leads to an increase in demand for domestic goods depends on the degree to which it is passed onto the relative price of domestic goods. If producers engage in PTM (i.e. goods are priced in the currency of the buyers) and prices are fixed by contracts, the expenditure switching effect of the monetary policy will be diminished in the short run.

To see this effect consider a comparison between cases 1 and 2. This comparison shows the effects of PTM under perfect capital mobility. In Case 2 all firms are PTM. PTM implies that changes in the nominal exchange rate are not reflected in changes in relative goods prices for those firms whose prices are fixed by existing contracts. This has important implications for the transmission e®ects of the expansionary monetary policy on the movements of other variables. The absence of pass-through e®ects means that the nominal exchange rate depreciation produces a smaller increase in output. This is apparent when the output responses of case 2 is compared to case 1 in panel 1.2. In case 1 output increases by more than 1 per cent whereas with PTM output increases only by 0.2 per cent.

Now consider a comparison between cases 3 and 4. This shows the e®ects of PTM against the background of low capital mobility. Looking at the output e®ect in panel 1.2 shows that the e®ectiveness of monetary policy under low capital mobility is again signi¯cantly diminished once the expenditure switching e®ect is removed In summary, therefore, goods market integration under low (moving from case 4 to case 3) or high capital mobility (moving from case 2 to case 1) enhances the e®ectiveness of monetary policy because it enhances the exchange rate pass-through e®ects of the policy shock

The e®ects of ¯nancial market integration on monetary policy e®ectiveness are more complicated. They work through the interaction of relative asset returns and the exchange rate. As explained above, an expansionary monetary policy shock raises output in the short run and thus induces saving, as seen in the current account plots. With low capital mobility, if domestic agents are trying to save there will be downward pressure on the relative yield of domestic assets. Since one component of the domestic yield is capital gains arising from changes in the exchange rate, downward pressure on domestic yields will imply that the expected depreciation of the exchange rate must be higher. Thus, with low capital mobility the expected rate of change in the exchange rate has to be more positive or less negative than with high capital mobility. This has implications for the impact e®ect of the monetary policy shock on the exchange rate. The long run e®ect of the policy shock on the exchange rate is roughly the same in all four cases. Thus, if low capital mobility implies a higher expected rate of depreciation in the short run, it is necessary for the impact e®ect on the exchange rate to be smaller. This is evident in panel 1.3 which shows that the exchange rate depreciates by 0.75 per cent in case 3 and by 1.0 per cent in case1.

The impact e®ect of monetary policy on output is determined by movements in relative prices and hence by the exchange rate. The greater depreciation in case 1 (perfect capital mobility) pushes relative prices of domestic goods down further than in case 3 (low capital mobility). Thus output increases by more when there is high capital mobility (as shown in panel 1.2).

The same basic e®ects arise when we consider increasing capital mobility against the background of PTM, i.e. a comparison of cases 2 and 4. Panel 1.3 shows that the rate of appreciation of the exchange rate is lower in case 4 than in case 2. Thus the impact e®ect on the exchange rate is greater in case 2 than in case 4. This again implies that the output e®ect is greater when there is high capital mobility. However the presence of PTM in these two cases implies that exchange rate pass-through is limited so the di®erence in the output e®ects is small.

To summarize, the e®ectiveness of monetary policy increases with the degree of capital mobility because the exchange rate responds more when capital is highly mobile. The pass-through e®ects of the exchange rate depreciation following the monetary expansion plays an important role in determining the e®ectiveness of the monetary policy. When a goods market friction (in the form of PTM) exists the e®ectiveness of monetary policy is considerably diminished. Thus both goods and ¯nancial market integration enhances the e®ectiveness of monetary policy.

3.2 Fiscal Policy E®ects

This section describes the e®ects of goods and ¯nancial market integration on the e®ectiveness of ¯scal policy. Domestic government expenditure is increased by 1 percent with no changes in foreign government expenditure. The increase in domestic spending is ¯nanced by an increase in domestic lump-sum taxes. Figure 2 presents the dynamic response of domestic macro variables to the shock.

Before considering the di®erences between the four cases, consider the general e®ects of a ¯scal expansion in this model. A positive ¯scal policy shock with tax increases cause a fall in the consumption of leisure, i.e. an increase in labour supply, and raises domestic output in the long run. This requires a fall in the relative price of domestic goods. One element of this relative price change is a depreciation of the domestic currency. Sluggish price adjustment implies that domestic goods prices fall by less in the short run so output rises by less than it does in the long run. With consumers smoothing consumption they will tend to dissave, this is seen in the current account de¯cit in panel 2.4.

FIGURE 2 ABOUT HERE

First consider the e®ects of goods market integration. As explained in the previous section, the e®ects of goods market integration work through the pass-through e®ect of the depreciation on the exchange rate. This e®ect is evident when a comparison of case 1 and 2 is made. The presence of PTM in case 2 means that the pass-through e®ect and the subsequent output response of the ¯scal expansion is reduced. This is seen in panel 2.2 when the output plots of case 1 and 2 are compared. The output response is higher in case 1 (0.72 per cent) compared to case 2 (0.68 per cent).

A comparison of the cases 3 and 4 under low capital mobility leads to similar results. In Case 4, the upward pressure put on domestic asset returns implies a large overshoot of the nominal exchange rate which creates an expected appreciation (see Panel 2.3). Domestic output expands with the government spending shock, but the removal of the expenditure switching e®ect dampens the output response.

The e®ects of ¯nancial market integration on ¯scal policy e®ectiveness again depends largely on exchange rate movements and relative asset returns. With low capital mobility, if domestic agents are trying to borrow there will be an upward pressure on domestic yields. This will imply that the expected appreciation of the domestic currency must be higher. Thus the expected rate of change in the exchange rate will be more negative than it would be under perfect capital mobility. If there is to be greater appreciation under low capital mobility, it is necessary for the short run e®ect of the ¯scal expansion on the exchange rate to be larger. This means that the domestic currency will depreciate by more in the short run. As seen in panel 2.3 the exchange rate depreciates by more in case 3 than in case 1. Coupled with sluggish price adjustment, the expenditure switching e®ects of the depreciation lead to greater output expansion in the short run. Consequently, comparing the output plots of cases 3 and 1 in panel 2.2 shows that output increases by more under imperfect capital mobility. Thus ¯nancial market integration with completely integrated goods markets causes ¯scal policy to be less e®ective.

When the e®ects of capital mobility and PTM are considered together (a comparison of cases 2 and 4), a similar situation is observed. Panel 2.3 shows that the depreciation of the exchange rate is larger in case 4 than in case 2. In fact the exchange rate signi¯cantly overshoots its long run level and the impact e®ect on the exchange rate and subsequently on output is larger when there is low capital mobility. Despite the presence of PTM the overshooting of the exchange rate increases output by a signi¯cant amount.

4 Conclusions

This paper has used a two country intertemporal general equilibrium model with imperfectly competitive goods markets and sluggish price adjustment to analyse the e®ects of goods and ¯nancial market integration on the e®ectiveness of monetary and ¯scal policy. The results have shown that the e®ectiveness of ¯scal and monetary policy change signi¯cantly depending on the presence of incompletely integrated goods and/or ¯nancial markets. While ¯nancial market integration increases the e®ectiveness of monetary policy, it diminishes the e®ectiveness of ¯scal policy. These e®ects arise through the interaction between the exchange rate and relative asset returns. Goods market integration increases the e®ectiveness of both monetary and ¯scal policy. This is due to the greater role of expenditure switching e®ects when goods markets are well integrated.

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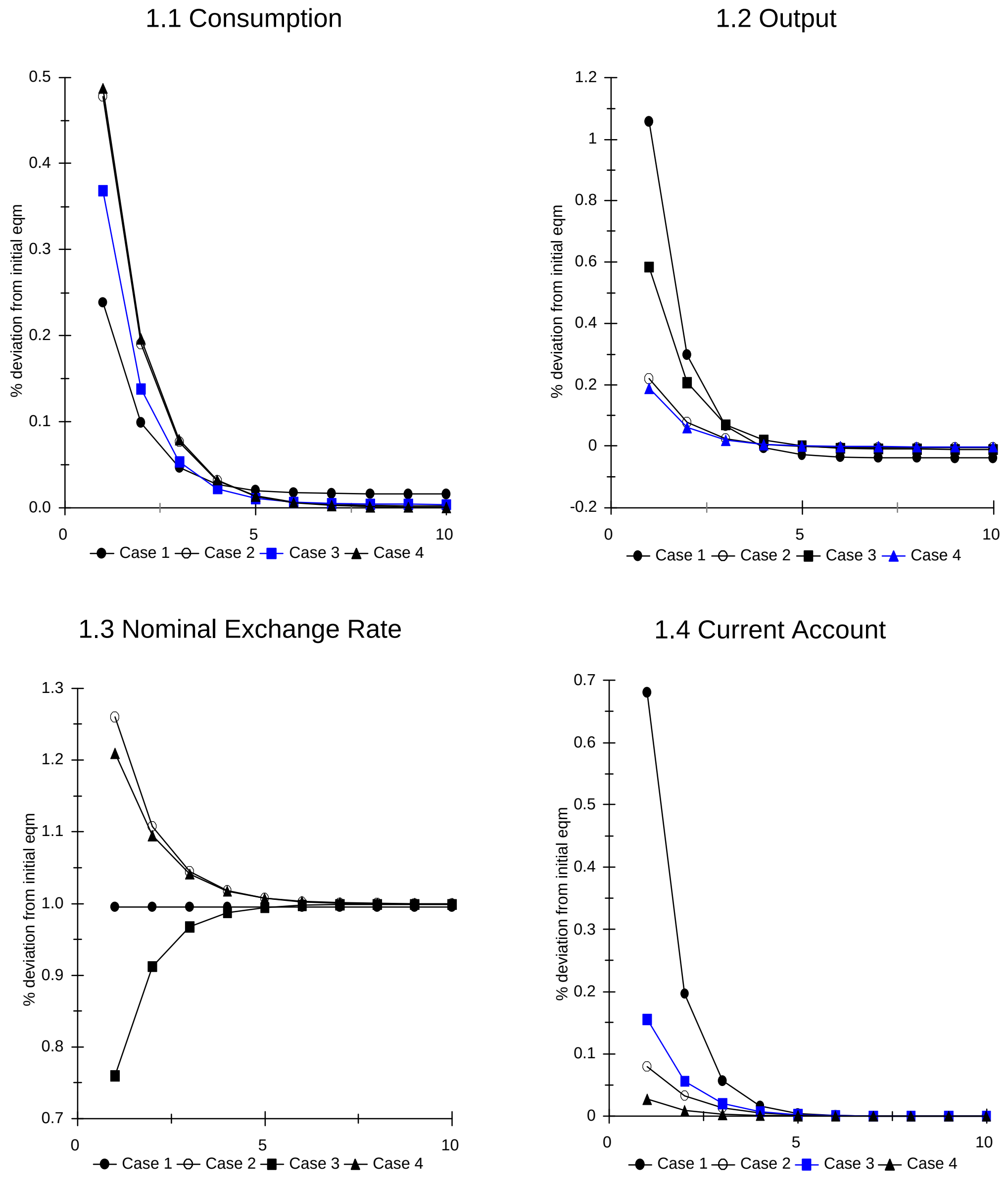
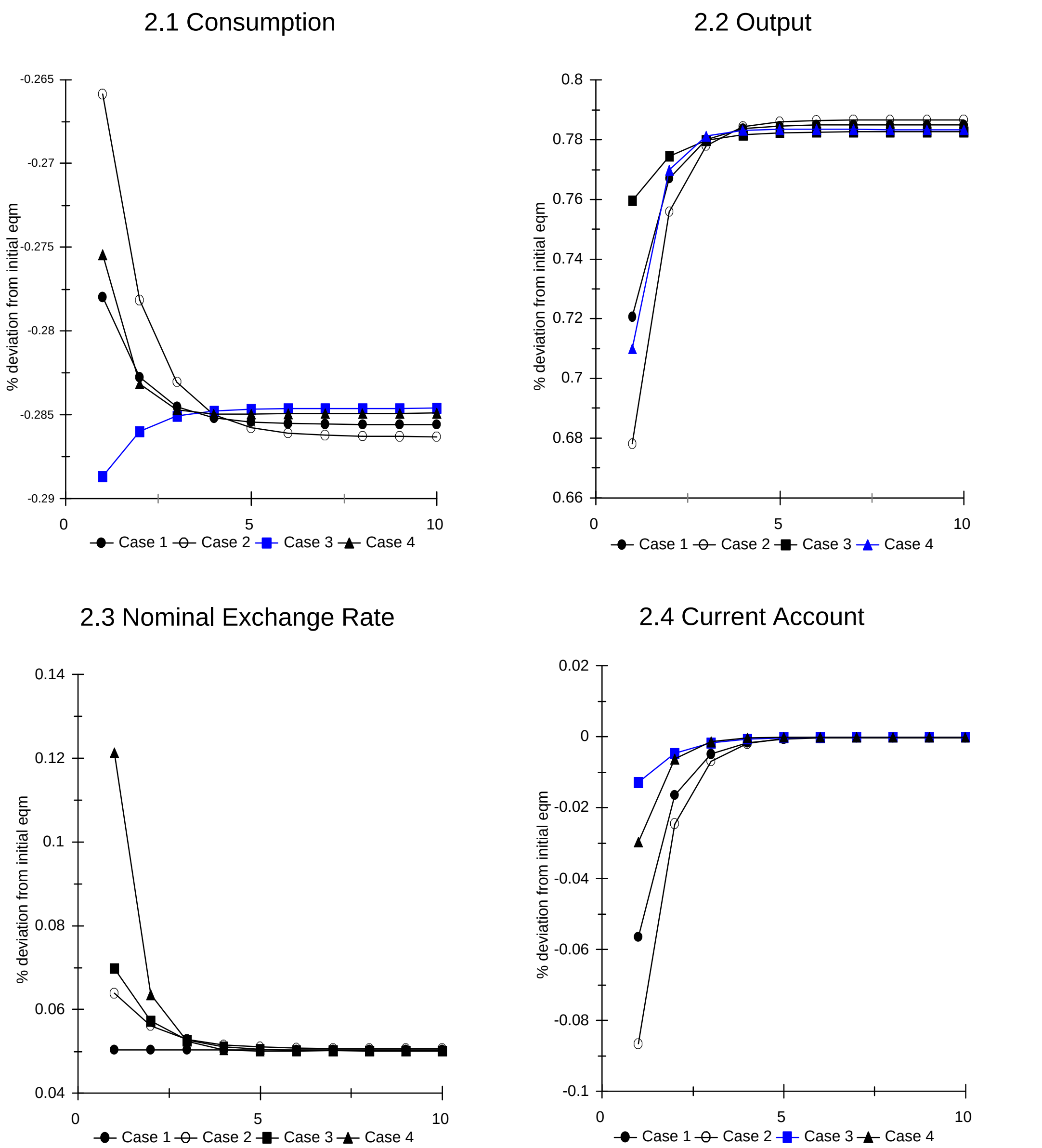
Figure 1 Monetary Policy Shock



Case 1: Complete GMI, Complete FMI, Case 3: Complete GMI, Incomplete FMI
Case 2: Incomplete GMI, Complete FMI, Case 4: Incomplete GMI, Incomplete FMI

Figure 2 Fiscal Policy Shock



Case 1: Complete GMI, Complete FMI, Case 3: Complete GMI, Incomplete FMI
Case 2: Incomplete GMI, Complete FMI, Case 4: Incomplete GMI, Incomplete FMI