Openness and optimal monetary policy ☆

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ABSTRACT

We show that the composition of international trade has important implications for the optimal volatility of the exchange rate, above and beyond the size of trade flows. Using an analytically tractable small open economy model, we characterize the impact of the trade composition on the policy trade-off and on the role played by the exchange rate in correcting for price misalignments. Contrary to models where openness can be summarized by the degree of home bias, we find that openness can be a poor proxy of the welfare impact of alternative monetary policies. Using input–output data for 25 countries we document substantial differences in the import and non-tradable content of final demand components, and in the role played by imported inputs in domestic production. The estimates are used in a richer small-open-economy DSGE model to quantify the loss from an exchange rate peg relative to the Ramsey policy conditional on the composition of imports. We find that the main determinant of the losses is the share of non-traded goods in final demand.

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1. Introduction

The nominal exchange rate is probably the defining variable in open-economy monetary economics. In an economy where trade barriers result in little international exchange of assets and goods, the monetary policymaker can neglect the effects on the nominal exchange rate of its policy at a limited cost in terms of welfare. On the contrary, in a very open economy, exchange rate adjustments are likely to be a key ingredient in the design of the optimal monetary policy response to shocks.

In this paper we argue that the composition of international trade flows can affect the policy trade-off faced by the policymaker and the optimal response of the exchange rate to shocks, above and beyond the degree of openness, measured by the size of the international trade flows.[1] Our modeling approach allows economies with identical degree of openness to differ in the degree of home bias in the demand for tradable goods, in the share of non-tradables in consumption and investment demand, and in the share of imported intermediates in domestic production.[2] We find that there is no systematic relationship between openness and optimal exchange rate volatility, and discuss how the composition of trade flows impacts the policy trade-off, and the role played by the exchange rate in correcting for price misalignments.

The analysis proceeds as follows. First, we document from input–output table data that differences in the composition of international trade flows across both industrial and emerging economies are substantial, and provide estimates of the tradable and non-tradable input shares in consumption and investment for 25 countries.

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[1] The openness of an economy to trade in goods and services is determined by the trade policy and the existence of trade barriers, regardless of the actual amount of trade flows occurring in equilibrium. Our measure of openness correlates optimal policy choices with *observable* trade flows. In our model, openness is determined by preference and technology parameters, which are taken as primitives by the policymaker, and determine steady state trade flows.

[2] A similar emphasis on non-traded goods is also in Corsetti et al. (2008), Dotsey and Duarte (2008) and Duarte and Obstfeld (2008). Devereux and Engel (2007) consider imported intermediate goods in production. Engel and Wang (in press) discuss the importance of durable consumption in explaining the high volatility of imports and exports.

Second, we build a simple, analytically tractable, multi-good model of a small open economy (SOE) with one-period preset prices to illustrate through which channels the composition of imports can affect the policy trade-off and the transmission of shocks under alternative policy regimes.

In our model both imported and exported goods are priced in foreign markets, similarly to Mendoza (1995). This setup implies that the terms of trade are independent of policy. Because of our specification for households' preferences across tradable and non-tradable goods, this exogeneity is not important for our analytical results on optimal policy, while it allows us to easily characterize the consequences of exchange rate misalignments in an economy with multiple imported goods. Additionally, our assumption about pricing is appropriate to describe emerging market economies, which typically specialize in the export of few primary commodities, and are normally small players in the world markets. For these countries, terms of trade variations can be considered exogenous.

Finally, we discuss how our results carry over to a more complete model of the economy, including sector-specific capital, imported investment goods, and incomplete financial markets. In this setup, we assess quantitatively the welfare implications of the composition of international trade flows using parameter values estimated from input–output tables.

Our analytical results show that the rate at which the optimal policy trades off inefficiency gaps across sectors depends on the relative weight of each good in the household preferences, but is not directly related to openness, which depends also on the share of imported intermediate inputs in production. Even in the limiting case where the composition of imports does not affect the trade-off, it still affects the welfare cost of a peg through two channels. First, the share of imported intermediates in production affects the optimal volatility of exchange rate movements, for given trade-off. Second, the weight of the inefficiently-priced good in the CPI affects the size of the welfare loss under a peg, for the given optimal volatility of the exchange rate.

In our model, a peg is costly because it forces the adjustment in the tradable/non-tradable relative price on the sticky nominal price. This mechanism works through the spill-over of input prices across sectors: since labor is mobile across sectors, any change affecting the conditions for efficient production in one sector will spill over to the other sector through changes in nominal wages, resulting in a price misalignment under a peg. This propagation mechanism explains the role of the intermediate import share: a larger share requires a larger optimal movement in the exchange rate to prevent changes in nominal wages across all sectors and inefficient mark-up fluctuations. The intermediate import share is only relevant if production is asymmetric across sectors. If tradable and non-tradable goods are produced with the same technology, the optimal policy calls for exchange rate stability in response to shocks to imported intermediate prices.

The numerical results confirm that our findings extend to a richer sticky price SOE model. Openness and optimal exchange rate volatility turn out to be close to orthogonal variables. This result holds also if financial markets are incomplete and regardless of the importance of distortions in the pricing of imports or of frictions preventing costless labor mobility across sectors. An exchange rate peg leads to large welfare losses in an economy where the share of imported intermediates in the domestic production input mix is high, and at the same time the bias towards non-tradable goods is high. In an equally open economy importing mainly consumption or investment goods a peg leads only to a modest welfare loss. When estimating the model's preference and technology parameters using OECD input–output table data for 25 countries, we find that the welfare loss is highly correlated with the share of non-tradable goods in final demand.[3]

Our paper is related to several recent contributions. Friedman (1953) and Mundell (1961) pointed out long ago that, in economies displaying nominal rigidities, nominal exchange rate adjustments are a key ingredient in the efficient response to shocks. A more recent literature recognizes that the optimal volatility of the exchange rate crucially depends on the degree of openness of the economy, which in the simplest models, where all goods are tradable, is inversely related to the degree of home bias in preferences.[4] Our analysis shows that results from stylized models where home bias and openness are directly related cannot be generalized once the cross-country variation in the composition of imports is taken into account.

Faia and Monacelli (2008) provide a detailed analysis of the impact of home bias on optimal policy in a small open economy model with only tradable goods. They conclude that optimal exchange rate volatility is monotonically decreasing in the degree of openness. Corsetti (2006) shows in a two-country model that exchange rate volatility is optimal whenever there is home bias, even if import prices are preset in local currency, following a local currency pricing framework also used by Devereux and Engel (2003). In the presence of home bias, exchange rate fluctuations allow the policymaker to optimally respond to asymmetric shocks. The relationship between openness – proportional to the degree of home bias – and optimal exchange rate volatility is non-monotonic, although volatility increases for positive degrees of home bias. The existence of several additional goods and the spill-over across sectors of sectoral shocks implies that neither of these results holds in our model.

Duarte and Obstfeld (2008) present a two-country model where the existence of non-traded goods, rather than home bias, generates asymmetry in the way domestic and foreign consumption react to shocks, and result in exchange rate volatility under the optimal policy even in the absence of exchange rate pass-through. As in their work, the existence of non-traded goods in our model implies that the risk-sharing condition depends on the relative price of traded and non-traded goods, generating an incentive for the optimal policymaker to manipulate allocations through the exchange rate. Dotsey and Duarte (2008) examine the role of non-tradables for business cycle correlations in a model similar to ours. They assume a complete input–output structure in the economy, so that final non-tradable goods are an input in domestic production. We have only a partial input–output structure in the model, but parameterize the final demand aggregators using estimates of input shares, rather than final demand shares, so as to account for the shares of final good production being used as intermediates by other sectors. In this way, our model is more easily comparable with most of the recent open economy macroeconomic literature.

The paper is structured as follows. Section 2 provides empirical results on the role of imported consumption and intermediate goods, and estimates of the tradable and non-tradable goods' shares in final demand for 25 countries. Section 3 develops a one-period preset-price model and derives analytical results concerning the relationship between the composition of international trade flows and optimal monetary policy. Section 4 describes the model used to obtain our numerical results on welfare outcomes. Section 5 concludes.

2. Trade flows composition and tradable goods demand across countries

We document a number of empirical results on the composition of final demand, on the magnitude of imported consumption and investment relative to the size of the domestic economy, and on the role

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[3] In this exercise, our welfare metric is the cost of fixing the exchange rate, relative to the optimal policy. This is a welfare measure that is relevant from the point of view of the policymaker. IMF (2012) reports that 84 countries have either a fixed exchange rate target or rely on a currency board.

[4] Corsetti et al. (2012) highlight the welfare costs and trade-offs brought about by a (real) exchange rate misalignment in open-economy models with nominal rigidities. Corsetti (2006), Sutherland (2005) and Faia and Monacelli (2008) study explicitly the relationship between openness and optimal policy. These authors don't consider richer compositions of international trade and of domestic demand. While focusing on different aspects of optimal policy, also Corsetti et al. (2008), De Paoli (2009a) and Engel (2011) acknowledge the importance of home bias in their results.