Does trade integration alter monetary policy transmission?

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A R T I C L E   I N F O

A B S T R A C T

This paper explores the role of trade integration—or openness—for monetary policy transmission in a medium-scale new Keynesian model. Allowing for strategic complementarities in price setting, we highlight a new dimension of the exchange rate channel by which monetary policy directly impacts domestic inflation: a monetary contraction which appreciates the exchange rate lowers the local currency price of imported goods; this, in turn, induces domestic producers to lower their prices too. We pin down key parameters of the model by matching impulse responses obtained from a vector autoregression on time series for the US relative to the euro area. Our estimation procedure yields plausible parameter values and suggests a strong role for strategic complementarities. Counterfactual simulations show that openness alters monetary transmission significantly. While the contractionary effect of a monetary policy shock on inflation and output tends to increase in openness, we find that monetary policy's control over inflation increases, as the output decline which is necessary to bring about a given reduction of inflation is smaller in more open economies.

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1. Introduction

Recent research on the monetary transmission mechanism has focused on the quantitative performance of dynamic stochastic general equilibrium (DSGE) models. Specifically, interest has centered on their ability to account for the dynamic effects of monetary policy shocks as apparent from estimated vector autoregression (VAR) models. In a seminal study, Christiano et al. (2005) show that a medium scale new Keynesian model mimics quite closely the VAR-responses to a monetary policy shock of as many as nine variables. This result is obtained while abstracting from external trade altogether. Taken at face value, it suggests that trade integration, or openness, plays no important role for monetary policy transmission—at least as far as a large open economy such as the US is concerned.[1]

There is, however, a secular trend in trade integration, suggesting that economies are becoming considerably more open over time. In the US, imports, as a fraction of GDP, have risen from about 6 percent in 1973 to about 15 percent to date. In fact, as this trend has been accelerating over the last decade, some observers have identified increasing trade integration as an important manifestation of globalization.[2] In this paper, we investigate more systematically the role of trade integration for

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[1] Other studies which employ this approach find similarly satisfactory results for variants of the new Keynesian model. Rotemberg and Woodford (1997), Amato and Laubach (2003), Bovin and Giannoni (2006) and Meier and Müller (2006) are examples. These studies also assume counterfactually closed economy models. Other studies have explored the empirical performance of open economy DSGE models; yet these studies have typically not been particularly concerned with monetary transmission, see, e.g., Lubik and Schorfheide (2006) and Adolfson et al. (2007).

[2] The consequences of globalization for monetary policy are widely discussed both in academia and among policy makers. Most commentators, taking a fairly general perspective, have argued that globalization does not fundamentally affect the central bank's ability to control the economy, see, e.g., Mishkin (2007) and Bernanke (2007). Changes brought about by globalization may nevertheless require, as Yellen (2006) puts it, 'some recalibration of policy responses'.

monetary policy transmission, where we measure trade integration by the import-to-GDP ratio. Specifically, we assess how increasing openness alters quantitatively the effects of monetary policy shocks on inflation and economic activity.

Taking an analytical perspective, earlier work by Clarida et al. (2001) and Galí and Monacelli (2005) has stressed the similarity between open and closed economy versions of the new Keynesian baseline model. In fact, apart from being a source of additional shocks, 'openness' merely alters some of the reduced-form coefficients of the canonical representation of the model which is, in fact, shown to be isomorphic in closed and open economies. These results are important for optimal monetary policy design in open economy models. In the special case where the intertemporal elasticity of substitution equals the trade price elasticity, targeting domestic inflation, rather than CPI inflation or the exchange rate is the optimal policy. De Paoli (2009) shows how this result changes in the more general case where elasticities differ. Taking a positive perspective, Erceg et al. (2010) analyze how differences in the transmission mechanism across closed and open economies hinge on the relative size of these elasticities. These authors argue that—for plausible calibrations—increasing openness is unlikely to alter the transmission of monetary policy shocks in a quantitatively important way.

However, taking up the question within the new Keynesian baseline model twists the analysis towards finding little 'openness effects'. A key assumption underlying the derivation of the new Keynesian Phillips curve and, hence, its isomorphism in closed and open economies, is that the demand functions faced by intermediate goods firms are characterized by a constant elasticity of substitution. This, in turn, implies that the desired markup is independent of the price of competitors, i.e. there are no strategic complementarities in price setting. Such complementarities arise under a more general formulation of the demand functions, or, rather, the underlying aggregation technology. In this case, the isomorphism of the new Keynesian Phillips curve in closed and open economies breaks down. Intuitively, strategic complementarities arise not only with respect to domestic, but also with respect to foreign competitors. Hence, the domestic currency price charged by foreign competitors enters the decision problem of domestic firms and eventually the new Keynesian Phillips curve. Recently, Guerrieri et al. (2010) have highlighted the importance of this mechanism in accounting for inflation dynamics.[3] More generally, Chen et al. (2009) provide evidence suggesting that increased exposure to foreign trade has a competitive effect which is reflected in firms' price-setting decisions.

In this paper, we take price-setting complementarities into account when exploring the role of openness for monetary transmission. As a result, a new dimension of the exchange rate channel emerges. Traditionally, monetary policy is thought to directly impact CPI inflation and to indirectly impact domestic inflation via exchange rate changes, where the latter effect comes about through changes in demand induced by 'expenditure switching'. In contrast, with strategic price-setting complementarities, changes in the exchange rate, which alter the domestic currency price charged by foreign competitors, directly influence domestic inflation. The quantitative importance of this effect increases with the openness of an economy.

Our analysis is based on a medium-scale two-country DSGE model. It features an aggregation technology which allows to combine domestically produced and imported goods and gives rise to strategic complementarities in price setting; in addition, the aggregation technology determines trade integration by giving unequal weight to domestically produced and imported intermediate goods. The model also features a number of frictions which the literature has found to increase the empirical success of this class of models. Overall, the model structure is rich enough to provide a quantitatively realistic account of the monetary transmission mechanism.

As a benchmark, we compute impulse responses to a monetary policy shock within a VAR model estimated on quarterly time-series data for the US relative to the euro area (EA) for the period 1973–2006. In addition to standard 'closed economy' variables, the VAR model also includes CPI inflation as well as US net exports vis-à-vis the EA. We treat the impulse responses as a characterization of the actual monetary transmission mechanism and estimate the structural parameters of the DSGE model by matching the impulse response functions of relative variables, i.e. the response of a domestic variable relative to its foreign counterpart. The domestic and the foreign economy in our two-country model are meant to represent the US and the EA, respectively. As trade with the EA accounts only for a small fraction of US trade, we assume, while estimating the model on US-EA data, that imports and exports account on average for 2 percent of GDP, respectively.

We limit ourselves to these data, because economic structures and trade relationships with the US have been less stable in most other regions of the world economy during our sample period. Instead, we rely on counterfactual simulations relative to the baseline scenario and analyze how a higher degree of openness alters the effects of a monetary policy shock. Put differently, we use our structural model to make up for the lack of long and stable time series. In a first step, we assume that imports account for 15 percent of GDP, a value close to the actual value for the US during the last few years. In a second step, we consider an average import share of 30 percent in order to assess the likely consequences of a further increase in openness.

Relative to the baseline economy we find considerable differences in the dynamic adjustment of the economy to a contractionary monetary policy shock. In more open economies domestic absorption tends to fall less, but overall activity tends to decline more strongly, reflecting a stronger reduction in real net exports. We also find the dynamics of inflation altered by openness. While CPI inflation generally falls in response to the shock, because the appreciation of the exchange rate is gradually passed through into consumer prices, this effect grows stronger, as the economy becomes more open. Openness similarly affects the response of domestic inflation. For this result, strategic complementarities in price setting—which our estimates suggest to be sizeable—are crucial. Lastly, we find that monetary policy's control over inflation (both of domestic

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