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**Comment** Malin Adolfson**Introduction**

Opening up an economy to trade does not only subject it to international linkages in the form of spillovers of foreign disturbances, but also the propagation of purely domestically originated shocks may change because of, for example, expenditure switching effects. Christopher Erceg, Christopher Gust, and David López-Salido provide an excellent examination of the extent to which trade openness affects the diffusion of three domestic shocks (i.e., inflation target, government spending, and total factor productivity shocks), using a modern two-country dynamic stochastic general equilibrium model (DSGE) SIGMA. The authors also present a very clear understanding of the mechanisms at work by building intuition from a much more stylized model (à la Galí and Monacelli 2005). The chapter thus provides an important contribution to policymakers who need to know how macroeconomic fluctuations are affected and shaped by the increase in world trade.

Erceg, Gust, and López-Salido find that, under their preferred parameterization and model choice, a larger trade share has relatively small quantitative effects on the transmission of domestic shocks. Impulse responses of aggregate output and domestic prices are mainly unaffected by the degree of openness. In this comment, I will focus my discussion on two aspects that influence the chapter's findings. First, the authors' choice of parameterization, and in particular, the elasticity of substitution between domestic and imported goods, which critically governs the extent to which real quantities respond to disturbances and thereby also how these responses are affected by changes in trade openness. Second, I will discuss the role of monetary policy and how the monetary policy transmission mechanism changes with trade openness, which also influences how shocks are propagated into the economy.

**Parameterization and Empirical Validation**

The elasticity of substitution between domestic and imported goods is a crucial parameter for any open economy DSGE model since it affects how demand responds to relative prices between foreign and domestically produced goods. A low or a high elasticity has very different implications for the model economy, influencing, for example, the volatilities in international prices and quantities (see also the discussion in Corsetti, Dedola, and Leduc 2008).

Erceg, Gust, and López-Salido find in their stylized model that the elasticity of substitution between domestic and imported goods (together with

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the Frisch elasticity of labor supply and the intertemporal elasticity of substitution in consumption) critically determines whether openness has large or small effects on output and inflation. This is because the elasticity of substitution between goods influences the slope of the labor supply curve in the same way as openness does; that is, flattening the curve the closer substitutes the goods are or the larger the trade share is. Consequently, with a low elasticity of substitution, consumers prefer not to change their domestic and imported quantities very much in order to smooth aggregate consumption. Because the consumption pattern is more or less fixed, this implies that the consumers do not take advantage of the enhanced possibilities to share risk internationally when the trade share increases. This, in turn, leads to very small effects on domestic responses. In addition, one should bear in mind that the SIGMA model also contains adjustment costs on changing the trade flows, which further limit the consumers' incentives to switch between internationally and domestically produced goods. In this sense it is not surprising that SIGMA responds more like a closed economy to the shocks, irrespective of the degree of trade openness, since there is no strong mechanism for the relative price differentials to propagate into the real economy.

However, as is well known, the elasticity of substitution between domestic and imported goods is notoriously difficult to estimate and the uncertainty in the literature is very large. Micro and macroeconomists reach very different conclusions, where estimates obtained from disaggregate time series and trade data usually are a lot larger than those resulting from macroeconomic data. For example, Harrigan (1993) finds values in the range of 5 to 12 using 3-digit Standard International Trade Classification (SITC) data for thirteen Organization for Economic Cooperation and Development (OECD) countries, Bernard et al. (2003) estimate the elasticity to about 4 using U.S. trade data, whereas Hooper, Johnson, and Marquez (2000) report price elasticities in the range of 0.3 to 1.5 for aggregate U.S. imports and exports.

The recent empirical DSGE literature has also produced very diverse estimates of the elasticity of substitution. Adolfson et al. (2007) show, using euro area data, that including imports among the observed variables in the estimation leads to a relatively high estimate of the elasticity of substitution (5, compared to about 0.5 when imports are excluded). Because imports are a lot more volatile than aggregate consumption, the model needs a high estimate of the elasticity of substitution to account for the fluctuations in both imports and consumption. Lubik and Schorfheide (2005), on the other hand, do not match their DSGE model against any traded quantities and report an estimate of around 0.4, whereas De Walque, Smets, and Wouters (2005) do include the real trade balance in their estimation and find estimates between 1.2 and 1.7 for the U.S. economy.

To get an idea about the robustness of Erceg, Gust, and López-Salido's results, figure 2C.1 shows the impulse response functions of some key macroeconomic variables to a one standard deviation (transitory) technology

shock, using two different elasticities of substitution between domestic and imported goods (i.e., 5 and 1.5) in the model by Adolfson et al. (2008b). In contrast to SIGMA, this model does not contain trade adjustment costs so the difference between the open and closed economy responses are somewhat larger, also with a low elasticity of substitution.<sup>1</sup>

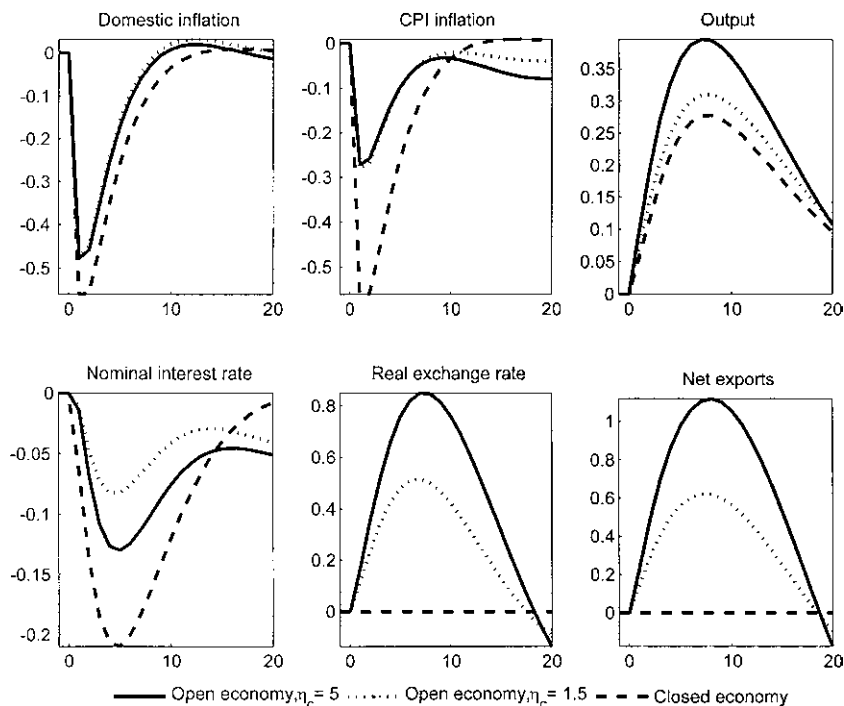
Which estimate should one then rely on when using a macromodel? Is an open economy with “fixed” consumption bundles more reliable than a closed economy specification, and do we believe that the consumers have an ability to substitute between goods? This is still very much an open question.

To determine whether the domestic effects of increased trade openness are quantitatively large or small is, in my view, ultimately an empirical question. Not only do we need to know how the transmission of domestic shocks changes with increased trade shares (which is studied here), but also which types of shocks matter most in the different setups. Even if increased trade openness changes the propagation of certain domestic disturbances, these disturbances may not contribute much to explaining the macroeconomic fluctuations in the open economy (see Adolfson et al. 2008a). An empirical variance decomposition could answer whether different shocks are important for the economic development in the open and closed economies. This could also simplify the parameterization. We know that matching the observed data can require different parameters than expected a priori. This means that conclusions based on a particular parameterization of the model may be overruled when taking the model to the data. As an illustration to this, figure 2C.2 shows the impulse response functions to a transitory technology shock under the prior and posterior modes using the model in Adolfson et al. (2008b). The figure shows that the a priori belief about the parameters has been updated by the data in the estimation, so that the responses obtained under the posterior are quite different from the ones generated by the prior.

### **The Role of Monetary Policy**

Erceg, Gust, and López-Salido furthermore show that the interest rate sensitivity of aggregate demand increases with trade openness, because net exports are directly affected by the interest rate via the uncovered interest rate parity (UIP) condition and its implied expenditure switching effects. This suggests that the behavior of monetary policy is vital for the impulse responses obtained under different trade shares. By comparing variance trade-offs in the (domestic) inflation-output space and studying implied real interest rate volatilities, the authors conclude that the relatively small differences in responses between the closed and open economy specifications

1. The steady-state import share in the open economy is about 20 percent in the model by Adolfson et al., although it should be remembered that the value of the elasticity of substitution between the goods affects this share.

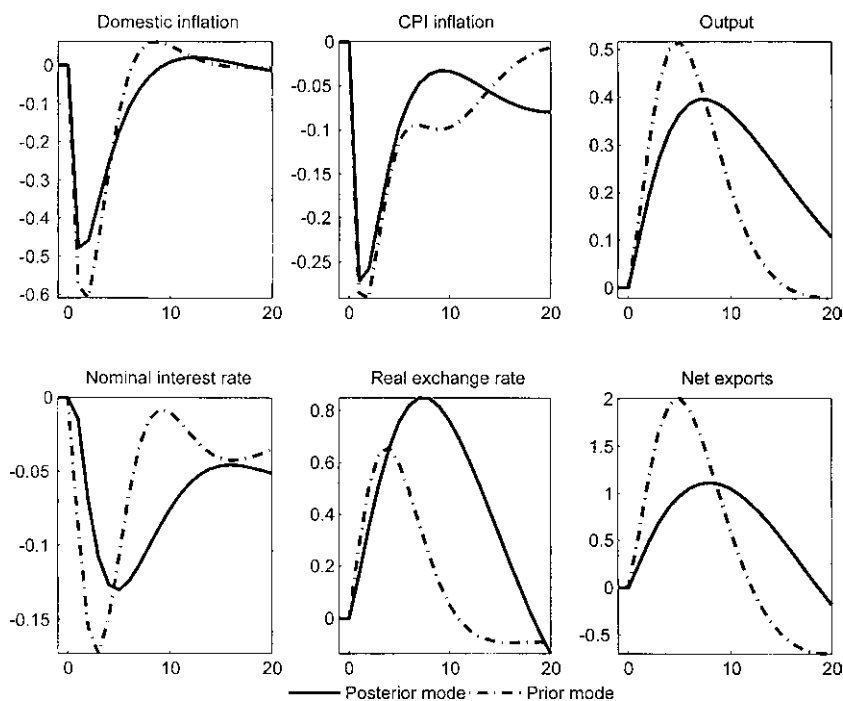


**Fig. 2C.1 Impulse response functions to a transitory technology shock**

*Note:* Percentage deviations from steady state

are mainly due to the aggregate demand block, since the inflation-output variance frontiers do not differ much whereas the implied interest rate volatility is a lot lower in the open economy.

I want to raise two comments in relation to this. First, conditioning the analysis upon an ad hoc quadratic loss function in only domestic inflation and the output gap implies that very large swings in the interest rate are permitted. In practice, however, interest rate smoothing appears to be an integral part of everyday central banking. Including an interest rate argument in the loss function would penalize the closed economy central bank more than that in the open economy, just because the exchange rate channel of monetary policy has less impact the lower the trade share is. This has consequences also for the variance trade-offs between inflation and output, since the closed economy policy becomes less efficient in stabilizing inflation and output in such a case, and the discrepancies between the closed and open economies would increase. To see how the exchange rate channel of transmitting monetary policy changes with openness, figure 2C.3 displays the impulse response functions to a monetary policy shock in the closed and

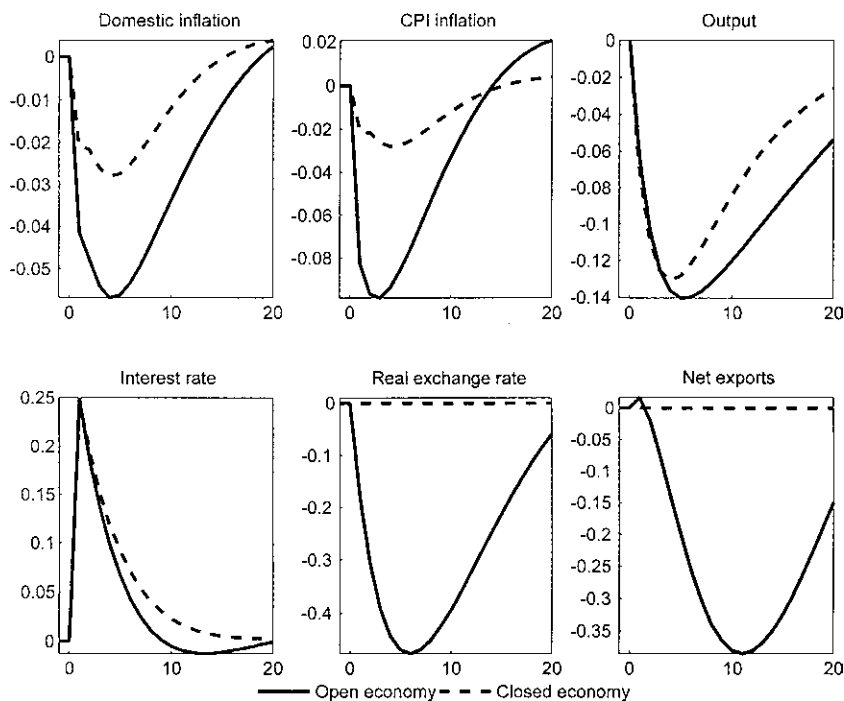


**Fig. 2C.2** Impulse response functions to a transitory technology shock, prior and posterior mode

*Note:* Percentage deviations from steady state

open setup of the model in Adolfson et al. (2008b). The figure shows that the inflation rates respond much more to an interest rate increase of twenty-five basis points in the open economy than in the closed economy, which can be exploited by the central bank without an interest rate smoothing term in the loss function.

Second, the authors use *GDP deflator inflation* as the relevant inflation objective in their loss function, irrespective of the degree of openness. It should be remembered that the variance trade-off between *CPI inflation* and output is very different in the closed and open economies. In a similar framework to the stylized model here, Clarida, Galí, and Gertler (2001) show that the open economy monetary policy problem under the stated loss function is isomorphic to the closed economy policy problem, assuming that the law of one price holds. However, when there is incomplete exchange rate pass-through, as is the case in the SIGMA model, it can be welfare enhancing for the central bank to stabilize consumer price index (CPI) inflation rather than domestic inflation (Corsetti and Pesenti 2005). Because the households' consumption basket is specified in terms of both domestically produced goods and imported goods and there are distortions in the form of price stickiness



**Fig. 2C.3** Impulse response functions to a monetary policy shock, closed and open economy

Note: Percentage deviations from steady state

in both sectors, the central bank should stabilize CPI inflation in this case. If this is accounted for here, there will be larger differences between the variance trade-offs in the closed and open economies and the intuition from the stylized model may not carry over to the more complex SIGMA model.

### Final Remarks

To conclude, Erceg, Gust, and López-Salido have nicely argued that trade openness can have relatively modest effects on how domestic shocks affect the economy. Still, there is uncertainty about some of the key aspects that influence how international linkages operate, which is why I think more empirical work on these issues is desirable.

### References

Adolfson, M., S. Laséen, J. Lindé, and M. Villani. 2007. Bayesian estimation of an open economy DSGE model with incomplete pass-through. *Journal of International Economics* 72 (2): 481–511.

- . 2008a. Empirical properties of closed and open economy DSGE models of the euro area. *Macroeconomic Dynamics* 12 (S1): 2–19.
- . 2008b. Evaluating an estimated new Keynesian small open economy model. *Journal of Economic Dynamics and Control* 32 (8): 2690–2721.
- Bernard, A., J. Eaton, B. Jensen, and S. Kortum. 2003. Plants and productivity in international trade. *American Economic Review* 93 (4): 1268–90.
- Clarida, R., J. Galí, and M. Gertler. 2001. Optimal monetary policy in open versus closed economies: An integrated approach. *American Economic Review* 91 (2): 248–52.
- Corsetti, G., L. Dedola, and S. Leduc. 2008. International risk sharing and the transmission of productivity shocks. *Review of Economic Studies* 75 (2): 443–73.
- Corsetti, G., and P. Pesenti. 2005. International dimensions of monetary policy. *Journal of Monetary Economics* 52: 281–305.
- De Walque, G., F. Smets, and R. Wouters. 2005. An estimated two-country DSGE model for the euro area and the U.S. economy. National Bank of Belgium. Unpublished Manuscript.
- Galí, J., and T. Monacelli. 2005. Monetary policy and exchange rate volatility in a small open economy. *Review of Economic Studies* 72 (3): 707–34.
- Harrigan, J. 1993. OECD imports and trade barriers in 1983. *Journal of International Economics* 35 (1–2): 91–111.
- Hooper, P., K. Johnson, and J. Marquez. 2000. *Trade elasticities for the G-7 countries*, *Princeton Studies in International Economics*. Princeton, NJ: Princeton University Press.
- Lubik, T., and F. Schorfheide. 2005. A Bayesian look at new open economy macroeconomics. In *NBER Macroeconomics Annual*, ed. M. Gertler, and K. Rogoff, 313–66. Cambridge, MA: MIT Press.