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The Macroeconomic Costs and Benefits of Adopting the Euro

PHILIPPE KARAM, DOUGLAS LAXTON, DAVID ROSE and NATALIA TAMIRISA*

This paper uses a two-country version of the global economy model to investigate some costs and benefits of a small, emerging economy's abandoning a flexible exchange rate regime in favor of adopting the currency of its main trading partner. The topic is particularly relevant for countries in central and eastern Europe, which recently joined the European Union and are now preparing to adopt the euro. We begin by evaluating macroeconomic performance in an inflation-targeting regime under various monetary policy rules. The results are then compared with the case where the small economy gives up its flexible exchange rate and joins the monetary union, under a number of alternative assumptions about the magnitude of shocks and structural rigidities. The analysis shows that although the monetary union has the benefit of eliminating exchange rate shocks, the loss of the buffering role of the exchange rate leads to greater volatility in domestic output and inflation. These costs are likely to decline over time, as markets become more competitive, flexible, and integrated in the monetary union. [JEL C51, E31, E52]
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*Philippe Karam is a senior economist with the IMF Institute; Douglas Laxton is assistant to the director of the IMF Research Department; David Rose is an IMF consultant; and Natalia Tamirisa is the deputy chief of the IMF Research Department's World Economic Studies Division. The authors thank Gian Maria Milesi-Ferretti for providing comments on an earlier version of this paper. We gratefully acknowledge the invaluable support of Michel Juillard, Heesun Kiem, and Susanna Mursula in developing the procedures used in the model simulations. Finally, we thank Yasmina Zinbi for her help in formatting the paper.

This paper uses a two-country version of the Global Economy Model (GEM) to examine the costs and benefits of a small emerging market economy's abandoning an inflation-targeting and adopting the currency of its main trading partner, a large advanced economy. This topic is particularly relevant for transition economies in central and eastern Europe, such as the Czech Republic, Hungary, Poland, and the Slovak Republic, which recently joined the European Union (EU) and are now preparing to adopt the euro.

The literature has concentrated on the long-run welfare benefits associated with membership in a monetary union. Rose (2000, 2002) and Frankel and Rose (2002) showed that common currency boosts trade—the finding that has spawned extensive investigations about the likely magnitude of trade creation, for example, by Bayoumi and others (2004a) and Faruqee (2004).[1] Besides the gains from trade, savings from lower transaction costs and dynamic gains from larger foreign direct investment are likely to raise potential growth and improve the long-run welfare of a small open economy in a monetary union.

However, these long-run benefits are not the focus of this paper. Instead, we highlight an issue that has received less attention in the euro adoption literature—the benefits and costs relating to macroeconomic volatility under alternative exchange rate regimes.

A stylized feature of emerging market economies is higher volatility in exchange rates than that in advanced economies (Clark, Laxton, and Rose, 2001). An emerging market economy can gain from the elimination of the exchange rate shocks vis-à-vis the common currency of the monetary union. However, this benefit needs to be weighed against the cost of losing the exchange rate as a mechanism for absorbing shocks. The magnitude of exchange rate shocks is thus an important factor determining whether joining the monetary union would be beneficial or not for a small open economy. But it is not the only factor. The ability of the economy to adjust to shocks through other mechanisms, depending on the flexibility of its product, labor, and financial markets, is also relevant. The degree of similarity in the economic structures of the small open economy and its trading partners also matters, as it determines the degree of synchronization in their economic activity and similarity in the transmission of shocks—considerations, the importance of which has been highlighted in the long-standing optimal currency area literature.

GEM is well suited for the analysis of euro adoption issues. The model has strong theoretical microfoundations, which make it more immune than empirical models to the Lucas critique that agents' behavior may change under an alternative policy regime. GEM provides a multicountry general

[1]See Micco, Stein, and Ordoñez (2003). For a recent survey of the literature on how the euro has boosted trade, see Baldwin (2006). According to Baldwin, detailed theoretical hypothesis as to how the euro affects trade needs to be emphasized and less so the "how much" did the euro boost trade.

equilibrium perspective, which is essential for examining the costs and benefits of a monetary union. It has a complete multisector structure, with a detailed representation of traded and nontraded goods sectors. This allows us to consider the details of trade between the small economy and its large trading partner as well as sector-specific productivity shocks. The model also has a new-Keynesian macroeconomic structure, with sticky nominal adjustment that provides a framework for considering the output-inflation variability trade-offs under different policy regimes and different assumptions about shock distributions. Another strength of the model, which we exploit here, is that it has sufficient structure to consider the effects on nominal dynamics of structural reforms that enhance market efficiency.

The GEM version we use is an updated calibration of a two-country model developed in Laxton and Pesenti (2003). We treat the small economy as a representative new EU member state (NM) with a flexible exchange rate, and the large economy as its main trading partner—the euro area (EA). The starting point for the calibration and the initial distribution of shocks is the stylized features and historical data for the Czech Republic—a typical NM economy. These country-specific data are supplemented with selected regional data for NMs, particularly recent information on the degree of competition in labor and product markets. After obtaining results with the base-case calibration, we undertake extensive sensitivity analyses. The primary motivation for these analyses is to identify the key factors determining the macroeconomic costs and benefits of euro adoption. Yet the tests also have another benefit—ascertaining the implications of cross-country differences in NMs' characteristics and mitigating against parameter uncertainty inherent in calibration-based modeling. Together with an eclectic calibration of the model, which draws on both country-specific and regional information, the sensitivity tests help ensure that the qualitative conclusions of the paper apply to all NMs, even though the quantitative findings may not be relevant for any particular country or NMs as a group.

The focus of the paper is on comparing the trade-off between output and inflation volatility under alternative exchange rate regimes. Under the first policy regime, both EA and the NM pursue inflation targeting, and the currencies are linked by a flexible exchange rate. The analysis of the output-inflation trade-offs under the calibration assumptions renders base-case efficiency frontiers for the foreign economy—the original euro area—and the NM economy. Next, we remove the flexible exchange rate and consider a monetary union, where a combined monetary policy target is a weighted average measure of inflation and the output gap in EA and NM. NM (and EA) tend to do worse in terms of output-inflation variability under the monetary union, because they can no longer buffer the effects of other rigidities through the exchange rate. In the sensitivity analyses we begin with experiments designed to investigate the importance of structural flexibility and efficiency and then turn to experiments focusing on the implications of the underlying distribution of shocks. Major advances in simulation technology permit the gamut of alternative assumptions and shock distributions to be considered fairly easily.

The analysis of monetary policy under inflation targeting is based on Taylor rules (TAY) and inflation-forecast-based (IFB) monetary reaction functions. In IFB monetary rules, the central bank changes interest rates in response to the forecast profile of deviations of inflation from the target level, conditioned on the state of the economy as represented by the output gap, normally with some smoothing of the adjustment. TAY rules use current, rather than future deviations of inflation from the target rate.[2] These rules can be derived by minimizing a loss function that penalizes a weighted sum of measures of the variability of inflation, output, and interest rates. An "optimal" form of the reaction function will have coefficients that depend on the relative weights in the loss function and the nature of the joint distribution of shocks. By changing the weights in the loss function we can derive a trade-off efficiency frontier that shows the best available combinations of variability in output and inflation, given the model and the assumptions about shock distributions. An efficiency frontier will generally have the convex shape typical of trade-offs. More stable inflation will typically be available only at the cost of higher volatility in output, with the slope of the trade-off reflecting diminishing returns at the margin.

I. Model and Calibration

The model is taken directly from Laxton and Pesenti (2003).[3] This was the first version of GEM, which was calibrated to the Czech Republic and the euro area.[4] The model includes firms that produce goods, households that consume and provide labor and capital to firms, and a public sector that taxes and spends. Production is split into two stages. In the first stage, labor, capital, and land are used to create intermediate goods that can be traded, such as components for manufacturing. These intermediate goods are then combined with additional labor and capital at home and abroad to produce final goods.[5] Goods are differentiated, and as a result firms possess market power and restrict output to create excess profits. A second feature is a split of intermediate goods into traded and nontraded goods, which is central to a

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[2]For a discussion of IFB and Taylor rules, see Clark, Laxton, and Rose (2001); Batini and Nelson (2001); and Laxton and Pesenti (2003).

[3]See Laxton and Pesenti (2003) for the complete set of equations.

[4]For the purpose of this paper we will refer to the model for the Czech Republic as a representative NM. There are two reasons for this. First, while many aspects of the model apply to other new member states we do not want readers to focus excessively on the exact quantitative magnitudes. Second, some of the sensitivity analysis we perform is motivated by characteristics of other NMs.

[5]The addition of intermediate goods allows the model to examine issues that are important for developing countries. This includes policy challenges in economies that supply low value-added components to industrial countries, or assemble higher-technology components from such countries into final products, or are commodity producers and exporters.

number of issues in international macroeconomics. It is necessary to explain features in transition countries such as the higher investment in the tradable goods sector, as well as the effects of structural reforms and a production shift toward the desired higher quality goods supplied by more advanced economies. Rapid productivity increases in traded goods relative to nontraded goods also help explain why real exchange rates tend to appreciate in countries that are growing rapidly. Workers make a choice between work and leisure. They have market power and hence restrict their labor to raise their real wage. The model also features adjustment costs on real and nominal variables to ensure that it exhibits meaningful dynamics.

The model is closed with a monetary policy reaction function. Over the last decade, the literature on the performance of interest rate rules in macroeconomic models has mainly focused on two types of rules, both of which have been extensively used in research and policy analysis in central banks. The first one has come to be known universally as the TAY, following the seminal contribution by Taylor (1993) showing that a simple interest rate reaction function, which depended on contemporaneous values for inflation and the output gap, could provide both policymakers and researchers a useful organizational device for thinking about monetary policy issues. The second type of monetary policy rule has come to be known as an IFB rule, but IFB rules are simply more "forward-looking" versions of a TAY, as the short-term policy rate is assumed to respond to a forecast of future inflation rather than the contemporaneous level of inflation. IFB rules have been used extensively in the types of macro models that inflation-targeting central banks use to create forecasts and risk assessments.

Structural change and short data sets in the transition economies make formal estimation unreliable and so it is necessary to use calibration methods. Our approach to calibration is very pragmatic.[6] For parameters that define medium- and long-term responses of firms and consumers we often use estimates from microeconomic studies when they are available. Other parameters are selected to mimic key characteristics of the economic environment, such as the relative size of the countries, their levels of trade, and their capital-output ratios. Adjustment costs on real and nominal variables are chosen to generate realistic dynamic responses—elongating the responses to shocks and ensuring that consumption, investment, and production do not immediately jump to a new long-term equilibrium in response to new information. Foremost, the model's parameters have been calibrated to mimic the monetary transmission mechanism that is represented by the core production models that are used at the Czech National Bank and the European Central Bank.

[6]See the IMF Working Paper upon which this article is based for a discussion of the assumptions behind the parameters' choice and the calibration of key steady-state ratios that are consistent with national accounts data (Karam and others, forthcoming). See Box 2.1 of Bayoumi and others (2004b) for a high-level description of how parameters have been calibrated in GEM.

The calibration of the model largely follows Laxton and Pesenti's original GEM version (2003), with one notable exception. Markups in product and labor markets, which were set as equal for NM and EA in Laxton and Pesenti (2003), were recalibrated in this paper in light of new cross-country studies on measures of regulatory and institutional rigidities in product and labor markets. Conceptually, such rigidities are the primary reason for noncompetitive, markup pricing. In product markets, regulations and barriers to competition render market power to firms, allowing them to charge consumers a markup over costs. Likewise, labor market regulation (for example, minimum wages and employment protection) and other institutional arrangements (for example, rent regulations creating barriers to geographical mobility) prevent competitive forces from operating fully.

The calibration of markups in product and labor markets is important for the analysis of the costs and benefits associated with euro adoption. Bayoumi, Laxton, and Pesenti (2004) show that reforms that raise competition and reduce markups in labor and product markets strengthen the monetary transmission mechanism, making the task of monetary policy easier. An advantage of inflation targeting—that the exchange rate can play the role of a shock absorber, facilitating adjustments in the economy with nominal rigidities and imperfect competition—would be reduced if prices were flexible and markets were highly competitive, because in this case the burden of adjustment would fall on prices rather than the exchange rate. (Indeed, in a pure competitive equilibrium, where firms and workers do not have any market power, there will be little difference between inflation targeting and a monetary union.)

There are no empirical estimates of markups for the NM states, to our knowledge. However, recent studies provide useful cross-country comparisons of various regulatory and institutional measures of rigidities in product and labor markets. These studies allow one to gauge how the degree of market competition in the NM states compares to that in the euro area and other advanced economies. On balance, institutional measures suggest that the degree of labor market flexibility is higher in the NM states than in the euro area, and the opposite is true for product markets—for a description of the markups that were chosen, see Karam and others (2008) and the references therein.

The specific forms of the Taylor and IFB rules considered in this paper can be nested into a general rule of the form:

$$
\begin{aligned}
(1+i_t)^4 = {} & \omega_i[(1+i_{t-1})^4 - 1] + \omega_y y_t \\
& + (1-\omega_i)\left[\left[\sum_{j=0}^{\tau} \omega_j \mathrm{E}_t \frac{P_{t+j}}{P_{t-4+j}}\right](1+\bar{r}_t)^4 - 1\right] \\
& + \omega_\pi \sum_{j=0}^{\tau} \omega_j \mathrm{E}_t \left[\frac{P_{t+j}}{P_{t-4+j}} - \Pi_{t+j}\right], \qquad (1)
\end{aligned}
$$

where i_t is the policy rate, $\bar{r}_t$ the equilibrium real interest rate, y_t the output gap and p_{t+j}/p_{t-4+j} a measure of the year-over-year change in the price level j quarters ahead, Π is the inflation target and $\sum_j^{\tau}\omega_j E_t(p_{t+j}/p_{t-4+j})$ is a weighted measure of inflation forecasts that has weights summing to one ($\sum_j^{\tau}\omega_j = 1$). In our simulations, the output gap is defined as the deviation of real GDP from the model's stationary equilibrium. Note that, when τ and ω_i are set to zero and when $\omega_\pi, \omega_y = 0.5$, and $\omega_j = 1.0$ *for* $j = 0$ and 0 *for all other* j, expression (1) becomes the original Taylor (1993) rule. By contrast, when $\tau > 0$, we refer to the rule as an IFB rule, because the interest rate in this case will depend on weighted forecasts of the year-over-year inflation rate up to τ quarters into the future. In the analysis below we consider a general case where the IFB rule is based on inflation forecasts up to four quarters in the future (referred to as IFB(0–4)) as well as simpler IFB rules that only depend on one measure of inflation j periods ahead.[7] For example, we will refer to an IFB (j) rule as a special case of expression (1) where we eliminate all but one inflation measure j periods ahead and an IFB (j and k) rule where we consider only two measures of inflation j and k periods ahead. For example, an IFB(4) rule reduces to

$$\begin{aligned}(1+i_t)4 - 1 = {} & \omega_i[(1+i_{t-1})^4 - 1] + \omega_y y_t \\ & + (1-\omega_i)\left[\frac{P_{t+4}}{P_t}(1+\bar{r}_t)^4 - 1\right] \\ & + \omega_\pi \mathrm{E}_t\left[\frac{P_{t+4}}{P_t} - \Pi_{t+4}\right]. \end{aligned} \tag{2}$$

To compare macroeconomic performance under alternative rules, we find the parameters in the rules that plot out the trade-off between inflation and output variability subject to a constraint that the standard deviation of the first difference in the policy rate be no larger than 80 basis points. As in Laxton and Pesenti (2003), the constraint on interest rate variability is necessary to rule out extremely aggressive rules that result in implausibly large and volatile changes in the policy rate.[8]

The list and structural characteristics of the shocks in the model and the calibration of the stochastic processes to reflect the historical variability of

[7]For simplicity it has been quite common for central bank models to rely upon these simpler IFB rules. For example, the Czech National Bank's model has an IFB rule that depends on the forecast of inflation four quarters in the future.

[8]The constrained efficiency frontiers (EF) are constructed with an extended version of the Optimal Simple Rule (OSR) routine in DYNARE (Dynamic Rational Expectations Program, by Adjemian and others, 2007) that allows for constrained optimization. The earlier Laxton and Pesenti (2003) results, which compared EFs for simple IFB rules and simple TAY rules, were constructed with a numerical grid search and took a significant amount of time and computer simulations to construct. The new OSR routine was programmed by Michel Juillard and produces EFs for this model in under 30 min, which is very impressive considering the model has 13 stochastic shocks and 88 state variables.

key macroeconomic variables—discussed in details in Laxton and Pesenti (2003)—are reported in Karam and others (2008).

II. The Case of Independent Monetary Policies

In the first policy regime, both EA and the NM pursue inflation targeting, and the currencies are linked by a flexible exchange rate. Figure 1 shows four efficiency frontiers. The inner pair of curves shows the trade-offs facing the EA economy, but the outer pair of curves shows the equivalent curves for the NM under inflation targeting with a flexible exchange rate. The two frontiers in each case reflect the results under the two particular alternative policy rules, TAY and IFB with a four-quarter lead in the inflation term (that is, the central bank responds to the forecast of the difference between inflation and the target rate, four quarters ahead).

The first point that emerges is that the EA economy experiences far less volatile outcomes. The EA curves lie southwest of the NM curves because the NM faces much more volatile shocks generally, and important risk-premium, productivity, and import preference shocks in particular.[9]

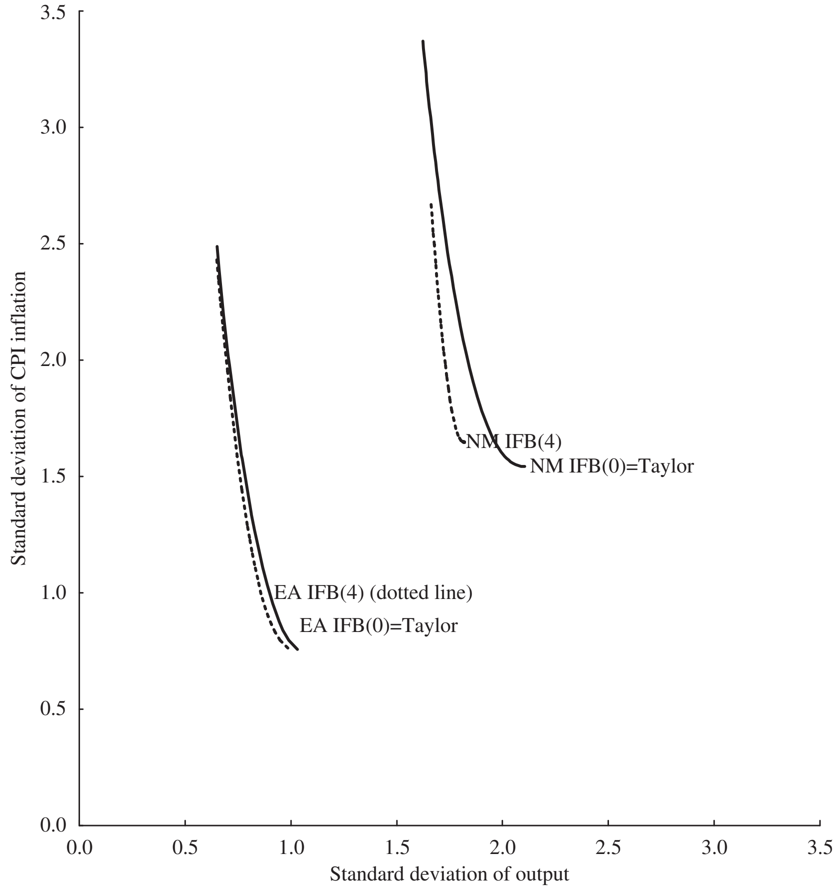
The second point is that the form of the monetary rule makes virtually no difference in the much larger, more closed EA economy. The IFB(4) rule does a tiny bit better, but the difference is miniscule. A TAY works well when current measures capture virtually all the information about the future dynamics of output and inflation. This tends to be the case for large, closed economies. This result echoes previous findings with a variety of models on the U.S. economy.

The same is not true for the small emerging economy. Figure 1 shows that there are significant macroeconomic performance gains available for such economies from the use of the more forward-looking IFB rule. The shocks hitting such economies are larger and, owing to the more open nature of these economies, the resulting movements in the exchange rate are important. These effects are essentially irrelevant in the larger economy. Moreover, the more open nature of small economies amplifies the importance of international transmission mechanisms. In short, the dynamic properties in such economies are more volatile and current measures of the inflation gap do not capture all the essential information. The important role of the exchange rate in the nominal adjustment process for such economies is part of the reason. In any case, our results indicate that for such economies a flexible exchange rate can provide policymakers with significant scope to limit volatility in output and inflation.

Figure 1 presents a version of the IFB results with the lead on the inflation forecast term at four quarters, as was chosen for the first core model used for IT in the Czech Republic. Under an IFB rule, the policy response is to some forecast of the deviation of inflation from target. But what should

[9]By import preference shocks we mean shocks to the relative preference for foreign goods over domestic goods. Such shocks contribute to volatility in trade and exchange rates, which is an important issue here.

Figure 1. Comparison of IFB (4) and the Taylor Rule (IFB(0)) for the Euro Area and New European Union Member Economies

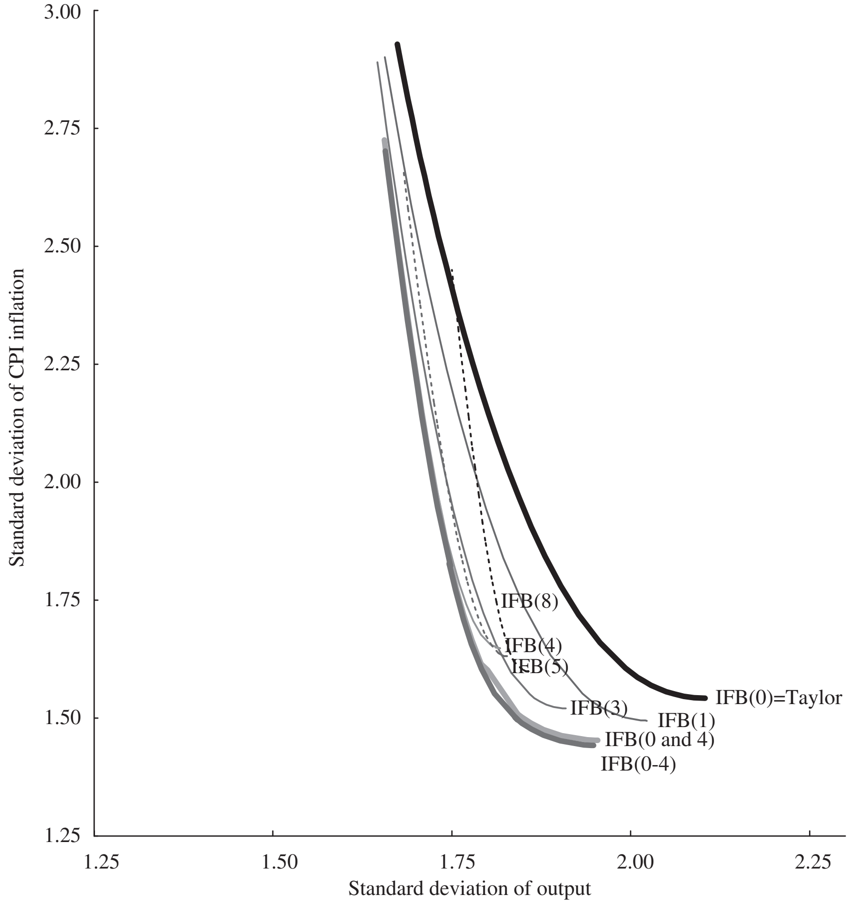


Note: IFB = inflation-forecast-based monetary reaction functions; EA = euro area; NM = new member of the European Union; CPI = consumer price index.

the lead be? The general answer is that no one lead produces optimal results. We need a linear combination of leads in the reaction function. Figure 2 shows the IFB results for the NM economy under a number of individual leads. Note that there is no general dominance. If the desired choice is low inflation variability, then shorter leads produce better results. As the choice moves to lower output variability, with consequent higher inflation variability, the optimal lead rises. At lead four quarters, we see a dominance result. As the lead is extended further, the results deteriorate. The frontiers for leads eight and nine are dominated by the TAY, at least over some regions.

The lesson is that the TAY and any simple IFB rule may or may not provide points on the general efficiency frontier, which is an envelope curve encompassing all options for horizon. In Figure 2 we also show the result for

Figure 2. Comparison of Alternative IFB Rules for the NM Economy



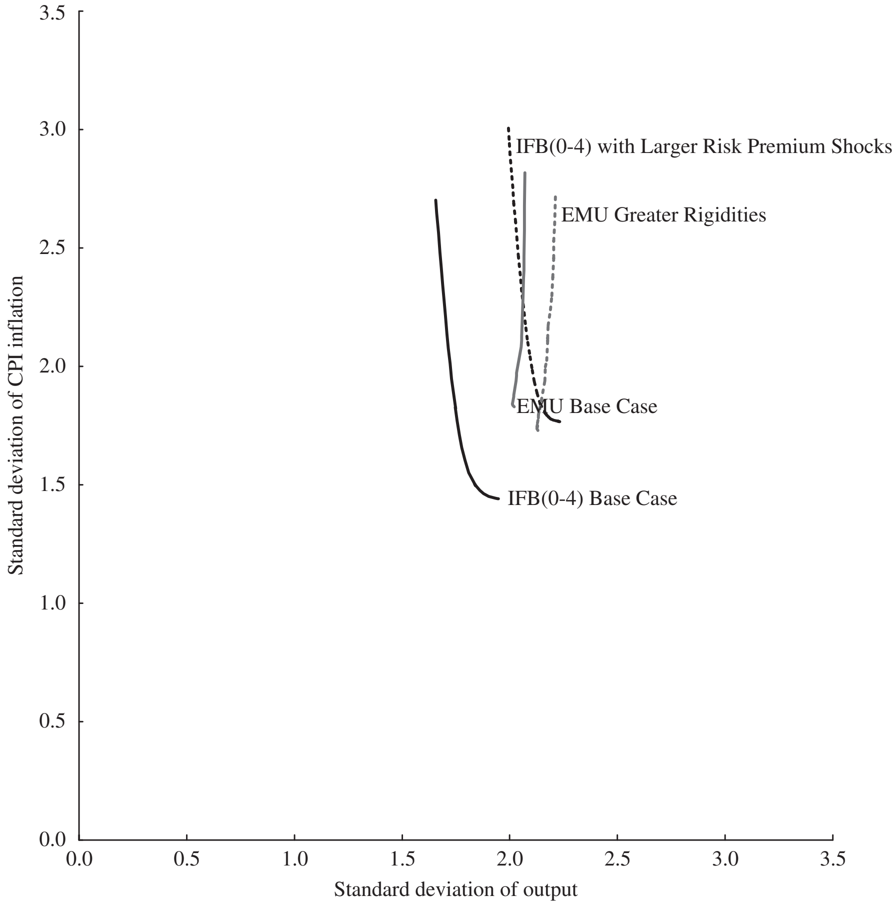
Note: IFB = inflation-forecast-based monetary reaction functions; NM = new member of the European Union; CPI = consumer price index.

a simple combination of a lead four IFB formulation (a common choice in central bank models) and a lead zero Taylor formulation. The result dominates both simple alternatives in the bottom-right region. Also shown is the solution that allows weights to be placed on all leads up to four quarters. It dominates the other solution, again especially in the bottom-right region of low inflation variability and high output variability. In all results to follow, we use this generalized formulation of the reaction function.

III. Comparison of Monetary Union and Independent Monetary Policies

We focus on the NM economy in the discussion from here on, because the comparative results for the EA economy are little influenced by any of the factors that we consider. The solid lines in Figure 3 compare the results for

Figure 3. NM Inflation and Output Variability Under an IFB Rule and Monetary Union
(includes cases with greater nominal rigidities and larger risk premium shocks)



Note: IFB = inflation-forecast-based monetary reaction functions; EMU = European Monetary Union; NM = new member of the European Union; CPI = consumer price index.

the IFB rule and monetary union. The line labeled "EMU base case" traces out combinations of standard deviation pairs for the NM economy under monetary union. To generate these, we eliminate the risk premium shocks and force a common interest rate on the two regions that depends on a weighted sum of inflation and the output gap in the two regions, where the weights are equal to relative population size. We then trace out the points for the NM economy as we move along the combined European Economic and Monetary Union (EMU) efficiency frontier—not reported in the figures. Because the size of the shocks to the exchange rate play a large role in determining overall volatility in the NM economy we also consider an alternative case in Figure 3 where we increase the standard deviation of the risk premium shocks by 75 percent.

The curve "EMU base case" comes from combinations generated under the EMU base-case assumptions. All combinations lie above and to the right of the frontier for the IT-flexible exchange rate regime, which is labeled as "IFB(0–4) base case" in Figure 3. This means that there is a clear loss to the NM economy under monetary union. This loss reflects the suboptimal monetary policy that is forced on the NM economy under monetary union under the base-case assumptions. In the base case, the variation in the exchange rate has a buffering effect that reduces overall macroeconomic variability. Under monetary union, this buffering role is not available and the adjustment must be transferred to other domestic variables, principally inflation. What used to come as a change in the real exchange rate from a nominal exchange rate change with sticky domestic costs and prices must now come from those domestic nominal variables. The result is deterioration in the overall variability results.

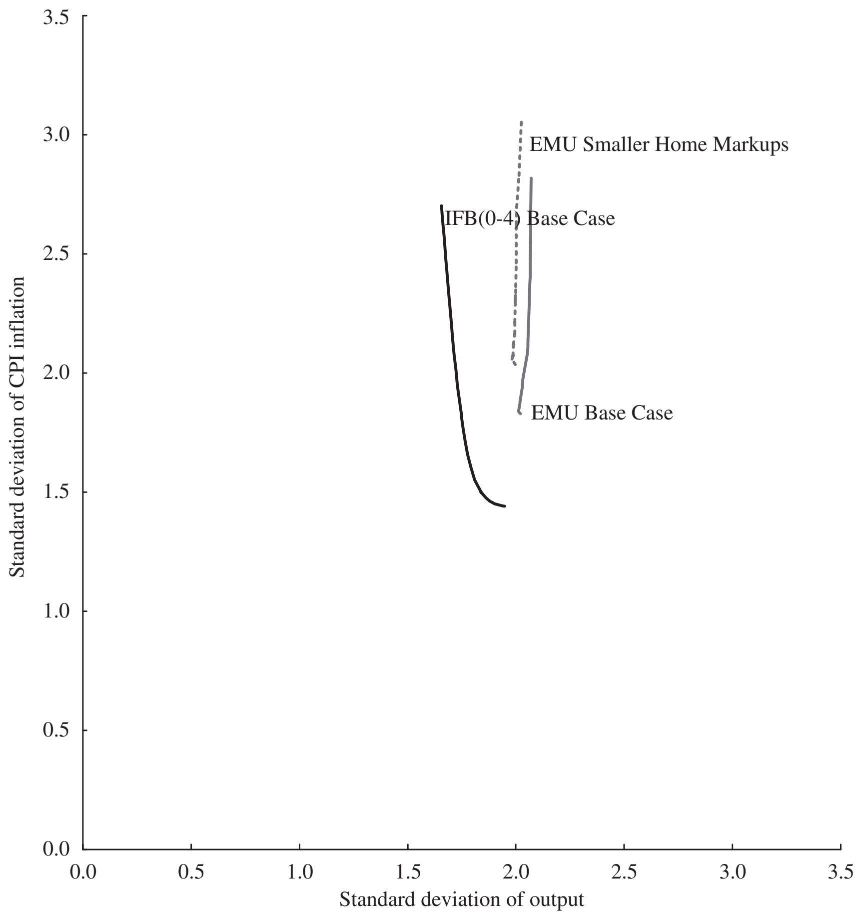
This conclusion is subject to possible qualification, depending on the size of the risk-premium (exchange rate) shocks that are eliminated under monetary union. The union locus is not everywhere outside the efficiency frontier for the flexible exchange-rate locus under the higher shock dispersion. Thus, if the eliminated risk-premium shocks are large enough, there could be a gain from monetary union. Whether there would be still depends on choices made in overall EMU policy, but improvement for the NM economy becomes possible, in principle, if the initial conditions include large exchange rate shocks.

The final locus on Figure 3 shows the combinations available under monetary union when we increase the degree of rigidity in nominal adjustment processes in the NM economy to be equal to that in the EA economy. With the greater rigidities, the cost for the NM economy of losing the contribution of the flexible exchange rate is significantly higher.

Consider next the results in Figure 4. In this experiment, we increase the competitiveness of the NM markets, halving the monopolistic markup in prices (37–18.5 percent) and wages (23–11.5 percent). There is a shift to the left of the locus under a common currency. One could conclude that the costs of monetary union associated with the loss of exchange rate flexibility can be moderated if the common currency is associated with less protection for home markets, either through reforms at home or simply a more complete integration of markets. If we also assume increased competitiveness in the EU economy after the union through a halving of markups, this effect gets considerably stronger (Figure 5). In other words, lower markups in the EU economy lead to less volatility in both economies, and with significant extra gains in the NM economy (Figure 5 shows a much larger shift than Figure 4).

Figure 6 shows a striking result when we lower the volatility of shocks to preferences for imported goods in both the EA and NM economies. For NM economies, volatility in trade tends to be high, more so than can be explained by the degree of openness and the volatility of demand, and this is an important part of overall cycle properties. In GEM, we capture this through

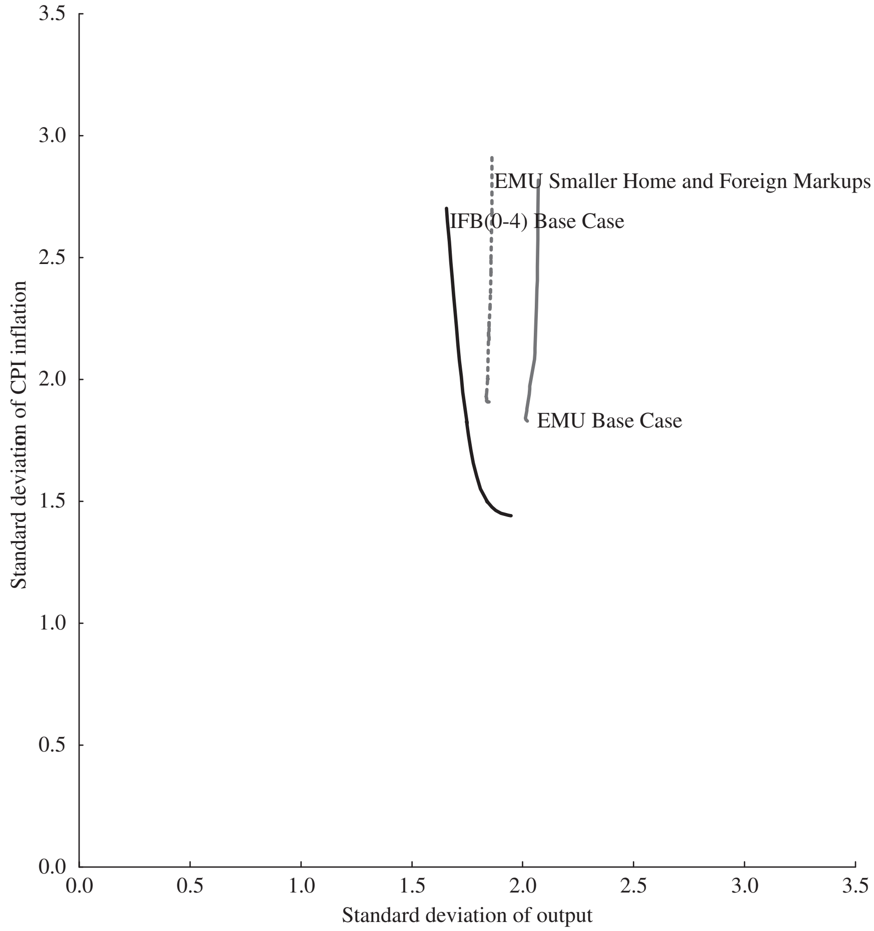
Figure 4. NM Inflation and Output Variability Under an IFB Rule and Monetary Union
(includes cases of smaller NM markups under monetary union)



Note: IFB = inflation-forecast-based monetary reaction functions; EMU = European Monetary Union; NM = new member of the European Union; CPI = consumer price index.

a shock to the relative preference for foreign goods vs. domestic goods. Here we reduce the volatility of these preference shocks. The result is a dramatic reduction in the volatility of the economy under IT and flexible exchange rates, and this has a big effect on the costs of monetary union. When import demand shocks are less important, the overall volatility of the economy is reduced, and, because there is less need for exchange rate response, there is less volatility in inflation coming from import prices. This reduces the costs of currency union; note that the locus of pairs under monetary union shifts in even more strongly. Indeed, there are points available where the home, NM economy is less volatile after a monetary union than it was with a flexible exchange rate. This is an important result, as it might be expected that goods

Figure 5. NM Inflation and Output Variability Under an IFB Rule and Monetary Union
(includes cases of smaller NM and EA markups under monetary union)

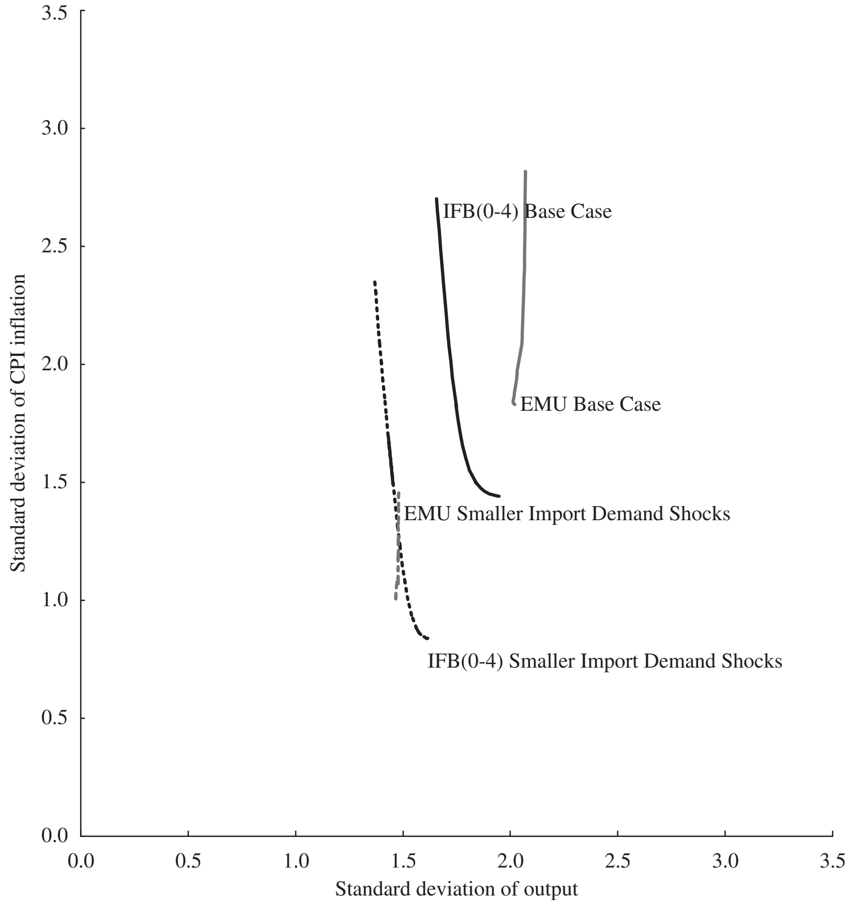


Note: IFB = inflation-forecast-based monetary reaction functions; EA = euro area; EMU = European Monetary Union; NM = new member of the European Union; CPI = consumer price index.

would become more homogeneous and preferences would become less variable over time within an economic union.

We considered a number of other possible influences on the impact of monetary union, including changing the size of fiscal shocks, investment shocks, and labor market shocks. Only the latter revealed anything interesting. If home labor markets become less volatile, as might be expected to happen over time in a monetary union, there could be a small reduction in the costs of the union. However, the lower labor shock case does not change the basic results. The trade-off available with a flexible exchange rate shifts to the left, as does the postunion locus. There is no sense in which

Figure 6. NM Inflation and Output Variability Under and IFB Rule and Monetary Union
(includes cases of smaller import demand shocks in NM and EA economies)



Note: IFB = inflation-forecast-based monetary reaction functions; EA = euro area; EMU = European Monetary Union; NM = new member of the European Union; CPI = consumer price index.

this creates a case for gains from a monetary union. But, one can see a slightly larger shift of the postunion locus, meaning that the costs of the union are offset a bit, if labor markets become less volatile.

IV. Conclusions

In this paper, we investigate using GEM, the costs and benefits in terms of the volatility of output and inflation when a small, emerging economy adopts the currency of its main trading partner. We establish as a point of departure that the high relative openness of such economies combined with the relatively high volatility in the shocks they face leads to a systematically worse policy efficiency frontier compared with that of the larger trading partner. Small, open economies are inherently more volatile than large, relatively closed economies, in part because of their greater exposure to volatility in trade.

We show that one consequence is that TAY, which use contemporaneous measures of the deviation of inflation from target in the monetary policy rule, tend to work reasonably well for larger, more closed economies, whereas better performance is available for small, open economies in responding to a forecast for inflation. We show, further, that for policymakers who wish to put a high weight on minimizing inflation volatility, a short lead is appropriate, whereas if the preference for minimizing output volatility is given more weight, the optimal lead for the inflation forecast rises. For this model, there is no case for going beyond a lead of four quarters, because results systematically deteriorate for longer leads.

We find that a flexible exchange rate plays an important buffering role that facilitates macroeconomic adjustment to shocks in small, emerging economies, which allows the central bank to achieve better outcomes in terms of domestic volatility. In general, the results show that there is a cost to a small, emerging economy in joining a common currency area when this flexibility is lost. The essential reason is that there are rigidities in domestic adjustment, and when the burden of macroeconomic adjustment is forced onto domestic nominal variables under the common currency, macroeconomic volatility generally increases.

This conclusion must be tempered, however, by the results of the sensitivity analysis. In general, if the volatility of shocks were to decline in monetary union, some of these costs would be at least mitigated. Indeed, we show that there are some assumptions that can open the possibility of better performance within a monetary union. In terms of mitigating costs, there is a general result that the more competitive and flexible are markets, the less rigid are adjustment processes and the less important will be the loss of the buffering role of the exchange rate. Looking at the results as indicators of what might happen over time as emerging economies adopt world technology and as markets become more competitive and more integrated, we would conclude that any macroeconomic costs of a monetary union are likely to fall over time. Finally, our experiments show dramatic improvement in the volatility frontier, and consequent reduction in the costs of joining a monetary union, when the volatility of preferences for foreign vs. domestic goods is reduced.

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