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Should Eastern European Countries Join the Euro?
A Review and Update of Trade Estimates
and Consideration of Endogenous OCA Criteria

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Abstract

An advantage of monetary union is facilitating trade.   After many critiques, Rose's basic finding is left standing: currency unions have greater trade effects than previously believed. Updated estimates also find an effect of the euro on trade among members that is significant (though mysteriously still only 15%). An argument for retaining monetary independence is asymmetric shocks, i.e., low cyclical correlation.   Eastern European countries might want to wait before joining, because their trade patterns and cyclical correlations have been gradually shifting toward Western Europe anyway; thus the argument for the euro strengthens as time passes, while the argument against it weakens.

Key words:
Asymmetric shocks, cyclical correlation, bilateral trade, Central Europe, currency union, Eastern Europe, endogenous optimum currency area, euro, European Monetary Union, EMU, gravity, monetary union, Rose, Slovenia

JEL classification numbers:
F1, F33.

Should Eastern European Countries Join the Euro?
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Twelve countries have acceded to the European Union (EU) since 2004, including five transition economies in Central Europe, the three Baltic republics and two more in Eastern Europe. One of the transition economies, Slovenia, joined the European Economic and Monetary Union (EMU), adopting the euro, as envisioned in the Maastricht Treaty, in 2007. (Cyprus and Malta also joined the EU in 2004 and the euro in 2008.) Should the others follow suit? The advantages of belonging to such a currency area are fairly straightforward. They include notably the promotion of trade and growth.

The disadvantages are a bit more complicated but include notably the loss of the ability to pursue an independent monetary policy.[1] Figure 1 illustrates the loss of monetary independence by showing how Slovenia's interest rates converged to euro interest rates in the year before it formally joined EMU in January 2007. Slovenia essentially lost the power to choose its interest rates in 2004.
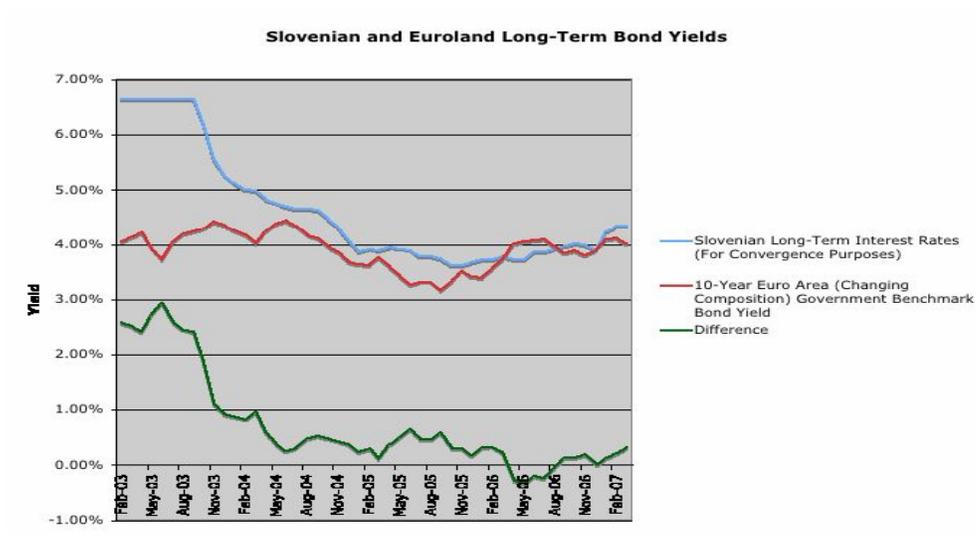
What would it take for the advantages of belong to a currency area such as euroland to outweigh the disadvantages?

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[1] Frankel (2004) offers a more complete review of the arguments for fixed versus floating exchange rates in emerging markets.

The well-known theory of optimum currency areas weighs the advantages of fixed exchange rates against the advantages of floating.[2] One standard textbook criterion is synchronization of the business cycle or what is called in the jargon "symmetry of shocks."[3] If the candidate country experiences economic downturns when and only when the rest of the EMU experiences economic downturns, it will not be giving up much to allow its monetary policy to be set in Frankfurt. The interest rates that suit the rest of the euroland are likely to suit the candidate country as well. If cyclical correlation is low, on the other hand, having to accept the interest rate constraint is more likely to be a hardship.

The conclusion of this paper emphasizes the endogeneity of cyclical correlations with respect to the decision to seek economic and monetary integration in the first place. The argument is that a link to the euro, like accession to the EU, promotes trade with Western Europe, which in turn raises the cyclical correlation, which in turn makes the country in question a better candidate for the EMU. That the creation of a common currency could alter patterns of international trade was one of the original motivations of the EMU's architects. Nevertheless, it is only relatively recently that academic researchers have found convincing evidence that this is a major effect. This paper will explain what has been learned from recent research on:

(1) the effect of common currencies on trade among members,[4]

(2) the further implications for the benefits of a common currency, and

(3) the further implications for the costs of a common currency as reflected in cyclical correlations—an important, but endogenous, criterion for membership in an optimum currency area.

The Effect of Common Currencies on Trade Among Members

Until ten years ago, economists were skeptical about whether a reduction in exchange rate variability gives a substantial boost to trade. The skepticism had both a theoretical and an empirical basis. Theoretically, the argument was that importers and exporters can hedge exchange rate uncertainty. Empirically, econometric studies found little evidence that exchange rate variability had an adverse effect on trade.

The problem with the theoretical argument, however, is that forward and futures markets (1) do not exist for most countries and for most longer-term horizons, (2) come with transactions costs when they do exist, and (3) come also with risk premiums, which can drive a wedge between the forward rate and the expected future spot rate. The

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[2] Mundell (1961), of course, coined the phrase "optimum currency area." Tavlas (1992) surveyed the literature.

[3] I would prefer to reserve the word "symmetry" to describe a structure in which, for instance, the Central European countries all have the same correlation patterns as each other, regardless of whether those correlation numbers are high or low. Unfortunately, the literature long ago adopted "symmetry of shocks" as a synonym for cyclical synchronization or correlation.

[4] Not considered here are the effects of the EMU on those who stay out. If there were evidence of trade diversion from monetary union, it would suggest that periphery countries would be worse off remaining outside of the EMU than they would be if the EMU had never been created. Fortunately, the evidence seems to go the other way. The Frankel and Rose (2002) estimates of currency union effects reject the hypothesis of trade diversion in general. The results of Micco, Stein, and Ordoñez (2002), which are updated to 2001, find the same with respect to United Kingdom–EMU trade in particular. The (limited) early evidence is reviewed in Frankel (2003).

problem with the empirical evidence is that it (1) was based mostly on time series, where it was difficult to sort out other influences on trade, and (2) was based mostly on large industrialized countries. When smaller countries were included in cross-section studies, some effects started to show up. This was particularly true for studies of bilateral trade. Data on trade among 100 countries offer 9,900 observations for each year (100×99). Having that volume of data allows the researcher to control for such other important determinants of trade as country size, bilateral distance, and common borders, as in the gravity model, thereby obtaining better estimates.[5]

        The most important discovery was made by Andrew Rose (2000), who looked at a data set that included many very small countries and dependencies. To begin with, he found a statistically significant effect of bilateral exchange rate variability on bilateral trade. But, beyond that, he found a large effect of common currencies on bilateral trade. Enough small countries use some other country's currency (most of them either the U.S. dollar, the French franc, the pound sterling, the Australian or New Zealand dollar, or the South African rand) that it was possible to isolate the effect. His remarkable estimate, which by now he has replicated in various forms many times, was that a common currency *triples* trade among members.

The Critiques

        No sooner had Rose written his paper than the brigade to "shrink the Rose effect"[6] – or to make it disappear altogether -- descended en masse. These critiques sometimes read to me as "guilty until proven innocent."

        It is understandable that a threefold effect was greeted with skepticism, as this is a very large number. There are five grounds for skepticism, as I classify them. Each of these arguments is potentially potent in the context of assessing the euro's effect on European trade patterns, if for no other reason than the claims that the Rose finding has always been spurious. But the critiques need to be assessed.

        The first critique is the proposition that one cannot necessarily infer from cross-section evidence what would be the effect in real time of countries adopting a common currency. Most pre-1999 members of currency unions had essentially never had their own national currencies, but instead used an external currency either since independence (e.g., Panama) or earlier in the case of former colonies who only achieved their independence in the post war period (e.g., the CFA countries in Africa or the Eastern Caribbean Currency Area).

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[5] E.g., Frankel and Wei (1995 a,b). The gravity model is comprehensively explained in Frankel (1997). Applications to the European Community include Aitken (1973), Havrylyshyn and Pritchett (1991), Hamilton and Winters (1992), Brada (1993), and Winters (1997).

[6] The phrase is from Richard Baldwin (2006). Baldwin's survey of the critiques concludes in the end that there is a Rose effect, but that it is probably substantially smaller than a tripling. That is fine with me. If Rose had come up with a 30% effect on trade from the beginning, everyone would have considered that large and important.

Second are allegations of missing variables. The statistical association between currency links and trade links might not be the result of causation running from currencies to trade but might arise instead because both sorts of links are caused by a third factor, such as colonial history, remaining political links, complementarity of endowments, or accidents of history. Another alleged missing variable is a country's "multilateral resistance" to trade, or a more specific measure of remoteness.

The third critique also concerns causality: the endogeneity of the currency decision. Countries choose as partners for currency links the neighbors with whom they trade the most, rather than the other way around. Perhaps the endogeneity of the currency union decision, and the simultaneity of other regional trade-promoting forces, has been stronger among developing countries than among European countries. In other words much of the correlation observed for currency unions among other countries may be spurious.

Fourth, the estimated effect on trade simply seems too big to be believable. While this judgment is explicitly a gut-reaction, it is widely shared. Furthermore, an influential argument by Van Wincoop, to the effect that the question has been mis-parameterized and that the true effects are substantially smaller, seems to support it.

Fifth, Rose's evidence came entirely from countries that were either small (e.g., Ireland, Panama) or *very* small (e.g., Kiribati, Greenland, Mayotte). Thus it was not clear that the estimates could be extended to larger countries. European economies tend to be large – some, particularly Germany, very large – while the set of non-EMU currency union countries tends to be small, some of them very small. If the currency union effect is substantially more important in small highly trade-dependent countries, that could readily explain the small estimates for Europe.

While each of these five arguments has some validity, to each there is a better response than one might expect.

Times series dimension

First, regarding the time dimension, a logical interpretation is that, even if the full comparative statics effect were to obtain in the very long run after a change in regime, there are very substantial lags. It would not be surprising, as we have evidence of long lags in the effects on bilateral trade of such variables as colonization and the formation of FTAs.

Even 30 years may not be the long run effect. The effect may keep rising for a long time. Panama reports sending more than half its exports to the United States; perhaps one reason is that it has been on the US dollar for over a hundred years. We know that other gravity influences leave an effect on bilateral trade many decades after the cause has been removed. One piece of evidence is the slow speed of adjustment in general estimated in gravity models with lags.[7] Frankel (1997) discusses lagged effects historically for the cases of FTAs and political unions. Following the breakup of the Austro-Hungarian Empire, for example, trade among the constituent states remained for

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[7] Eichengreen and Irwin (1998) .

awhile two to four times higher on account of the lagged effects of the imperial links. Another important example is the effect that colonial relationships have even decades after independence, and even after controlling for continuing linguistic, political, or other links.[8] Even when the original reason for a high level of bilateral trade has disappeared, the stock of capital that firms have invested in the form of marketing and distribution networks, brand-name loyalty among customers, and so forth, lives on for many years thereafter. The word *hysteresis* is sometimes applied to this phenomenon, suggesting that the effect is considered to be permanent.

Subsequent research on time-series data finds that a substantial share of the tripling that Rose had estimated from the cross-section data, which is presumably the long-run effect, shows up within a few decades of a change. Using a 1948–97 sample that includes a number of countries which left currency unions during that period, Glick and Rose (2002) find that trade among the members was twice as high in the currency union period as afterward. This suggests that roughly two-thirds of the tripling effect may be reached within three decades of a change in regime. (This reasoning assumes symmetry with respect to entry into and exit from currency unions.)

Omitted variables

The second objection concerns the possible influence of omitted factors. Rose did a thorough job of controlling for common languages, colonial history, and remaining political links.[9] The large estimated effect of a common currency remains. It seems very possible that there remain other omitted factors (e.g., accidents of history) that influence both currency choices and trade links. Nevertheless, Rose's various extensions of the original research—these robustness tests together with the time-series results (Glick and Rose) and the common use of fixed effects —reduce some of the force of this critique.

The omitted variable that is probably of greatest concern to the critics comes from the influential Anderson-Van Wincoop paper, and is variously called "multilateral resistance term" or – a more concrete manifestation – "remoteness".[10] A country's remoteness is defined as average distance from all trading partners, a weighted average based on the sizes of the trading partners; it is expected to have a positive effect on trade between a pair of countries, controlling for the more obvious negative effect of the distance between them bilaterally. Baldwin and Van Wincoop are a bit fanatical on this point: anyone who omits the relevant terms is not fit to be received in polite society. [11]

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[8] Kleiman (1976) finds about one-quarter of the (2- to 4-fold) bias of colonial times remaining for countries that have been independent for two decades. Anderson and Norheim find longer lags in colonial effects. Wang and Winters (1991) and Hamilton and Winters (1992) find significant effects for UK ex-colonial relationships (though not French) as late as 1984-86.

[9] While it is admirable how many factors Rose controls for, I agree with Baldwin and also Melitz (2001) in regarding as a "nuisance" Rose's persistent habit of calling these "nuisance parameters." These coefficients are of interest in their own right, and also help gauge the persuasiveness of the overall model.

[10] Baldwin wants to call it the "relative prices matter" term.

[11] I am one of those who long ago included remoteness in some of my gravity estimates (though not all). I devoted two pages to the subject in Frankel (1997, 143-144), and noted that it sometimes makes a difference to the results. The resistance to Canadian-U.S. trade is an example where it makes a difference; Wei (1996) found that controlling for remoteness helped knock

The Anderson-Van Wincoop (2001) model is an important contribution, both as theoretical foundation for the gravity model and in offering an argument that some of the border effects may have been quantitatively over-estimated. Rose and van Wincoop (2001) find that taking multilateral resistance and trade-diversion into account should, a priori, knock the estimated value of the euro on bilateral trade down from tripling to 58% (among the original euro members).   But the model's insistence on the role of trade-diversion may be too doctrinaire.   If I understand correctly the aspect of the Anderson-van Wincoop theory that leads to numerical estimates of the effects of borders and currencies that are sharply reduced in magnitude (though still significant), it is the property that the elimination of borders or currency differences within a region theoretically entails substantial diversion of trade away from the rest of the world and thus an increase in multilateral resistance.   But such trade-diversion from currency unions, whatever its basis in theory, is not observed in the data, by and large.[12] Thus the argument for imposing the constraints from this particular theory may not be as strong as it otherwise would be.

Even if one goes along with van Wincoop in imposing the constraint, the currency union term apparently remains high (1) compared to its standard error, (2) compared to what we all thought ten years ago, and (3) compared to what happens to the FTA term when it too is knocked down by imposing the van Wincoop constraint.

Causality problems

The endogeneity of a country's choice of exchange regime is perhaps the most intractable problem with the Rose-style estimates.   After all, optimum currency area theory suggests that countries should peg if they are small and open, and should peg to the partners with which they trade a lot.[13] Lithuania decided to switch from the dollar to the euro because it traded a lot with Western Europe, rather than the other way around. In that case the Rose finding would be spurious. Controlling for exogenous third factors such as political history is a partial correction, but not a complete one, because they don't completely determine trade patterns.

One might reasonably ask why the same logic would not apply equally to the decisions by European countries to join the euro.   Clearly the countries that have been most firmly committed to European monetary integration from the beginning (say, Germany, the Netherlands and Luxembourg) have been those that were the most thoroughly integrated with each other anyway.   Those that have stayed out tend to be those that are less integrated. If this is enough to produce a tripling in the context of other countries, why is the estimated effect so low in Europe?

Many of the critiques of the Rose results, after pointing out a problem of omitted variables or endogeneity or one of the other legitimate problems, offer an alleged way to

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down the home country bias from around 10 to around 3.   Another may be the finding of a huge apparent effect of Pacific Islanders adopting the Australian dollar, in Nitsch (2001).

[12] For example, the UK does not appear to have lost trade to euroland as a result of the euro. Begg, et al (2003), Frankel and Rose (2002), Frankel (2003), Micco, Ordoñez and Stein (2003), and Chintrakarn (2008).

[13] McKinnon (1963).

address it and then report that the currency union effect disappears.[14]   My own view is that many of these responses in effect throw out most of the data in the name of addressing the (correctly emphasized) issues of endogeneity or country size. Or they do something similar: put in a great many dummy variables or fixed effects, often one for every pair of countries. This approach seems these days to be considered not just good econometric practice, but essential; we are told that we are not allowed so much as a peek at evil studies that neglect to do this. But my view is that since the finding of statistical significance arose only when Rose put together a large enough data set for it to show up,[15] there is little information gained in reducing the data set sharply and then noticing the loss in statistical significance.   The statistical power lies in the cross-country variation. Throw that out, and one may be left with little.[16]

 That said, the complete bilateral data set is so large and the statistical relationship is so strong that there is some firepower to spare, and it is worth using some of it to try to get at the problems of endogeneity and missing variables. Including fixed effects for countries and/or years has become standard. The results generally hold up. Adding fixed effects for *pairs* of countries is a bit more problematic. Rose (2001) himself tried adding pair fixed effects to his original data set, and found that the currency union dummy lost all significance, while pointing out that it is hard to see how it could have been otherwise, since all the action is in the bilateral cross-section.   The same with Pakko and Wall (2001). Klein (2002), who deliberately focuses on US bilateral data alone, is one of many examples of throwing out enough data until the results become insignificant. Persson (2001) is another, despite the virtues of the matching estimator. When Rose tries the matching estimator on a larger data set, he found a significant (though smaller) effect (2.6.3).

 More persuasive still is a before-and-after study such as Glick and Rose (2002). It eliminates the problem that Panama has always (since independence) been on the dollar because it has always traded with the US, much as Luxembourg has always had a currency union with Belgium (at least since the Latin Monetary Union of 1865), because it has always traded with Belgium. Rather these results show that when a country enters or leaves a currency link, its bilateral trade responds accordingly.   But none of this is to deny that endogeneity remains a likely problem. Attempting to deal with it should be a priority.   For example, an evolution in trade patterns may come first, with the currency decision following.   In theory, Ireland may have switched its currency allegiance from British to the continent in response to shifting trade patterns rather than as a cause of them.   Similarly with Slovenia's more recent decision to join the euro.

Implausible magnitude of the estimate

 Fourth, although those who claim that the tripling number is too large to sound plausible have a point, they tend to neglect two counterarguments.   In the first place, the estimated effect of currency unions is on the same order of magnitude as the estimated

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[14] Rose (2001) replies to one, his website (http://faculty.haas.berkeley.edu/arose/RecRes.htm#CUTrade) to others.
[15] Earlier gravity studies had not found major evidence of currency link effects on bilateral trade, presumably because the data sets were too small to include many examples of countries with institutionally fixed exchange rates: Thursby and Thursby (1987), DeGrauwe (1988), Brada and Mendez (1988), and Frankel and Wei (1993, 1995, 1997).
[16] Frankel (1990).

effects of FTAs or, if anything, larger. [17] When one applies some of the variant estimation strategies, such as the Rose-van Wincoop re-parameterization, so that the estimated effect of currency unions falls, the estimated effects of regional trading arrangements tend to fall in tandem.   The point estimates, significance levels, *and necessary methodological qualifications,* are comparable across the two kinds of unions. In the second place, the estimated effects of currency unions are almost as big as the famous estimated effects of borders (home bias), e.g., in the Canada-US context, which is at least as big as a factor of three. [18]   This home bias is surprising, but is a fact of life. Something needs to explain it, and there are not very many candidates other than exchange rate variability.   Thus the Rose findings remain a challenge to the traditional views of international economists, who believed that trade barriers were far more important than either currency differences or other remaining barrier frictions.

Country size
        The fifth critique was the claim that the result from pre-1999 currency unions are relevant only for small countries, which are highly trade dependent, but are less relevant for larger countries such as those in Europe. A partial response has been possible all along: there has been no evidence of the monetary union effect varying with size, within the available sample.   But if one suspects a threshold effect, above which the monetary union effect diminishes, and one posits that euro members are the first to be big enough to lie above that threshold, then this could explain the gap.   The question whether the largest economies are truly different can only be answered with data from those countries.   Fortunately, the euro experiment is now almost ten years old, and so we should hope to be able to answer the question.   But to do so we would have to expand our view beyond the sort of data set used by Micco, Ordoñez and Stein and others, which was limited to European countries or at most to the set of industrialized countries, and to nest it within the larger sort of data set used by Rose, which captures trade among all countries.

Updated econometric investigation of the trade effects of the euro

        This part of the paper will address two tasks: first, to see if the effects of the euro to date are still relatively small, even with the addition of the few extra years of data that are now available, and second, to try to explain the gap. Three candidate explanations are the most obvious possibilities:
  • Time is needed for gradual adjustment.
  • Currency union effects for large countries are fundamentally different from those for small countries.

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[17] Baldwin cites approvingly an assertion of Berger and Nitsch (2005) that it is implausible, even crazy, to think that the trade effect of the euro could be as large as the trade effect of EU.   But this empirical finding is common. If critics were to apply the same tough standards to both customs unions and currency unions, they would likely find the estimated magnitude at least as large in the latter case as in the former.   As traditionally specified, this is a tripling.
[18] McCallum (1995), Helliwell (1998), Wei (1996), and Nitsch (1990, 1991).

- Earlier estimates from pre-1999 samples of currency unions were biased upward by endogeneity.

First post-1999 results on effects of the euro on European trade patterns

By roughly the five year mark, 2004, enough data had accumulated to allow an analysis of the early effects of the euro on European trade patterns. The general finding was that bilateral trade among euro members had indeed increased significantly, but that the effect was far less than the one that had been estimated by Rose on the larger data set of smaller countries.   Micco, Ordoñez & Stein (2003) found in a data set of European countries that trade between pairs of the first 12 EMU-joiners rose significantly between 1999 and 2002, an estimated 15 % beyond what could be explained by economic growth and other factors.   The estimates of the euro effect in a larger set of 22 industrialized countries ranged from 6 to 26 %, depending on dummies. The authors expressed a preference for estimates that allowed for pair dummies, and produced a somewhat smaller estimate of the effect: 4-16 %.[19]   These magnitudes were less than in the Rose studies. As the authors pointed out, however, the effects were not only statistically significant but also economically important, especially considering that the sample covered only the first four years of the EMU, a period in which the euro did not even circulate.

Other evidence from the first five years confirmed the finding. Bun and Klaassen (2002, p.1) updated gravity estimates and found that "the euro has significantly increased trade, with an effect of 4% in the first year" and a long-run effect projected to be about 40 percent. Flam and Nordström (2006) found an effect of 26% in the change from 1995-98 to 2002-05. Berger and Nitsch (2005) and De Nardis and Vicarelli (2003) reported similarly positive results.   More recently, Chintrakarn (2008) finds that two countries sharing the euro have experienced a boost in bilateral trade between 9 and 14%. Overall, the central tendencies of these estimates seems to be an effect in the first few years on the order of 10-15%.

Studies with price data have tended to confirm that the euro is facilitating arbitrage among the markets of member countries.   Looking at price data across pairs of European cities, Rogers (2001, 2002) and Engel and Rogers (2004) find evidence of convergence in the 1990s, though not post-1999. In the European auto market, Goldberg, Koujianou, and Verboven (2001) find gradual convergence over the period 1970–2000. Goldberg and Verboven (2004) nail down EMU, per se, as a significant determinant of this convergence. Other positive findings come from Allington, Kattuman and Waldman (2005), Baldwin et al (2008, Chapter 3) and Parsley and Wei (2001b).

It seems that the trade effects of monetary union are not entirely limited to small countries.

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[19] Earlier, the preferred Micco, Ordoñez and Stein (2002) "difference in differences" estimates showed between 1992 and 2001 a boost to intra-EMU trade of about 18 to 35 percent, depending on whether using country-pair dummies, or conditioning on the standard gravity variables.

Results on the euro's effects on European trade patterns updated through 2006

We can now update the results, as another four years of data have become available since the first wave of studies that included Micco, Ordonez and Stein.   See Table 2. We find that the effect of the euro on bilateral trade remains highly significant statistically during the years 2003-2006, but that the point estimate is no longer rising. Rather, it appears to have leveled off at approximately 0.10, still very far below the Rose tripling estimate. (Here we follow the literature in restricting the sample to industrialized countries and to the recent period, although results in Frankel, 2008, suggest that this may be a mistake.)   Similarly, when Baldwin et al (2008, Chapter 2) update the sample through 2006, they get an estimated effect of around 0.05.[20]

Table 2: Estimated effects on bilateral trade patterns in the first eight years of the euro

Update: €effect continues strong, 2001-2006

EMU Impact on Trade - Includes Data from 1992 - 2006.
Includes Year and Country-Pair Fixed Effects.

	Developed Sample			EU Sample		
	Coefficient	Std. Error		Coefficient	Std. Error	
EMU2 - 1993	-0.0489	0.0457		-0.0137	0.0352	
EMU2 - 1994	-0.0297	0.0463		-0.0060	0.0352	
EMU2 - 1995	-0.0258	0.0458		-0.0113	0.0352	
EMU2 - 1996	-0.0300	0.0461		-0.0132	0.0352	
EMU2 - 1997	-0.0138	0.0464		0.0007	0.0352	
EMU2 - 1998	0.0315	0.0463		0.0453	0.0352	
EMU2 - 1999	0.0205	0.0468		0.0707	0.0358	**
EMU2 - 2000	-0.0064	0.0469		0.0719	0.0358	**
EMU2 - 2001	0.0650	0.0469		0.1621	0.0355	***
EMU2 - 2002	0.0698	0.0469		0.1306	0.0354	***
EMU2 - 2003	0.1102	0.0469	**	0.1334	0.0354	***
EMU2 - 2004	0.1160	0.0467	***	0.1507	0.0354	***
EMU2 - 2005	0.0940	0.0469	**	0.1385	0.0354	***
EMU2 - 2006	0.0806	0.0481	*	0.1450	0.0354	***
Log of Product of Real GDPs	0.6623	0.0378	***	0.4090	0.0341	***
Free Trade Agreement	0.0066	0.0163		-0.0669	0.0232	***
EU	(dropped)			(dropped)		
EU Trend	0.0000	0.0017		-0.0019	0.0015	
Real Exchange Rate of Country 1	-0.0184	0.0032	***	0.0006	0.0029	
Real Exchange Rate of Country 2	-0.0004	0.0027		0.0074	0.0024	***
Observations	2850			1170		
Within R ^{2}	0.998			0.999		
Between R ^{2}	0.650			0.804		
Overall R ^{2}	0.920			0.929		

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Notes: * significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level

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[20] One possible reason that the estimates from Baldwin et al (2008) are lower is that they try to control also for other ongoing integration measures in Europe, which are highly correlated with the euro.

Why does the effect show up the year *before* EMU? It is likely that currency unions can start to have substantial effects on trade even before they have formally gone into effect. This pattern is familiar from other studies, not just with respect to monetary unions but also with respect to FTAs (such as the European Union and its forerunners) and political unions.[21] The most obvious interpretation is that once the negotiations, which typically have been going on for many years, are far enough along that the union appears very likely to take place, businessmen move quickly to try to establish a position in what is expected to be a large new market opportunity, perhaps to get a "first mover advantage." (This argument works best, theoretically, in the case of markets destined for imperfect competition. But even in perfectly competitive markets, firms might want to get started early if there are transition costs associated with rapid investment in a new market.)

Baldwin (in section 5.1) regards as suspicious the striking fact that the estimated effect in euroland appears suddenly in 1998, even though EMU did not take effect until January 1999. Even allowing the principle that business perceptions of imminent monetary union can set the date, rather than waiting for 1999, he claims "right up to March 1998, skeptics doubted that monetary union would be a reality." But statistics from financial markets tend to identify June 1997 as the breakpoint in perceptions.[22] So I find it plausible that businesses had started reacting in a measurable way by 1998.

A more important question is why everyone's estimated effects on intra-euro trade, in the range of 10-20%, remain so much lower than the effects estimated by Rose and others on large data sets that included many smaller and less developed countries, in the range of doubling or tripling. Frankel (2008) considers what appear to be the three leading explanations: it takes time for the effects on trade to rise to their full magnitudes, monetary unions have much smaller effects on large countries than small, and the Rose estimates on smaller countries were spuriously high as a result of the endogeneity of the decision to form a currency union. Surprisingly, the evidence runs counter to all three explanations.

Taken at face value, the results seem to suggest that earlier studies of the euro's effects erred in limiting the sample to European or industrialized countries, with the result that their estimates of such control parameters as the coefficients on the border and language were inaccurate, and that estimation on a more reliable complete sample reveals that the trade effect of the euro has, after all, been on of a magnitude comparable to that of monetary unions among smaller countries. As Baldwin, et al (2008, p.31) points out, however, "If trade among the euro-using countries had in 1999 jumped up by 60% to 70% above that of other non-euro using EU members, we would not need careful econometrics to detect it – a simple data plot would have made it obvious since the other

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[21] E.g., Frankel (1997).

[22] On June 15, 1997, implied probabilities of joining Germany in EMU in 1999 were 100% for Belgium and France and over 70% for Finland, Spain and Portugal (calculations from JP Morgan based on spreads in the interest rate swap market). A similar statistic from Goldman Sachs on the probability of EMU taking place on January 1, 1999, shot up above 75% after the Stability Pact was agreed in June 1997.

standard determinants of trade have not been that different…"   For the time being, the gap between standard euro and non-euro estimates remains something of a mystery.

Case study: The euro's effects on Slovenian trade patterns through 2007

Slovenia offers an interesting example. It is the first of the central/eastern European countries or transition economies to have joined the euro. Furthermore, by 2001, one might expect that the major structural changes of the preceding decade were substantially complete – the formal establishment of the European Union and the switch of Eastern European countries away from Russian-oriented trade and socialist economies. Although one year in the euro (2007) is very little to go on, but the history from other countries might lead up to expect that an effect on trade would begin a year or more earlier.

The table shows that Slovenia's trade with other euro countries indeed increased rapidly from 2001 to 2007, but that, surprisingly, it increased less rapidly than its trade with the rest of the world. This appears a blow against the hypothesis that the promotes trade. It has been suggested that the explanation might be that Slovenia's trade with Croatia and other neighbors in the former Yugoslavia may still have been depressed in 2001 from the effects of the violent breakup, and that the recovery of this trade subsequently might constitute the rest-of-world trade that increased so rapidly. But a look at Slovenia's trade with other states of the former Yugoslavia shows that it did not rise as a share of the total, but actually fell slightly (from 0.11 in each year 2001-2004, to 0.09 in 2006, 2007, and the first quarter of 2008).[23]

Slovenia's bilateral trade

Totals, in millions of euros

		2001	2002	2003	2004	2005	2006	2007
euroland	Import	7975.759	9053.447	9574.879	10875.42	12005.52	13759.87	15490.62
	Export	5967.701	7463.365	7637.038	8596.236	9730.082	11134.68	12540.71
	Total	13943.46	16516.81	17211.92	19471.65	21735.61	24894.55	28031.33
CFA (Goods Only)	Import	7.357	6.043	7.071	6.474	8.6	12.666	7.957
	Export	3.09	2.149	2.256	1.996	1.15	1.214	0.709
	Total	10.447	8.192	9.327	8.47	9.75	13.88	8.666
Rest of the World	Import	7.357	24.25819	26.25036	39.06621	48.58717	37.96153	42.21507
	Export	4375.988	5932.478	6108.5	6959.474	7797.629	9054.639	10922.92
	Total	4383.345	5956.736	6134.75	6998.54	7846.216	9092.6	10965.13
Total	Import	3361.358	4316.137	4562.539	5323.515	6044.163	7126.801	9029.29
	Export	10346.78	13401.54	13749.88	15565.67	17539.85	20206.63	23500.71
	Total	13708.14	17717.67	18312.42	20889.18	23584.01	27333.43	32530

[23] The bilateral trade data are from the Statistical Office of the Republic of Slovenia. I am indebted to Bostjan Jazbec of the Slovenian National Bank for the data, and for discussion.

The Benefits of Monetary Union

Boosting trade is of interest primarily as a determinant of economic performance. (Non-economic motivations for encouraging trade, such as binding countries together politically, are outside the scope of this study.) But there are several sorts of ways that an increase in trade among members of a group feeds into the question of the economic advisability of opting for a common currency. The increase in trade can influence the benefits of a common currency, or the costs.

One reason that trade patterns are relevant has to do with the advantage of a common currency for exporters and importers. The fact that the elimination of exchange rate uncertainty makes life easier for those engaged in trade will be more important, the higher is the share of trade in GDP, even if the level of trade does not change. Also, a fixed exchange rate will help stabilize the price level, the higher is the share of trade in GDP. For these reasons, McKinnon (1963) argued that a key factor determining the advisability of fixing the exchange rate is the ratio of tradable goods to GDP. Thus openness has long been on the standard textbook list of optimum currency area criteria. One implication is that if trade among the members of the EU is increasing over time, then they will satisfy the optimum currency area criteria more strongly in the future than in the past. A related implication is that even if a country does not satisfy the optimum currency area criteria ex ante, if it joins a currency area anyway and enough time passes to increase trade with other members substantially as a result of the common currency, it may satisfy the optimum currency area criteria in the future. In Frankel and Rose (1996, 1998), we called this the endogeneity of the optimum currency area criterion.

The second factor has to do with the long-run determination of growth. Trade is not just another sector. Theory and empirical evidence suggest that trade is good for the level or growth rate of income. Currency unions raise openness, and openness raises real income. Frankel and Rose (2002) combine estimates of the effects of a common currency on trade and the follow-up effects of higher trade on GDP, to derive estimates of the effects of common currencies on GDP. Table 3 shows that membership in a typical currency union raises the ratio of trade to GDP by an estimated 10 to 26 percent. But joining a currency union with particularly important trading partners (e.g., large and close neighbors) can have a larger impact. For example, if Poland were to join the EMU and thereby triple trade with euro countries, its ratio of total trade to GDP would eventually more than double, from 0.50 to 1.12. Once the increase in trade was realized, the estimated effect would be to raise real income by 20 percent over the subsequent 20 years—quite a substantial effect, if it is accurate. Similarly, if Hungary were to join and thereby triple trade with the euro area, its ratio of trade to GDP would also eventually

more than double (from 0.76 to 1.83), and its real income would increase by an estimated 35 percent.[24]

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[24] These calculations take existing trade patterns as the baseline. Trade between Hungary/Poland and other EU members may continue to increase between now and the time that an EMU counterfactual becomes relevant.

Table 3. The Effect of Currency Union Membership on Aggregate Trade/GDP

Currency union	0.12 (0.02)	0.19 (0.03)	0.10 (0.02)	0.26 (0.04)	0.14 (0.02)
Political union	0.12 (0.03)	0.41 (0.05)	0.19 (0.03)	0.04 (0.02)	0.13 (0.03)
Log real GDP per capita	0.12 (0.01)	0.06 (0.01)	0.12 (0.01)	0.25 (0.02)	0.15 (0.01)
Log population	–0.19 (0.01)	–0.17 (0.01)	–0.23 (0.003)	–0.07 (0.03)	–0.17 (0.01)
Log land area	–0.06 (0.01)	–0.08 (0.01)			–0.05 (0.01)
Island	–0.10 (0.02)	–0.02 (0.03)			–0.07 (0.02)
Landlocked area	–0.04 (0.02)	0.01 (0.03)			–0.04 (0.02)
Remoteness	–0.15 (0.03)	0.06 (0.05)	–0.27 (0.03)	–0.67 (0.15)	–0.12 (0.03)
Log RoW real GDP	0.37 (0.02)	0.19 (0.04)	0.41 (0.02)	0.25 (0.03)	2.89 (0.15)
Log import tariff rate		–0.06 (0.01)			
Number of observations	4,236	1,777	4,236	4,236	4,236
R^2	0.57	0.60	0.55	0.88	0.59
RMSE	0.416	0.396	0.423	0.228	0.409
With fixed effects?				Country fixed effects	Year fixed effects

Source: Frankel and Rose (2000).
Note: Regressand is log of trade/GDP, from Penn World Table.
Robust standard errors are recorded in parentheses.
GDP = gross domestic product;
RMSE = Root Mean Squared Error;
RoW = Rest of World .

The Implications of Trade Patterns for the Costs of a Common Currency: Asymmetric Shocks

The last way in which trade feeds into the OCA decision concerns cyclical fluctuations. If joining a currency union has advantages, such as promoting trade or stabilizing the price level, what is the countervailing attraction of retaining an independent currency? Why don't all countries fix their exchange rates or join currency unions? The most important advantage of flexible exchange rates is to retain the ability to respond to cyclical downturns by means of monetary policy—a reduction in real interest rates, a real depreciation of the currency, or both—and to respond to cyclical booms in

the opposite direction. But this advantage is less important if the domestic economy is highly correlated with the other countries in a prospective currency area (i.e., if shocks are usually "symmetric"), because the changes in monetary policy that the other member countries choose will also be appropriate for the domestic economy. This is another key tenet of optimum currency area theory. But cyclical correlations are not timeless, unchanging parameters. If trade among members of a currency area increases, then the cyclical correlation is likely to change as well.

Artis and Zhang (1995) find that most European countries' incomes were more highly correlated with that of the United States during 1961–79 but (with the exception of the United Kingdom) became more highly correlated with Germany after joining the European Exchange Rate Mechanism.[25] Fatas (1997) also found increasing correlation within Western Europe. More recently, Darvas and Szapáry (2004) found that with the advent of the EMU, the synchronization of GDP (and components of GDP) among the members has continued to increase.

In Frankel and Rose (1998), we found on a broad cross-section of industrialized countries that an increase in bilateral trade raises the bilateral cyclical correlation. The geographic determinants of bilateral trade, via the gravity model, are used as instrumental variables to deal with what is otherwise likely to be the endogeneity of trade. (In other words, a pair of countries could show high trade links together with high cyclical correlation, but the connection could be spurious: both could be the result of currency links.) Clark and van Wincoop (2001) found that the historical lack of cyclical synchronization within Europe, as compared to within the United States, is explained by the lower level of internal trade (and to a lesser extent the higher degree of sectoral specialization). By now, the view reflected in di Giovanni and Levchenko (2008) is that the link between higher bilateral trade and higher bilateral cyclical correlation is a "well established empirical result."

Calderón, Chong, and Stein (2003) point out that the experience of developing countries might be different, in that the composition of their economies differs from that of high-income countries. They extend the finding -- that trade links lead to cyclical correlation -- to a larger sample of 147 countries, a majority of them developing countries, again using the gravity model to control for the endogeneity of trade. They find that the estimated effect on cyclical correlations is not quite as strong for developing countries as it is among pairs of industrialized countries. They attribute the difference to the dominance of interindustry trade for developing countries, versus intraindustry trade among high-income countries.[26]

Researchers have looked at the cyclical patterns in Central and Eastern European (CEE) countries. Boone and Maurel (1998, 1999) find high correlations of CEE countries with the German economy in particular. Fidrmuc (2004) examines all European

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[25] Eichengreen pointed out that such correlations may be the result of loss of monetary independence rather than increased trade. But Clark and van Wincoop find that a common monetary policy is not, in fact, the reason why the cyclical correlation among regions of the United States is higher than among European countries over the past few decades.

[26] Torres and Vela (2003) find that growing trade links between Mexico and the United States have synchronized the business cycle.

countries, using output data through 2001; he confirms that correlations with the German economy increased for Hungary and Poland during the 1990s and that the correlation for Hungary is one of the highest in Europe but that the correlations are much lower in other CEE countries.[27]

Darvas and Szapáry (2004) examined eight CEE countries joining the EU in 2004. They found that three have achieved a high degree of synchronization with the EMU economy: Hungary, Poland, and Slovenia during 1998–2002, as compared with 1993–97. The implication is that these three now best satisfy the convergence criterion for joining the EMU optimum currency area. The lesser EMU correlation for the Czech and Slovak republics is attributed to financial crises in the late 1990s, and the lack of any EMU correlation for the Baltics is attributable to their greater relative exposure to Russia and Sweden. It is no coincidence that the EU makes up a higher share of the exports of Hungary, Poland, and Slovenia than of the exports of the other CEE countries (Figure 6 in Darvas and Szapáry, 2004). One could also note the importance of geographical proximity in determining trade links and cyclical correlations: except for the Czech Republic, the CEE countries that border the euro area are the ones with high EMU trade links and correlations.

The effect of trade on cyclical correlation holds as much when high bilateral trade originates in low bilateral exchange rate variability or adoption of a common currency as it does when the bilateral trade originates in proximity, common membership in free trade areas, or other determinants. This is another instance of the endogeneity of the optimum currency area criteria. A country is more likely to be suited to join a monetary union ex post than ex ante, because the cyclical correlation will have gone up in the meantime.

All these findings contradict an earlier surmise of Eichengreen (1992, pp. 14–16), Bayoumi and Eichengreen (1994, pp. 4–5), and Paul Krugman (1993). These authors suggested that, because a higher trade level would lead to greater specialization, it would also lead to lower synchronization of shocks.[28] Their view that specialization works against common currencies, and that diversification of the economy works in favor of it, went back to Kenen (1969).

In the growing literature on endogenous optimum currency area criteria, it is common to assume that the debate about whether trade raises cyclical correlations as Frankel and Rose (1998) claim,[29] or lowers it as Krugman and Eichengreen claim, turns

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[27] Others who find increasing cyclical correlations for some CEE countries include Babetski, Boone, and Maurel (2002) and Frenkel and Nickel (2002).

[28] "Theory and the experience of the US suggest that EC regions will become increasingly specialized, and that as they become more specialized they will become more vulnerable to region-specific shocks. Regions will, of course, be unable to respond with counter-cyclical monetary or exchange rate policy" (Krugman, 1993, p. 260). Hughes Hallett and Piscitelli (1999) call this "the traditional view" and add some modeling of demand-driven transmission, which had otherwise been missing from this debate. (The No Campaign [2001, p. 40] in the United Kingdom is among those asserting that the EMU is likely to generate a degree of specialization that undermines the insulation against shocks necessary for a common currency.)

[29] Evidence in Honkapohja and Pikkarainen (1992) also supports the idea that countries with a high degree of specialization are more likely to find it desirable to peg their exchange rate. But Imbs

on whether the trade is primarily intraindustry or interindustry. Fidrmuc (2001, 2004) and Imbs (2003) extend the econometric estimation to take specific account of intraindustry trade as a determinant of cyclical correlation. The reasoning is that shocks in a world of interindustry trade take the form of shifts from one industry to another: one country's loss is the other's gain, yielding negative correlations. In a world of intraindustry trade, industry shifts are assumed to affect all the product varieties produced in different countries, thus yielding positive correlations. Tests by these authors seem to confirm the argument that intraindustry specialization is in fact the source of positive cyclical correlations, driving out total bilateral trade as an explanatory factor.

I believe that several things may be wrong with this argument. First, a large share of trade today is in inputs and intermediate products. Think of iron ore that is made into steel, which is in turn made into machinery parts, which are made into the finished machine tool that is used in the production of something else. It is a similar story with computers. A positive shock at one point in the chain of value added in one country will tend to have positive spillover effects at the other points along the chain in other countries (e.g., Kose and Yi, 2001). Thus, trade in inputs and intermediate products gives rise to positive correlations and yet may be recorded as interindustry trade. Nevertheless, this is ultimately an empirical question, as Calderón, Chong, and Stein (2003) point out, and empirical studies such as Fidrmuc (2004) do indeed seem to find that intraindustry trade links are associated with cyclical correlation and interindustry trade links are not.

The second objection concerns supply versus demand shocks and may be harder to reject. It is worth stepping back for a moment to realize that we should be more interested in demand shocks than supply shocks. Recall that the point of the whole exercise is to see how much countries are giving up when they abandon independent/discretionary monetary policy. Discretionary monetary policy is not much good at addressing supply shocks anyway. Therefore, it does not much matter whether a country shares them with its neighbors.[30] Discretionary monetary policy is more useful in addressing demand shocks. For these, bilateral transmission could come from either intraindustry trade or interindustry trade. A shortfall in demand, originating for example in a decrease in velocity or a fall in investment, will be transmitted to trading partners as a reduction in demand for imports of all sorts—varieties that are in the same industry as well as products in different industries. If the partners are unable to respond to shocks because they have given up their monetary independence, this will be less of a hardship to the extent that the common monetary policy is determined by a set of countries all experiencing the common loss in demand. But the distinction between intraindustry and

(1999) claimed that trade is not, after all, a big determinant of cyclical correlations. According to Kalemli-Ozcan, Sorensen, and Yosha (1999, 2001), the degree of risk sharing via integrated capital markets is the interesting determinant of industrial specialization and cyclical symmetry.

[30] Admittedly, having one's own currency is more useful for terms of trade shocks than it is for domestic supply shocks, in that it allows equilibration to external balance without imposing deflation—automatically so in the case of a floating currency.

interindustry trade may be less useful than often supposed. The more important question may be demand shocks versus supply shocks.[31]

Are Eastern European Countries Ready to Join the Euro?

Whether Europe experiences a large asymmetric shock within the next few decades might determine whether the euro proves on net to benefit its members. The early 1990s saw a German spending boom associated with reunification, which implied a temporary real appreciation of the mark against the pound and other European currencies; fortunately, monetary integration had not proceeded so far as to make such a realignment impossible. Today it would not be possible.

One cannot predict the important shocks of the future. Their unpredictability is what makes them shocks. Possible shocks that would hit the eastern half of the continent more than the western half include repetitions of past instability in the former Soviet Union, which might particularly affect the Baltics, or of financial crises such as that experienced by the Czech Republic in the late 1990s. If such a shock occurs in one of the countries that are planning to join the euro, even the other candidates lucky enough to escape the direct impact would likely be hit indirectly. The reason is the contagion phenomenon that has been so evident in past crises: Western Europe, 1992–93; Latin America in 1982, 1994–95, and 1998–99; East Asia. 1997–98; and other emerging markets subsequent to the Russian default of 1998.

Some of the Central and Eastern European countries may not meet the optimum currency area criteria as well currently as do the existing members of the EMU. An argument for joining anyway is the endogeneity of the optimum currency area criteria. By adopting the euro, these countries will eventually promote trade with the rest of the euro area and increase the cyclical correlation. The increased trade will in turn further increase the advantages of a common currency, while the increased correlation will reduce the disadvantages of a common currency. Thus, the CEE countries may eventually qualify ex post even if they do not ex ante. On the other hand, the risks of asymmetric shocks in the meantime are substantial.

Trade links with the euro area have risen over the two decades anyway, as trade that had for half a century or more been distorted by enforced dependence on the Soviet Union reverts to more natural patterns. CEE countries now trade roughly as much with the euro area as the countries of the euro area trade with each other (Backe and Thimann, 2004, Charts 2.1 and 2.2; Boeri, 2004, Figure 1; Darvas and Szapáry, 2004). Trade with Western Europe can be expected to rise further in response to the formal accession of the eight to the EU in 2004. Along with trade links, cyclical correlations can be expected to rise further. The shift in trade patterns and correlations will be drawn out over time because the effects of membership in an FTA or a common market develop with long lags.[32] Therefore, the risk-averse strategy would be to wait five years or so for EU integration to proceed further. By then, the convergence would have proceeded far

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[31] In this regard, it is interesting that Babetski, Boone, and Maurel (2002) find progressive CEE countries–EU convergence for demand shocks over the last decade but divergence for supply shocks.

[32] The lags appear in the gravity estimates, for instance, Eichengreen and Irwin (1998).

enough that asymmetric shocks and contagion would pose less of a danger. Another factor working in favor of waiting is the opportunity to learn by watching the experiment unfold in the euro area (and—more unpredictably—among any additional joiners).

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