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EMU, EU, CAPITAL MARKET INTEGRATION AND CONSUMPTION SMOOTHING

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ABSTRACT

EMU, EU, capital market integration and consumption smoothing

This empirical study of the impact of EMU on capital market integration and consumption smoothing comes to three conclusions: first, EMU promotes members' holdings of foreign assets and foreign liabilities; second, no benefits of consumption smoothing result; third, EU membership, not a single money, nevertheless increases consumption smoothing. The source of this last influence on consumption smoothing is an important issue. Theoretically it could come from more tradable capital through greater price competition, more contestable home markets and the greater harmonization of regulations. There is also a seeming conflict between our results and those of one strand of the literature. However, the relevant writings concentrate on the effects of asymmetric output shocks while we study the unconditional impact of international portfolio diversification in the presence of all shocks. This can explain the difference.

JEL Classification: E00, F36, F41 and G10
Keywords: capital market integration, consumption smoothing, currency union, European monetary union and European union

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EMU, EU, CAPITAL MARKET INTEGRATION AND CONSUMPTION SMOOTHING*

Atanas Christev[+] and Jacques Melitz[++]
March 2010

There is considerable evidence of the impact of EMU on capital market integration in Europe (Rajan and Zingales (2003), Baele et al. (2004), Lane (2006a), Jappelli and Pagano (2008)). This impact could lead to better allocation of resources and growth. More modestly, it should mean more risk sharing. Based on the diversification of property claims, members should be able to share asymmetric shocks more broadly. In addition, the impact on capital market integration should mean that more of the non-tradable capital in these countries becomes tradable, which should also facilitate intertemporal substitution. Both because of the higher risk sharing and the higher tradability of capital, EMU members should then benefit from smoother consumption at home. However, thus far the evidence is sparse. Basically, it relates to risk sharing with others or else movement toward the law of one price rather consumption smoothing as such. In addition, in the case of risk sharing, the risk sharing is between members of the OECD rather than EMU. Sørensen et al. (2007) succeed in producing evidence of greater risk sharing in the OECD as a result of equity market integration. Kose, Prasad and Terrones (2009) (KPT) confirm, perhaps less strongly, that capital market integration, in a broad sense, has increased risk sharing in the OECD (emphatically not elsewhere). Corcoran (2008) provides some confirmatory evidence. But what about the impact of membership in the EMU and what about the effect on consumption smoothing as such? In this study, we make some headway in answering both questions and we do so while distinguishing between the impact of EMU and EU membership.

We find that EMU has increased international cross-holdings of assets and liabilities. However, there are no consequent benefits of consumption smoothing. Nor is there evidence that EMU smoothes consumption independently of international portfolio diversification. On the

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other hand, there is evidence that EU membership smoothes consumption independently. The source of this separate influence of the EU is an important issue. Theoretically it could come from more tradable capital through greater price competition, more contestable home markets and the greater harmonization of regulations. Capital market integration in the EU could have made it easier to borrow and obtain insurance based on wealth consisting of domestic real estate, housing and plant and future labor income and could have made it easier to switch between lenders and insurers. These changes could have increased the ability of EU households to smooth consumption. But this remains conjecture. We can only claim to show, first, that EMU promotes cross-country holdings of assets and liabilities; second, that these cross-country holdings do not affect consumption smoothing; and third, that EU membership, not a single money, nevertheless increases consumption smoothing or does so after we control for cross-country holdings. This last conclusion is not really as firm as the other two. We obtain it with our preferred estimation method, but not with another, with merits as well.

Our evidence of the impact of EMU on cross-country holdings of assets and liabilities is particularly strong. In the earlier literature cited in the opening statement, this impact could often be interpreted as referring essentially to bonds and equities. Thus, it might only concern the structure of international portfolios. The impact could also often be interpreted as relating strictly to holdings of claims of the members on the rest. By contrast, we find the impact to be on members' aggregate holdings of foreign asset and liability claims of all kinds, including FDI, financial derivatives, foreign reserves and bank credit. In other words, we find that EMU has promoted capital market integration with the rest of the world as a whole. This is true quite apart from other changes wrought by the EU. As for the lack of any consequent effect on consumption smoothing, our evidence is also strong. Indeed, if anything EMU has made things worse, since the cross-holdings of assets and liabilities promote trade openness, which, in turn, reduces consumption smoothing (compare Moser et al (2004) and Lane (2006b)). Our third conclusion, about the tendency of EU membership to increase consumption smoothing apart from international portfolio diversification, even though weaker than the other two, is strong enough to re-

mind us that the transmission mechanism to consumption smoothing need not depend on risk sharing but can follow independently from better convertibility of home capital. The surveys by Baele et al (2004) and Jappelli and Pagano (2008) point in the indicated direction. Both surveys focus mainly on international correlations between prices and tendencies toward the law of one price. Any tendency toward greater competition in price setting and toward greater price uniformity that would extend to physical capital in less liquid forms or human capital could promote consumption smoothing by improving the tradability of capital apart from any international portfolio diversification.[1]

It is important to pause on our failure to find any evidence of consumption smoothing stemming from international diversification since this result might seem at odds with the literature. But the conflict concerns one particular strand of the literature at most. The idea that trade openness may reduce consumption smoothing, as we find it does, is familiar enough. Openness to trade may protect against internal shocks, but it increases vulnerability to foreign shocks. Rodrik (1998) famously emphasized the vulnerability to foreign shocks. In conformity, Karras and Song (1996) report a positive effect of openness on output volatility. KPT (2003) obtain this result for consumption volatility as well. Our findings go the same way. In addition, earlier studies of international portfolio diversification often conclude that this form of capital market integration can lead to greater volatility because of short term capital flows and variable financial risk premia. The possibility is especially strong in countries with low domestic financial development and inadequate prudential rules. Much generally depends on the sources of shocks in combination with habit formation, price stickiness, and, of immediate relevance, the exchange rate system and both monetary and fiscal policy (Razin and Rose (1994), Sutherland (1996), Easterly et al (2000), Buch (2002) and Buch et al (2005) and Tharavanij (2007)). In general, studies of the influence of international diversification of property claims on business cycles yield ambiguous results; they clearly do not conflict with ours (compare Kose, Prasad, Rogoff and Terrones (2009)). However, there is a strand of the literature suggesting that by promoting capital market integration through

[1] We are highly indebted to a conversation with Oren Sussman for this line of thought.

cross-country holdings of assets and liabilities (Sørensen et al. (2007), Artis and Hoffman (2007), Corcoran (2008), KPT (2009)), EMU should promote consumption smoothing within countries. The apparent conflict with this strand of the literature needs special attention.

The outstanding technique for reaching conclusions about risk sharing in these last writings derives from Asdrubali, Sørensen and Yosha (1998). The idea there is to analyze the link between consumption in one country relative to a particular group of other countries to output in that country relative to the same group. So far as the group of countries shares risks, the individual country's consumption relative to the rest in the group should be independent of its output performance in relation to the rest. In other words, asymmetric output shocks within the group should affect consumption among the members evenly without particular repercussions on relative consumption between them. The question posed then is whether cross-country holdings of assets and liabilities from any source, including EMU, have reduced the response of relative consumption to shocks to relative output. As indicated, the answer tends to be positive for membership in the OECD (not particularly EMU). However, as this implies, this literature looks strictly at the influence of cross-country holdings of assets and liabilities conditional on asymmetric supply shocks. By contrast, we study the unconditional impact of these cross-country holdings and we do so in the presence of any shocks, whether they be to supply, asset prices, liquidity, demography or the life-cycle, etc. (cf. Melitz and Zumer (1999)). It is clear then that this literature could correctly identify some consumption smoothing from cross-country holdings of assets and liabilities while we might find no such effect on consumption smoothing (cf. Evans and Hnatkovska (2007)). Suppose, for example, that as international diversification advances, movements in equity prices listed anywhere acquired a destabilizing effect on consumption everywhere. This would not affect the results of the tests in this literature which focus strictly on the impact of asymmetric supply shocks (or might only affect these results circuitously) but it would affect ours.

In closing this introduction, something should be added about our measure of EMU. Earlier measures of EMU were uniformly bilateral and dichotomous with a value of either zero or

one. But any such measure of EMU is not possible here since we employ country-specific data. In response, we construct a continuous measure of currency union that varies from zero to one. Quite specifically, our measure of currency union is trade with other countries who share the same currency as a percentage of total foreign trade. EMU is then this ratio of bilateral trade to total trade for country members of EMU. The measure is therefore sensitive to the trade of members of EMU with one another rather than third countries. Thus, for example, it is higher for Belgium than for Ireland since EMU began. Admittedly, though, the measure concerns breadth or extensiveness of currency union rather than presence or absence of currency union.

The closest study to ours is Huizinga and Zhu (2004). They also examine consumption smoothing directly, apart from any sharing of output risks with a particular group of countries in the world, while focusing on the impact of international capital market integration on economic performance. The next section, II, sets forth our basic econometric model. The following section, III, explains our data sources. The one after, IV, presents our test results. Section V concludes.

II. **The econometric model**

In this effort to study the impact of EMU on consumption smoothing, we start from a stripped down model of the impact of currency union CU on consumption smoothing CS. The econometric form of the model is as follows:

$$FI_{it} = a_{10} + a_{11}\, OPEN_{it} + a_{12}CU_{it} + X_{it}'a_{13} + a_{1t} + \varepsilon_{it}^{1} \qquad (1)$$

$$OPEN_{it} = a_{20} + a_{21}\, FI_{it} + a_{22}CU_{it} + X_{it}'a_{23} + a_{2t} + \varepsilon_{it}^{2} \qquad (2)$$

$$CS_{it} = a_{30} + a_{31}\, FI_{it} + a_{32}OPEN_{it} + a_{33}CU_{it} + X_{it}'a_{34} + a_{3t} + \varepsilon_{it}^{3} \qquad (3)$$

FI refers to the average of the stock of gross foreign assets and gross foreign liabilities as a percentage of GDP (FI for financial integration). Similarly, trade openness or OPEN, is the average of imports and exports of goods and services as a percentage of GDP. X stands for a set of controls, which differs by equation and may include country-specific, time-invariant components; i is a country index; t is a time index; and a_t is a set of time specific effects (cf. Lane and Milesi Fer-

retti (2003) (LMF)). There are two primary centers of interest. One is the impact of CU on CS via FI and OPEN or $a_{12}(a_{31}+ a_{21}a_{32}) + a_{22}(a_{32} + a_{11}a_{31})$, where the a_{12} term is the part that passes through FI and the a_{22} term is the part that passes through OPEN. The other is the independent impact of CU on CS or a_{33}.[2] If FI was a comprehensive measure of capital market integration, there would be no independent impact of CU in equation (3). But as discussed, it is not, since FI neglects the capital market integration through price linkages and the tradability of capital, and this integration can occur apart from any cross-country holdings. Of course, FI could be so highly correlated with the tradability of home capital that it would reflect both influences. But our specification provides a test.

We shall be especially interested in the results after dividing up CU between members of EMU, or CUE, and the rest, or CUX. This will permit statements about EMU as such and the separate importance of the deeper monetary integration that this system entails. In the other numerous instances of CU, the adoption of a common currency is often unilateral and never signifies the presence of a joint central bank with considerable powers and political independence. In so far as CUE is a factor, it will also be important to check whether the true source of the influence is not really membership in the EU, since the provisions of the Maastricht Treaty could have promoted cross-holdings of assets and liabilities independently of a single money.

The fundamental issue in the rest of this section is the theoretical basis for the three equations. We can most easily see the grounding for equation (1) in general theory by taking as a point of departure a situation under uncertainty with traded goods only but no transaction costs in financial markets, a single interest rate, and no credit rationing. Suppose next that there are also no expected nominal or real exchange rate gains or losses, that nominal and real exchange rates are uncorrelated with home output and that all home currency prices of imports and exports are completely uncorrelated with one another or the exchange rate. This eliminates all incentives for

[2] There could also be an influence of CU on CS via domestic financial development. In addition, this next line of influence could be particularly important in analyzing the role of EMU for the new entrants from the former Soviet Bloc since 2004 (which do not figure in our analysis of EMU). We agree but will not develop this issue here.

portfolio diversification based on expected price movements and correlations. In that case, given diminishing marginal utility of consumption at all present and future dates, people will want to hold foreign assets and liabilities simply in order to hedge the risks associated with their expected future imports and exports of goods. Even though the money prices of imports and exports may be uncorrelated, they can still change. The more marginal utility diminishes and the higher the risk aversion, the higher the desired holdings of foreign assets and liabilities will be. Desired foreign capital holdings can therefore be large in this setting. If risk aversion is great enough, at the limit, importers would wish to hold the entire present value of future expected imports as gross foreign assets and exporters would wish to hold the entire present value of future expected exports as gross foreign liabilities. Obviously, desired hedging will be much lower than that in practice because of limited risk aversion. Furthermore, given non-price credit rationing and transaction costs in financial markets, including costs of converting currencies, the desired insurance cover will be lower still. Nonetheless FI will vary positively with OPEN on the earlier reasoning. LMF (2008) propose this same line of reasoning in a more formal treatment (on a bilateral basis, with emphasis on the international composition of hedging portfolios) while supposing that all financial assets consist of equities. They also relate their specification to Obstfeld and Rogoff (2001).

In order to introduce CU in equation (1) next, it is best to stop abstracting from expected real and nominal exchange rate gains and losses and international portfolio diversification opportunities resulting from correlated outcomes of all sorts (positive or negative), including ones that are related to non-traded goods, so that the hedging solution would change (though the previous basis for the positive influence of OPEN on FI would stand). We may also admit differences in expected asset yields, so that apart from the previous solution, people would wish to hold foreign assets and liabilities for reasons of profit and diversification of portfolio risk that are wholly independent of trade.[3] CU will then increase the desire for foreign assets and liabilities not only for

[3] Some authors prefer to reserve the term hedging strictly for the modifications of the hedging portfolio that result from correlated outcomes, rather than, as we do, to refer to this entire portfolio or all holdings stemming from efforts

earlier reasons of hedging but because of expected gains or speculation and to diversify the associated risks (despite some fall in FI resulting from the drop in exchange risk). CU will do so by reducing financial transaction costs and related barriers to capital market activity, by lowering exchange risk[4] and by increasing the transparency of yields. Therefore the coefficient of CU in equation (1) can be expected to be positive. As a side issue, CU would also affect the desired international composition of foreign portfolios. But that is little relevant here.

As regards the controls X in equation (1), domestic financial development is important. High financial development will reduce transaction costs and non-price credit rationing across the board. Unless there are still prohibitively high legal barriers to foreign transactions, the lower domestic transaction costs will spur international asset and liability diversification and profit-seeking abroad. For these reasons, it might raise FI. On the other hand, higher domestic financial development could also lower FI, since the ability to borrow at home may serve as a substitute for foreign borrowing. This opposite effect of domestic financial development may also show up in some measures of financial development rather than others (as we will find happens below).

In principle, controls for opportunities to diversify investment risk would also be fitting. Business cycle correlations matter. Positive correlations in expected returns on investments should discourage capital market openness by reducing the scope for welfare-improving foreign investment (on both asset and liability sides). The volatilities of real and nominal exchange rates should also enter. Greater volatility means a greater incentive to cover and to spread nominal and real exchange risk. In addition, all legal interferences with capital market openness, through exchange rate restrictions and otherwise, should clearly reduce capital market openness. Finally, LMF (2008) remind us of the relevance of international financial centers. Countries with that status would tend to be more open.

With respect to equation (2), the reciprocal tendency of FI to encourage OPEN is less

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to cover engagements to buy and sell on goods markets. See, for example, Coeurdacier (2008). There is no issue of substance here.

[4] Of course, the total elimination of an exchange rate can remove some opportunities to diversify the exchange risk that remains. We ignore this reservation.

evident. The impact of foreign direct investment (FDI) on FI is especially problematic. This form of FI may cause production to shift abroad, which may mean lower exports, thus lower OPEN. But this is not clear since FDI can spur the exports of intermediary goods (parts) and induce fresh imports of formerly home-produced goods. It can also generate trade through entry into new fields of economic activity. The effect of FDI is then an empirical question and the microeconomic literature on the issue is varied and complex (cf. de Sousa and Lochard (2009)). In addition, we have noted that FI can stem from efforts to reduce portfolio risk and to seek profits, independently of trade. This suggests other mechanisms through which FI can generate trade. Quite specifically, risk-diversifying and profit-seeking financial investment (in all forms, not only FDI) may breed learning of trade opportunities abroad. Portes and Rey (2005) emphasize this information channel (without particular concern with whether FI boosts OPEN or the influence works the other way). Thus, the reciprocal effect of FI on OPEN could well be positive.

The separate effect of CU in equation (2) could come from more price transparency, more uniform prices and added competition. In addition, if exchange risk eliminates some trade entirely, CU will promote trade directly by blunting this influence as well (apart from any trade promotion coming through FI).

As concerns the controls in equation (2), domestic financial development should facilitate foreign trade. We noted earlier that this development has an ambiguous effect on FI since ease of domestic borrowing could lower borrowing abroad in order to finance trade. But even if it reduces foreign borrowing, it should still encourage trade. Next, political trade restrictions should obviously reduce trade. In addition, the gravity model suggests a host of country-specific influences. These include geographical remoteness, output, population, land area, and geographical status as landlocked or an island. A high quality of roads, rails and telecommunications at home may also stimulate openness. Canning (1998) constructs a relevant index of infrastructure, which Carrère et al. (2009) have updated and show to be highly significant in promoting foreign trade, or at least, bilateral trade. Finally, literacy, linguistic diversity at home and the size of immigrant populations may also matter in diminishing the effects of foreign languages and generally im-

proving information (Melitz (2008)).

As regards equation (3), our measure of consumption smoothing CS is the absolute percentage change in private consumption spending from one period to the next, that is, a negative measure of smoothing. Evidently many factors may cause consumption to move from one period to the next. But if we control for these factors, including prominently absolute percentage movements in GDP, then the equation should enable us to see whether FI and OPEN tend to stabilize consumption once we introduce them. Stabilization would mean a negative influence of both variables on CS, as measured. As noted in the introduction, both theory and evidence say that destabilization is possible as well. We have already discussed the reasons for the separate introduction of CU in the equation.

Besides output, another important control is the level of domestic financial development. Financial development eases the transfer of saving to investment and thereby the ability to substitute consumption intertemporally. On this ground, it should lower CS. However, some forms of domestic credit development could also destabilize consumption by promoting asset price bubbles. This is a concern of the sort that underlies the doubts about the sign of influence of FI on CS.

A number of other controls X come to mind as belonging in the equation. Movements in the tax burden are important: they would disturb consumption in the absence of Ricardian equivalence. Movements in the price of consumption goods relative to the price of output and movements in the terms of trade should also do the same (that is, unless they are themselves responses to consumption smoothing). Involuntary movements in the ratio of employment to labor may destabilize consumption too. However, voluntary movements of the ratio of employment to labor might have the opposite effect of stabilizing it. Movements in the labor force participation rate might have this stabilizing effect as well. The life-cycle hypothesis suggests other factors that would tend to modify the steady state rate of consumption and therefore might destabilize consumption (raise CS) in the short run, such as movements in the age composition of the population and the duration of unemployment.

Since output movements must enter in equation (3) and movements in consumption could themselves engender movements in output, we will need to correct for this statistical problem.

In light of the rest of the literature, we must emphasize the role of the time-specific effect in the CS equation. This effect will capture any symmetric shocks hitting the entire world, that is, the entire group of countries with which risk can be shared. In this manner, we control for all symmetric shocks, not only those on world output, which sometimes receive sole attention. In addition, we concern ourselves with risk sharing with the rest of the world as a whole rather than with a particular sub-group in it.

Finally, in closing this section, let us return to the measure of CU. As defined, CU will vary over time with trade with currency union partners. Our model also says that CU may affect aggregate trade. A fortiori, it may then affect bilateral trade with union partners. Consequently, CU is endogenous. In response, we can either recognize CU as an endogenous variable or avoid the issue altogether by adopting a constant value for CU whenever its value is positive. Regression results with the time-varying and time-constant versions of CU show that the two measures yield indistinguishable results. In other words, the effect of our CU variable proves to be entirely cross-sectional and not time-dependent in the estimates. If so, the endogenous aspect of our CU measure is not a problem or if it is one, it is no more so than the dummy variable in general usage. For this reason, we will not model the endogeneity of our measure via trade and will choose a time-constant measure of CU. We take this measure to be the average over periods of positive values and zero for the rest of the time.[5]

III. **The data**

To study the effects of capital market integration on consumption smoothing, we use a large panel of data for the period 1980-2006 covering 180 countries. The basic source of our

[5] This measure may be oversimplified in cases of long interruptions between periods of positive values or widely different orders of magnitude for positive values at different times. But France is the only example of note. For this country, CU is small and positive prior to entry into EMU in 1999 and high afterwards. We therefore adopted two separate positive averages of CU for France: a small positive one before 1999 and a large positive one afterwards. Indeed we had no choice since a single average for France over the entire study period would even have muddied our measure of CUE.

data is the World Bank *World Development Indicators*. The relevant series for output, private and public consumption and exports and imports in this dataset are in US dollars at constant 1990 prices. We also employ the data on international financial integration in the LMF (2007) dataset. The authors provided us an updated version of their data going through 2007. All relevant variables in this database are calculated as ratios of GDP. The Beck et al (2009) database on financial structure is our source for the different measures of domestic capital market integration. As concerns restrictions on capital account, we choose the Chinn-Ito de jure index among the available measures (Chinn and Ito (2007)). The index is continuous and based on the information in the IMF *Annual Report on Exchange Arrangements and Exchange Restrictions.* Separate definitions and sources of the variables in the econometric analysis appear in Appendix A.

IV. **Results**

Our model and reasoning imply a reciprocal effect of the dependent variable on one explanatory variable in each equation: OPEN in eq. (1), FI in eq. (2) and output in eq. (3). In response, we instrumented all three relevant variables and employed a single-equation GMM estimate, which is efficient for arbitrary heteroskedasticity (though we ran various specifications without instrumenting and using lagged values instead).[6] We also provide a pooled OLS result for each equation for comparison. Finally, the tests depend on somewhat different country-year observation sets for each equation. Consequently, we present a set of GMM results for a particular trio of the equations over a uniform set of country-year observations, or as uniform a set as we can, and in this case, we are able to compare with a 3SLS estimate. This last estimate has the advantage of taking into account the covariance matrix across equations. But it suffers the disadvantage of assuming homoskedasticity. In all our estimates, we also correct the standard errors for clustering by country.

a. **Financial integration**

Table 1 provides five estimates of equation (1) in the separate columns, which we will

[6] Specifically, we used the STATA routine ivreg2, owing to Baum, Schaffer and Stillman (2003).

discuss in turn. One of the estimates is OLS. The other four instrument OPEN. In these last four cases, the identical instruments serve. These instruments follow from our theoretical discussion and we will discuss their performance more fully in connection with equation (2). For the moment, we simply list them in the note to the table. The chosen lags for the time-variant instruments are 1 or 2 years or both.

As we see in the GMM estimate in column 1, the positive influence of OPEN on FI comes out clearly. We use logs for both variables. Thus, the elasticity of influence is .63. This is a large effect, which we found to be persistent across different specifications. In our theoretical discussion, we based the effect entirely on the hedging of trade risks. But that was only done for terseness. In light of the results, some reinforcing influences should be mentioned. An obvious one is the direct inducement of exporters and importers to find home finance for their foreign clients and/or suppliers. Another is the effect of information and familiarity that we mentioned before strictly in connection with the reverse effect of FI on OPEN in equation (2). There is an earlier literature on the impact of geographical proximity on the composition of international portfolios (see Tesar and Werner (1995) and Ghosh and Wolf (2000) as well as Portes and Rey (2005)). This literature would suggest a direct link from trade to portfolio investment via first-hand knowledge and familiarity (cf. LMF (2003)).

The next two influences in column 1 refer to the two indices of domestic credit development that consistently enter significantly in our specifications out of the many that we tried in the Beck et al (2009) database. One is the (log of) the ratio of liquid liabilities of the financial sector to GDP and the other is the (log of) the ratio of deposit money bank liabilities to total bank (including central bank) assets. The former enters with a positive sign; the latter with a negative one. We interpret the former as reflecting the tendency for lower costs of finance to promote foreign asset holdings; and we interpret the latter as reflecting the tendency for greater ability to borrow domestically to reduce foreign borrowing. These interpretations are convenient; but they also stand up to examination in separate experiments with gross foreign assets and gross foreign liabilities as the measure of FI instead of the average of the two. In the estimate for assets, the

ratio of liquid liabilities to GDP enters still more significantly with the same sign while the second measure becomes insignificant. In the estimate for liabilities, the precise opposite happens.

` These two particular measures of domestic credit development play a large role in other work of the main architects, Beck et al. (2009), who have experimented widely with them. Regarding the first measure – their favorite one of all– they say:

> "Liquid liabilities to GDP is a traditional indicator of financial depth, already used by King and Levine in their seminal paper on finance and growth. It … is the broadest available indicator of financial intermediation, since it includes all banks, bank-like and non-bank financial institutions."

In the case of the second measure of domestic financial development, the authors say:

> "Countries where deposit money banks have a larger role in financial intermediation than central banks can be considered as having higher levels of financial development. Both King and Levine (1993) and Beck, Levine, and Loayza (2000) show a positive relationship between Deposit Money vs. Central Bank Assets and economic growth."

The coefficients of the two previous indicators of financial development are not directly comparable with one another even though both of them are ratios, since they have different denominators. In the first case the denominator is GDP and in the second it is total bank assets. If we set the averages of the two indicators the same (in the estimated form or in logs), so that they become of comparable dimension, the elasticity of influence of the first is larger and about 7/4 the size (in absolute terms) of the second. At .23, the first one's elasticity of influence is also much smaller than that of trade openness (.63), with which it is directly comparable since both variables are divided by GDP.

The next four variables in column 1 are not measured in logs, like the preceding, but in original form. The first two display the positive effect of financial centers and freedom of capital movements on FI. As regards freedom of capital movements, we use the de jure measures of Chinn and Ito (2006), which are continuous and time-varying (and where higher values mean more freedom). Both variables enter highly significantly. The third of these four variables is, of course, of central interest: it shows the effect of currency union on FI. As this effect is a semi-elasticity, the elasticity of influence of CU on FI is the exponential of 1.37 minus one and is ex-

tremely high, around 2.9. In addition, though the respective coefficients of Financial Center, the Chinn-Ito index and the CU measure are all semi-elasticities, they are not comparable since the first variable is a binary 0,1 term, the Chinn-Ito measure is a continuous measure going from -1.8 to 2.6 and CU goes from zero to 1. If we correct for these discrepancies in units, the influence of status as a financial center is by far the highest. It is about 4 times larger than that of either currency union or freedom of capital movements, while the last two are equivalent.[7] Of note, the output variable is insignificant, though in some other studies of financial integration a related distinction between developed, emerging and poor countries appears important (see, for example, KPT (2009)). Using output per head instead of output makes no difference.

The next two variables relate to relative price risk. In principle, countries whose output is highly positively correlated with that of the rest of the world have fewer opportunities for profitable risk diversification. The third estimate in column 1 confirms this theoretical implication: the (log of the) correlation enters with the correct negative sign. But some clarification is essential. The result obtains after we limit the measure of correlations to values of .80 and higher, or in other words, once we restrict the measure to economies that are well integrated in the world economy. If we include all countries with any positive correlation of domestic output with the rest (there are also cases of negative correlation), the variable becomes totally insignificant. But the positive correlations below .80 in these cases all concern tiny and exceptionally poor places, or war-torn countries of Africa and Asia, or very unlikely environments for foreign investment like North Korea, Cuba, and Zimbabwe, or, finally, newborn market economies after the collapse of the Soviet Union (compare Bai and Zhang (2007) and Kehoe and Perri (2004)). By restricting the analysis to correlations of .8 or higher, we retain all of the rich Middle Eastern countries, parts of South America like Argentina and Peru (with coefficients that are rather close to .8), and only lose around 80 observations, all of which were properly described before, thus leaving us with 1783. Real exchange rate volatility enters significantly with the right positive sign. We

[7] To make these comparisons, we add 1.8 to the Chinn-Ito measure to make it non-negative like the other two and then we compare the coefficient of Financial Center with that of the Chinn-Ito measure and CU at the means for positive values (which means averaging without the zeros for CU).

measure this volatility as the (log of the) absolute annual percentage change in the rate of exchange rate depreciation. But the same result holds if we measure it instead as the standard deviation of this rate of depreciation over the current and 2 or 4 previous years. We lagged the last 2 variables, relating to portfolio risk; this matters for volatility but not for the correlation coefficient which is just as significant without a lag.

Column 2 provides a pooled OLS estimate of the previous equation. The results are much the same except that the coefficients are less precisely estimated on the whole. The coefficient of openness drops from .63 to .48, which is what we would expect from negative bias coming from the positive reverse effect of FI on OPEN.

The next estimate, column 3, discloses that the influence of CU on FI stems predominantly, if not entirely, from the EMU members. Once we divide CU between EMU members and the rest, the precision of the estimate of CU for the EMU members, CUE, doubles while the estimate for the rest, CUX, drops and is only significant below conventional levels, at the 13% confidence one. This suggests that the deeper monetary integration in EMU leads to a larger positive effect. But this interpretation needs corroboration. With the Maastricht Treaty of 1993 and the arrival of EU, the earlier provisions of the Single Market Act of 1987 calling for more capital market integration (more factor mobility, the right of establishment and the absence of capital controls) became more firmly founded in law. This could then be the crux of the matter. To investigate, we constructed an EU variable exactly on the same lines as the CU one: that is, based on the percentage of trade of members of the EU with the rest relative to total trade with everyone. We then introduced this next variable after the same use of averages as before for CU in order to mitigate the problem of endogeneity. The results are in column 4. The impact of CUE drops but remains high and very significant while CUX remains insignificant at the 10% confidence level. If we consider the estimates of the influence of currency union in column 4 superior to the earlier one in column 1, as we are prone to do, the right single-value coefficient is around 1 rather than 1.31 (column 1) and the elasticity of influence of CU on FI is closer to 1.7, which is still high though lower than before. This unitary coefficient also corresponds to a semi-elasticity

of influence only around one-fifth as high as that of status as a financial center and about 15% lower than that of freedom of capital movements.

The last estimate shows what happens if we limit the study period to 1992-2005. For this sub-period, experiments show that CUE and EU cannot enter together and we retained CUE, the more important of the two in size and significance. A number of the coefficients are notably affected. But the only significant influence that disappears is that of volatility of the real exchange rate. In particular, the influence of CUE corresponds well to the earlier one for the combined influence of CUE and membership in the EU.

b. **Trade openness**

Consider next the estimates of OPEN in equation (2) in Table 2. The instruments for FI in this instance follow from the previous estimates of equation (1) and are shown in the note to the table. In this case, we lag all of the financial stock variables since they are end-of-period values, and by lagging them one period, we effectively use beginning-of-period values, or more exactly in the case of FI and the ratio of liquid liabilities to GDP, a beginning-of-period one divided by previous-year GDP.

As seen, FI shows up with a significant positive effect on OPEN. Its coefficient is around 45% the size of the one for the reverse effect of OPEN on FI in equation (1). The weaker effect of FI on OPEN than OPEN on FI is not surprising since we had stronger grounds for anticipating the latter effect. Of the two indices of domestic credit development that entered significantly before in the FI equation, only the ratio of private bank deposits to total bank assets continues to do so in this one. Of note, the latter, though lowering foreign borrowing, boosts foreign trade, as theory would predict. The next variable, output, is a control for level of economic development. However, now the variable has a second interpretation as well, as we can see by temporarily ignoring FI and the two credit market variables. If we do so, equation (2) corresponds to a country-specific version of the gravity model where the theoretical proposition of a unitary elasticity of influence of home output on aggregate trade (in levels) is simply imposed. Adding home output

in the equation can therefore be understood as paving the way for a test of the hypothesis of the unitary elasticity of influence. When the test is performed, output emerges as insignificant at conventional levels (with a coefficient that would signify little deviation from unitary elasticity in any event).[8] We lagged output like the two financial variables for no fundamental reason; this makes no difference.

As regards the gravity variables, the negative sign of (log of) population size in the estimate conforms to the idea that more people imply wider opportunities to trade at home and thereby to avoid the costs of foreign trade. Though this variable is insignificant, it is so only because of the presence of output in the equation. In the absence of output, the negative coefficient of population becomes large and highly significant (as we do not show). Next, the negative sign of (log of) land area makes sense since large domestic distances impose extra distances in foreign trade and should favor domestic trade. Literacy increases the ability to cope with the special linguistic problems associated with foreign trade, including translation. Linguistic diversity, in turn, reduces the ability to avoid linguistic problems by trading at home. This last variable may also be correlated with large immigrant communities, who would then be more prone to trade abroad. Both of these last two variables have the expected positive effect on openness. On the other hand, remoteness, landlocked, island and quality of infrastructure do not enter significantly.

The next result of column 1 in Table 2 says that currency union has no direct effect at all on trade openness. This result holds for CUE as well as CUX. Thus, the positive effect of CU on trade openness comes strictly via FI. It is interesting to compare these conclusions with those in the famous Rose literature. Based on column 4 of Table 1 together with column 1 of Table 2, the elasticity of influence of membership in the EMU on OPEN via FI is about .50 ($\exp(1.03)-1 \times .28 \cong .50$). This estimate is also statistically highly significant. Thus, widening membership in

[8] Based on the gravity model, it might also seem that we should include rest-of-the-world output in the equation as well; but this is not the case since we include time-specific effects. Those last effects, together with domestic output, cover rest-of-the-world output. As a minor point that remains notwithstanding, the output variable in column 2 should then be understood to stand partly for rest-of-world output, since the year dummies that reflect world output are the same for everyone and only the output variable reflects the small international differences in rest-of-world output.

EMU sufficiently to increase trade with other members by one percent relative to total trade will raise openness in the membership by half of one percent. On the other hand, the direct effect of EMU on OPEN, apart from FI, is nil. Of course, these results are not directly comparable with those in the Rose literature since Rose's famous conclusion that CU creates trade relates strictly to bilateral trade within the membership. Still, following Rose, experiments with the impact of currency union on trade with third-countries, based on his measure, have always shown a positive effect of currency union on outsiders too (see, for example, Micco et al. (2003) as well as Rose (2000), table 5c). Therefore, our results for the positive effect of CUE on trade agree with the Rose literature on the whole. Yet there are two differences, both of which could be laid to the fact that we look at the impact of the breadth of currency union with the rest of the world on total trade whereas the Rose literature looks at the impact of currency union between individual country pairs on their bilateral trade. First, we only find any positive effect of currency union on openness for the EMU (for CUE) and therefore for the wider degree of monetary integration that this system entails. Second, we find no effect of currency union via the usual channels that are taken for granted in the Rose literature: namely, reductions in trade frictions and increases in price transparency and competition in goods markets. The essential transmission mechanism operates through capital markets: specifically, through international portfolio diversification.

The next estimate, column 2, offers a pooled OLS estimate of the estimate in column 1. The results are essentially the same except that the influence of literacy is no longer visible. In addition, the coefficient of FI is unaffected, contrary to the expectation that it would drop because of simultaneity bias.

In the last column of Table 2, we repeat the estimate in column 1 over 1992-2005 alone. It now appears that the influence of output on trade is less than unitary. Otherwise little change of any note takes place.

c. **Consumption smoothing**

In discussing our tests of CS in Table 3, where both FI and OPEN enter (both of them

lagged), we prefer to begin by commenting upon the controls. To guard against reciprocal influence of consumption on output, we instrumented output volatility with the instruments shown in the note to Table 3. These include the volatility of rest-of-world output, lagged levels of the volatilities of output and the price of output, and lagged values of a few of the variables in the previous equations. All of our measures of volatilities are percentage changes from one year to the next, like our measure of CS. The two earlier indictors of domestic credit development appear as separate controls (lagged).

As regards the rest of the controls, some reflection of the budget constraint on households was a special concern to us. Of the available series, the most appropriate one would seem to be the ratio of tax revenues to GDP. However, the series for this ratio in the World Bank database shortened in recent years and only begins mostly since 1995 and often only since 2000, whereas when Henisz (2004) made his broad international study of policy volatility not so long ago the same database permitted him to cover 1971-1998. To the best of our ability to determine why, the answer lies in a switch of series for government finance from a cash basis to an accruals basis, beginning in the middle nineties in some countries, in the early 2000s in others, and still to come in the rest. On the other hand, the series for government consumption as a percentage of GDP remains unbroken. Further, for the limited period where we were able to use both series, the two gave corresponding results and, if combined, clearly interfered with one another. In light of this and the longer time span that the government consumption series covers, we then performed most of our experiments with the latter and will report strictly on those experiments.[9]

Further, we experimented with volatility of relative price movements in the CS equation,

[9] Fatas and Mihov (2008) also argue for favoring the government consumption measure to the one for total government revenues (or for government expenditures) in a broad international study of government influence, perhaps more strongly than we do. They maintain that the former series are more comparable internationally and less subject to breaks and definitional changes (for periods where both series exist). Of interest too, in his early attempt to test the theoretical implication of perfect risk sharing by examining the extent to which domestic private consumption can be explained by aggregate world consumption and is independent of idiosyncratic movement of home output, Obstfeld (1994) argued for removing government consumption entirely from output, as well as private and public investment, on the grounds that consumers could only share risks of output changes for the rest through portfolio diversification. Corcoran (2007) adopts Obstfeld's view. This would certainly argue for paying attention to government consumption in the analysis.

including those for nominal and real exchange rates. The only movements that gave any significant results are those concerning the absolute percentage changes in the price of consumption (CPI) relative to the price of GDP. (As regards the negative results with real exchange rates, cf. Ravn (2001) and Kollmann (2009).) This relative price movement is then the only one that we report in Table 3. In addition, all our experiments with other reflections of economic activity and with demographic variables proved nugatory. We tried movements in ratios of employment to labor, labor force participation rates and sex ratios in the labor force, and we tried movements in ratios of population 0 to 14 and 65 and over to total population. None of these variables emerged as significant.

In our estimates in Table 3, column 1 shows that a one percent movement in output results in about a 0.72 of one percent movement in consumption. This would imply that .28 of the output movement has no repercussion on consumption, and is certainly consistent with some major smoothing of output shocks. We will come back to this point in the conclusion.[10] Next, our estimate identifies two other sources of consumption volatility. One is the movement in the ratio of government consumption to GDP. A one percent movement in this ratio will produce a movement in consumption of .17 of one percent. The other influence is the movement of the ratio of the consumption price to the production price (lagged). A one percent movement in this next ratio will also raise CS by around .17 of one percent. On the other hand, we were not able to identify any positive influence of domestic financial development on consumption smoothing (or negative influence on CS). Both of our indices of financial development enter with the more or

[10] We made some experiments with more sophisticated formulations. Specifically, we tried distinguishing permanent and transitory movements of output. In principle, transitory movements would disturb consumption less, since it should be possible to smooth their effects on consumption through borrowing whereas it should not be possible to do the same in the case of permanent movements. The permanent and transitory movements did prove to be separately significant and of the right relative order of magnitude but the difference between the estimates of the two was not significant. We also tried adding cross-product terms for output volatility and level of domestic financial development (based on the liquid liability/GDP ratio) and cross-product terms for output volatility and FI (while instrumenting output volatility in both cases the same way we instrumented it generally). In principle, the response of consumption to movements of output should be lower for higher values of both terms. However, the results do not support the hypothesis and they are difficult to interpret. In addition, the presence of either or both terms does not affect the rest of our estimate of the CS equation and all of our subsequent conclusions about CS. We do not retain either experiment.

less expected negative sign, but both of them are insignificant.

Most important, the level of international financial diversification, FI, has no discernible tendency to stabilize consumption at all, and OPEN has the opposite effect of destabilizing it. One percent of extra trade openness (lagged) increases the movement of CS by .008 of one percent. Output is uniformly insignificant and changes little and has been left out in the CS equation.

Next, we introduce CUE, the indicator of EMU, and CUX, the indicator of other currency unions. As seen in column 2, CUE emerges as significant with a negative sign, implying a stabilizing effect. The elasticity of influence is small, about .02, but the effect is robust. Removing other variables in the equation, if anything, only tends to raise the estimate and its significance.

The following estimate, column 3, is a pooled OLS one of the preceding. The coefficient of output volatility goes down to .49, in line with expectations since we no longer correct for the positive reciprocal effect of consumption volatility on output volatility. Otherwise, little changes except that the influence of CUE rises to .03 and the significance of the estimate goes up while the influence of the volatility of the price of consumption relative to the price of output disappears.

The next two estimates show that the previous influence of EMU on consumption smoothing is entirely attributable to EU membership. In column 4, we add our index of the EU. Now CUE becomes totally insignificant, just like CUX, and EU appears as significant instead. Everything else is the same as compared with the preceding IV estimate in column 2. The following equation, column 5, drives home the point. One might still question that the EU is the relevant influence in column 4 on the ground that its effect might begin only in 1999, in which case its influence would be impossible to divorce from the emergence of EMU the same year. In the next equation, we break up EU into two separate measures, one before and one after 1999, using separate averages of bilateral trade relative to total trade in the two sub-periods for the two measures. The coefficients of the two measures are approximately the same both in level and significance. Therefore, the test reveals no particular change in 1999: EU would then seem to be the source of the tendency to promote consumption smoothing rather than EMU.

In column 6 we repeat the preceding estimate for 1992-2005 only (keeping only the index of EU since 1999). It shows little difference. Finally, in column 7 we return to the estimate in column 4 using standard deviations of percentage changes as a measure of instability instead of absolute percentage changes. The standard deviations rest on observations over the current and four preceding years and thus overlap over four years. There are only two differences of note. First, the impact of the volatility of the relative price variable no longer appears. Next, the impact of output volatility is about half as high. Thus, if we measure volatility over a longer observation period, a lot more smoothing of output volatility seems to occur. This could appear to be implicit but it is not. No greater smoothing of volatility of government consumption similarly emerges with the same lengthening of the measurement period.

d. **Further results**

To complete the empirical study, we present a 3SLS estimate of a chosen trio of equations (1), (2) and (3). The three estimates that we pick are those in column 4 of Table 1 concerning FI, column 1 of Table 2 for OPEN, and column 4 of Table 3 for CS. This particular set of equations seems to us the most fitting based on our discussion. Table 4, containing the joint estimate, also shows the results for FI, OPEN, and CS in three separate parts. In each part, we begin by repeating the earlier relevant GMM-IV estimate for convenience. Next, we show a re-estimate of this earlier one based on the more limited data serving for the joint 3SLS estimates in the third (and last) columns. The estimates in the second columns are then more comparable to the 3SLS estimates than the ones in the first columns. The numbers of observations – or, more properly, fitted values – in the second columns differ mildly from the common number of fitted values (1644) in the third columns because of the differences in the instruments in the two columns.

Comparing the first and second columns in Table 4, we find that the reduced sample size in the second ones makes little difference for the GMM-IV estimates in all three equations.

There are three notable differences in the 3SLS estimates. First, the coefficients of CUE and CUX in the OPEN equation now are significantly negative, especially the one for CUX.

Though our basic conclusions about the effect of EMU on trade are not affected (since the impact via capital market integration dominates), ours for CUX are. Next, openness no longer reduces consumption smoothing in the CS equation (or increases CS). Finally, and most important, the MT variable is no longer significant at conventional levels in reducing CS. The tendency of EU membership to yield consumption smoothing therefore now becomes contestable. The statistical difference between column 3 and the estimates in the other 2 columns is actually moderate. The coefficient of MT does not vary, but its standard error increases. It had been significant before at the 2% level in column 1 and the 1% level in column 2. We do not wish to minimize this difference. The 3SLS estimate is the only one that is sensitive to the covariance structure of the disturbances in our econometric model as a whole. By the same token, however, this estimate allows each of the equations to be affected by imprecision in the other two equations whereas the same is not true of the GMM-IV estimates. In addition, the 3SLS estimate assumes homoskedasticity while the GMM-IV estimates do not. We generally attach principal weight to the GMM-IV estimates.

V. **Conclusion**

In this work, we investigate the impact of EMU on consumption smoothing. We can confirm the impact of EMU on international portfolio diversification that other researchers have shown, perhaps more generally. However, we find no resulting tendency to stabilize consumption. Notwithstanding, based on our principal estimation method, we find that EU membership, not EMU as such, does tend to stabilize consumption through a separate channel. The effect is moderate but clear. Like the most part of the literature, we were essentially looking for consumption smoothing through the first channel – that is, through cross-country holdings of assets and liabilities – and can only guess about the other channel. Theory does offer a suggestion though, but it needs confirmation. It would be that the consumption smoothing stems from greater facility of obtaining credit and insurance at home and the generally heightened tradability of home capital because of capital market integration that results from foreign price competition, more con-

testable home markets and greater harmonization of regulations. This alternative channel does not imply any international risk sharing. It could also come simply from EU membership rather than EMU.

While our failure to find that international portfolio diversification enhances consumption smoothing agrees with much previous work, it does not concur with one important branch of the literature. This particular branch focuses on collective risk sharing of asymmetric output shocks. Let us return to the problem of healing the breach with this last literature. Our best estimate of the impact of output volatility on consumption volatility is around .70. This estimate pertains essentially to idiosyncratic or country-specific output movements since we control for common output movements in our tests by using time-specific effects. If we place this estimate in the context of the conflicting literature, the conclusion is that about 30 percent of the idiosyncratic output shocks are smoothed. The rest of the analysis in this other literature would then consist of decomposing the smoothed fraction of the output shocks between different channels, one of which would be cross-country holdings of assets and liabilities. Instead, we follow a different route. First, we view output shocks as only one of a number of independent sources of disturbances on consumption movements. Next, we allow that international portfolio diversification itself may possibly destabilize consumption by modifying the dynamics of price and wealth movements and the correlations between investment yields. Consequently, we directly investigate the degree to which cross-country holdings of assets and liabilities stabilize domestic consumption. It is then clear that we can get different – even opposite – results.

In closing, we should emphasize that our assessment of the impact of EMU on consumption smoothing does not permit a general verdict about the welfare impact of EMU. By affecting integration of goods and capital markets, EMU will also affect the allocation of resources and might influence economic growth. We only investigate one particular avenue of influence on welfare. It is a major avenue that receives much attention; but it is only one.

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Appendix A Data Description

TABLE 1 Variable Definition

	Definitions and Sources
Trade openness	The average of export and import to GDP ratios. Source: WDI
Financial Integration	The average of total assets and total liabilities to GDP ratios. Source: Lane and Milesi Ferretti (2007) and update from the authors.
Liquid Liabilities/GDP	Liquid liabilities to GDP ratio. Source: Beck et al (2009)
Deposits to Total (including Central Bank) Bank Assets	Ratio of deposit money bank claims on domestic nonfinancial real sector to the sum of deposit money bank and Central Bank claims on domestic nonfinancial real sector. Source: Beck et al (2009)
Consumption smoothing	The absolute value of % change in household consumption expenditure. Source: WDI (2008)
Volatility of government consumption	The absolute value of % change in government consumption to GDP. Source: WDI (2008)
Volatility of the ratio of CPI to GDP deflator	The absolute value of % change in the ratio of CPI to GDP deflator. Source: WDI (2008)
Volatility of output	The absolute value of % change in GDP at constant US 1990 prices. Source WDI (2008)
Currency Union	Trade with countries sharing the same currency to total trade. Sources: for trade, UN Direction of Trade Stats and WDI (2008); for currency unions, Glick and Rose (2002), updated with IMF International Financial Statistics.
CUE or EMU	Trade with other EMU members relative to total trade. Source: UN Direction of Trade Stats and WDI (2008).
CUX or Currency Union outside EMU	Trade with other countries sharing the same currency relative to total trade except for the euro. Source: UN Direction of Trade Stats and WDI (2008)
Maastricht Treaty	Trade with other signatories of the Maastricht treaty relative to total trade. Source: UN Direction of Trade Stats and WDI (2008)
Correlation of home output with ROW output	All positive values of correlations of home output to ROW output above 80%.
Volatility of the real exchange rate	The absolute value of the % change in the real exchange rate. Source IFS and Penn World Tables 6.2 data
Financial Center	Lane and Milesi Ferretti (2008)
Chinn-Ito Index	De jure measure (continuous). Source: Chinn and Ito (2007)
OECD	Pre-1994 member countries of the OECD except Turkey
Area	Source: CIA country factbook.
Literacy Rate	Source: CIA country factbook.
Language diversity	Source: Grimes (2000)
Population	Source: WDI (2008)

Appendix B

TABLE 1 Financial Integration (log):

	GMM-IV (1)	Pooled OLS (2)	GMM-IV (3)	GMM-IV (4)	GMM-IV (5) 1992-2006
OPEN : Trade Openness (log)	0.630***	0.478***	0.626***	0.602***	0.534***
	(0.08)	(0.09)	(0.08)	(0.08)	(0.07)
Liquid Liabilities / GDP (log)	0.228***	0.204**	0.228***	0.233***	0.161**
	(0.06)	(0.08)	(0.06)	(0.06)	(0.07)
Deposits / Total Bank (incl. Central Bank) Assets (log)	-0.381***	-0.331***	-0.375***	-0.366***	-0.120**
	(0.07)	(0.08)	(0.07)	(0.07)	(0.06)
Financial Center (0, 1)	0.985***	1.085***	0.991***	0.955***	1.122***
	(0.18)	(0.17)	(0.18)	(0.19)	(0.12)
Chinn-Ito Index	0.123***	0.117***	0.120***	0.114***	0.127***
	(0.02)	(0.03)	(0.02)	(0.02)	(0.02)
CU: Currency Union (0-1)	1.368***	1.263***			
	(0.26)	(0.32)			
CUE: EMU (0-1)			1.361***	1.032***	1.350***
			(0.14)	(0.15)	(0.16)
CUX: CU outside EMU (0-1)			0.99	0.960	0.769
			(0.64)	(0.67)	(0.51)
Maastricht Treaty (0-1)				0.362***	
				(0.14)	
Output (log)	-0.016	-0.035	-0.019	-0.027	-0.004
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Correlation of home output with ROW (.8-1) (log, lagged)	-2.906***	-2.318***	-2.868***	-2.978***	-3.187***
	(0.69)	(0.93)	(0.69)	(0.70)	(0.81)
Absolute value of exchange rate depreciation (log, lagged)	0.016**	0.02	0.016**	0.015**	0.003
	(0.007)	(0.01)	(0.007)	(0.007)	(0.01)
Observations	1783	1975	1783	1783	981
Number of Countries	91	101	91	91	91
Time dummy	Yes	Yes	Yes	Yes	Yes
R-squared		0.65			
Sargan-Hansen J Statistic (p-value)	15.21		15.14	14.62	16.77
	(0.17)		(0.18)	(0.20)	(0.11)
Cragg-Donald Under-identification Test (p-value)	39.24		41.39	40.76	38.16
	(0.00)		(0.00)	(0.00)	(0.00)

Notes: The dependent variable is the measure of financial integration in LML (2007) and is computed from total assets and liabilities available in their study. The standard errors, reported in parentheses, are corrected for clusters across country observations. GMM-IV is the generalized method of moments estimator. The instruments for OPEN are twice-lagged values of OPEN, once- and twice-lagged values of liquid liabilities and bank deposits ratios, lagged values of population, and remoteness, land area, landlocked, island, literacy and linguistic diversity. The Sargan-Hansen test is a test of over-identifying restrictions. Under the null, the test statistic is distributed as chi-square. P-values are reported in the parenthesis. The Cragg-Donald test statistic is a chi-square under the null hypothesis of under-identification. P-values are reported in the parenthesis. The asterisks ***, **, and * indicate that the coefficient is statistically different from zero respectively at the 1% , 5%, and 10% level of significance.

TABLE 2 Trade Openness (log):

	GMM-IV (1)	Pooled OLS (2)	GMM-IV (3) 1992-2006
FI : Financial Integration (log, lagged)	0.276***	0.277***	0.221***
	(0.06)	(0.06)	(0.07)
Liquid Liabilities / GDP (log, lagged)	-0.012	0.099	0.011
	(0.07)	(0.09)	(0.07)
Deposits / Total Bank (incl. Central Bank) Money Assets (log, lagged)	0.432***	0.386***	0.409***
	(0.06)	(0.10)	(0.10)
Output (log, lagged)	-0.053	-0.055	-0.087***
	(0.03)	(0.06)	(0.03)
Population (log, lagged)	-0.054	-0.085	-0.033
	(0.04)	(0.06)	(0.04)
Area (log)	-0.087***	-0.061*	-0.079***
	(0.02)	(0.03)	(0.03)
Literacy rate (0-1)	0.572**	0.453	0.957***
	(0.24)	(0.39)	(0.23)
Language diversity (0-1)	0.186*	0.252*	0.293**
	(0.11)	(0.15)	(0.12)
CUE: EMU (0-1)	-0.191	-0.061	-0.045
	(0.17)	(0.20)	(0.18)
CUX : CU outside EMU (0-1)	-0.25	-0.060	-0.067
	(0.36)	(0.37)	(0.46)
Observations	1836	2241	1005
Number of Countries	93	101	93
Time dummy	Yes	Yes	Yes
R-squared		0.54	
Sargan-Hansen J Statistic	11.29		8.37
(p-value)	(0.26)		(0.50)
Cragg-Donald Under-identification Test	36.82		27.56
(p-value)	(0.00)		(0.00)

Notes: The dependent variable is trade openness as measured by the average of the ratio of exports and imports to GDP. The standard errors, reported in parentheses, are corrected for clusters across country observations. GMM-IV is the generalized method of moments estimator. The instruments for (lagged) FI are twice-lagged values of FI, twice- and thrice-lagged values of liquid liabilities and bank deposits ratios, lagged values of output correlations and the Chinn-Ito index, and remoteness, landlocked and island. The Sargan-Hansen test is a test of over-identifying restrictions. Under the null, the test statistic is distributed as chi-square. P-values are reported in the parenthesis. The Cragg-Donald test statistic is a chi-square under the null hypothesis of under-identification. P-values are reported in the parenthesis. The asterisks ***, **, and * indicate that the coefficient is statistically different from zero respectively at the 1% , 5%, and 10% level of significance.

TABLE 3 Consumption Smoothing:

	GMM-IV (1)	GMM-IV (2)	Pooled OLS (3)	GMM-IV (4)
Output Volatility	0.719***	0.693***	0.486***	0.685***
	(0.08)	(0.08)	(0.10)	(0.08)
OPEN: Trade Openness (log, lagged)	0.008***	0.007***	0.008***	0.007***
	(0.002)	(0.002)	(0.003)	(0.002)
FI: Financial Integration (log, lagged)	-0.001	-0.000	0.001	0.001
	(0.002)	(0.00)	(0.003)	(0.002)
Liquid Liabilities / GDP (log, lagged)	-0.002	-0.002	-0.003	-0.001
	(0.002)	(0.00)	(0.003)	(0.002)
Deposits to Total Bank (incl. Central Bank) Assets (log, lagged)	-0.004	-0.004	-0.008	-0.004
	(0.006)	(0.01)	(0.008)	(0.006)
Volatility of Government Consumption	0.171***	0.172***	0.199***	0.172***
	(0.03)	(0.03)	(0.06)	(0.03)
Volatility of the ratio of CPI to GDP deflator (lagged)	0.168***	0.167***	0.153	0.165**
	(0.06)	(0.06)	(0.12)	(0.06)
CUE: EMU (0-1)		-0.02**	-0.028***	-0.007
		(0.008)	(0.01)	(0.008)
CUX: CU outside EMU (0-1)		0.02	0.013	0.018
		(0.02)	(0.02)	(0.02)
Maastricht Treaty (0-1)				-0.0135**
				(0.006)
Observations	2248	2248	2397	2248
Number of Countries	125	125	125	125
Time dummy	Yes	Yes	Yes	Yes
R-squared			0.27	
Sargan-Hansen J Statistic	6.94	7.21		7.13
(p-value)	(0.23)	(0.21)		(0.21)
Cragg-Donald Under-identification Test	39.13	38.17		38.16
(p-value)	(0.00)	(0.00)		(0.00)

Notes: The dependent variable is the absolute value of the % change in private consumption since the previous year. The standard errors, reported in parenthesis, are corrected for clusters across country observations. GMM-IV is the generalized method of moments estimator. The instruments for output volatility (the absolute value of the % change in output since the previous year) are rest-of-world output volatility, lagged output volatility, twice-lagged values of liquid liabilities and bank deposit ratios, and twice-lagged values of volatilities of, both, government consumption-GDP ratios and the absolute value of GDP price inflation. The Sargan-Hansen test is a test of over-identifying restrictions. Under the null, the test statistic is distributed as chi-square. P-values are reported in the parenthesis. The Cragg-Donald test statistic is a chi-square under the null hypothesis of under-identification. P-values are reported in the parenthesis. The asterisks ***, **, and * indicate that the coefficient is statistically different from zero respectively at the 1% , 5%, and 10% level of significance.

TABLE 3 Continued Consumption Smoothing:

	GMM-IV (5)	GMM-IV (6)	GMM-IV (7)
		1992-2005	Standard dev[+]
Output Volatility[+]	0.687***	0.634***	0.378***
	(0.08)	(0.1)	(0.11)
OPEN: Trade Openness (log, lagged)	0.007***	0.007**	0.006***
	(0.002)	(0.003)	(0.002)
FI: Financial Integration (log, lagged)	0.000	-0.002	0.002
	(0.00)	(0.002)	(0.002)
Liquid Liabilities / GDP (log, lagged)	-0.001	-0.005*	-0.003
	(0.002)	(0.003)	(0.002)
Deposits to Total Bank (incl. Central Bank) Assets (log, lagged)	-0.004	0.000	-0.005
	(0.006)	(0.01)	(0.007)
Volatility of Government Consumption[+]	0.172***	0.151***	0.148***
	(0.03)	(0.03)	(0.03)
Volatility of the ratio of CPI to GDP deflator (lagged)[+]	0.165**	0.223***	0.09
	(0.06)	(0.06)	(0.10)
CU: EMU (0-1)			-0.002
			(0.004)
CUX: CU outside EMU (0-1)	0.018	-0.004	0.016
	(0.02)	(0.03)	(0.04)
Maastricht Treaty (0-1)			-0.007*
			(0.004)
Maastricht Treaty: Pre-1999 (0-1)	-0.017***		
	(0.006)		
Maastricht Treaty: Post-1999 (0-1)	-0.014**	-0.013*	
	(0.006)	(0.007)	
Observations	2248	1398	1937
Number of Countries	125	125	124
Time dummy	Yes	Yes	Yes
Sargan-Hansen J Statistic	7.17	7.95	3.94
(p-value)	(0.21)	(0.16)	(0.56)
Cragg-Donald Under-identification Test	38.94	35.99	44.36
(p-value)	(0.00)	(0.00)	(0.00)

[+]In column 7, the measures of volatility are standard deviations (over 5 years) rather than absolute percentage changes from the preceding year. This concerns the variables with a "+" sign on the left: output volatility, volatility of government consumption/GDP and volatility of the CPI relative to the price of GDP.

TABLE 4 Part A Financial Integration (log)

	GMM-IV (1)	GMM-IV (2)	3SLS (3)
OPEN : Trade Openness (log)	0.602***	0.608***	0.851***
	(0.08)	(0.08)	(0.02)
Liquid Liabilities / GDP (log)	0.233***	0.230***	0.113***
	(0.06)	(0.06)	(0.02)
Deposits / Total Bank (incl. Central Bank) Assets (log)	-0.366***	-0.369***	-0.446***
	(0.07)	(0.06)	(0.03)
Financial Center (0, 1)	0.955***	0.915***	0.816***
	(0.18)	(0.19)	(0.06)
Chinn-Ito Index	0.114***	0.113***	0.075***
	(0.02)	(0.02)	(0.01)
CUE: EMU (0-1)	1.032***	1.020**	0.925***
	(0.15)	(0.15)	(0.15)
CUX: CU outside EMU (0-1)	0.960	1.130*	1.220***
	(0.67)	(0.605)	(0.17)
Maastricht Treaty (0-1)	0.362	0.328**	0.358***
	(0.14)	(0.14)	(0.08)
Output (log)	-0.027	-0.014	0.037***
	(0.03)	(0.03)	(0.01)
Correlation of home output with ROW (0.8-1) (log, lagged)	-2.978***	-3.211***	-2.929***
	(0.70)	(0.70)	(0.28)
Absolute value of exchange rate depreciation (log, lagged)	0.015**	0.017**	0.014*
	(0.007)	(0.007)	(0.007)
Observations	1783	1645	1644
Number of Countries	91	91	91
Time dummy	Yes	Yes	Yes
R-squared			0.64
Sargan-Hansen J Statistic	14.62	13.56	
(p-value)	(0.20)	(0.26)	
Cragg-Donald Under-identification Test	40.76	40.51	
(p-value)	(0.00)	(0.00)	

Notes: The dependent variable is the measure of financial integration in LML (2007) and is computed from total assets and liabilities available in their study. The standard errors, reported in parentheses, are corrected for clusters across country observations. GMM-IV is the generalized method of moments estimator. The instruments for OPEN are twice-lagged values of OPEN, once- and twice-lagged values of liquid liabilities and bank deposits ratios, lagged values of population, and remoteness, land area, landlocked, island, literacy and linguistic diversity. The Sargan-Hansen test is a test of over-identifying restrictions. Under the null, the test statistic is distributed as chi-square. P-values are reported in the parenthesis. The Cragg-Donald test statistic is a chi-square under the null hypothesis of under-identification. P-values are reported in the parenthesis. The asterisks ***, **, and * indicate that the coefficient is statistically different from zero respectively at the 1%, 5%, and 10% level of significance.

TABLE 4 Part B Trade Openness (log)

	GMM-IV (1)	GMM-IV (2)	3SLS (3)
FI : Financial Integration (log, lagged)	0.276***	0.240***	0.405***
	(0.06)	(0.06)	(0.01)
Liquid Liabilities / GDP (log, lagged)	-0.012	0.060	0.044**
	(0.07)	(0.06)	(0.02)
Deposits / Total Bank (incl. Central Bank) Money Assets (log, lagged)	0.432***	0.315***	0.401***
	(0.06)	(0.04)	(0.02)
Output (log, lagged)	-0.053	-0.098***	-0.110***
	(0.03)	(0.03)	(0.01)
Population (log, lagged)	-0.054	-0.010	-0.004
	(0.04)	(0.03)	(0.01)
Area (log)	-0.087***	-0.082***	-0.061***
	(0.02)	(0.02)	(0.01)
Literacy rate (0-1)	0.572***	0.853***	0.665***
	(0.24)	(0.18)	(0.05)
Language diversity (0-1)	0.186***	0.180*	0.187***
	(0.11)	(0.10)	(0.03)
CUE: EMU (0-1)	-0.191	-0.088	-0.184**
	(0.17)	(0.14)	(0.09)
CUX : CU outside EMU (0-1)	-0.25	0.071	-0.441***
	(0.36)	(0.33)	(0.13)
Observations	1836	1540	1644
Number of Countries	93	90	90
Time dummy	Yes	Yes	Yes
R-squared			0.63
Sargan-Hansen J Statistic	11.29	11.47	
(p-value)	(0.26)	(0.24)	
Cragg-Donald Under-identification Test	36.82	34.38	
(p-value)	(0.00)	(0.00)	

Notes: The dependent variable is trade openness as measured by the average of the ratio of exports and imports to GDP. The standard errors, reported in parentheses, are corrected for clusters across country observations. GMM-IV is the generalized method of moments estimator. The instruments for (lagged) FI are twice-lagged values of FI, twice- and thrice-lagged values of liquid liabilities and bank deposits ratios, lagged values of output correlations and the Chinn-Ito index, and remoteness, landlocked and island. The Sargan-Hansen test is a test of over-identifying restrictions. Under the null, the test statistic is distributed as chi-square. P-values are reported in the parenthesis. The Cragg-Donald test statistic is a chi-square under the null hypothesis of under-identification. P-values are reported in the parenthesis. The asterisks ***, **, and * indicate that the coefficient is statistically different from zero respectively at the 1% , 5%, and 10% level of significance.

TABLE 4 Part C Consumption Smoothing:

	GMM-IV (1)	GMM-IV (2)	3SLS (3)
Output Volatility	0.685***	0.660***	0.552***
	(0.08)	(0.08)	(0.05)
OPEN: Trade Openness (log, lagged)	0.007***	0.009***	0.003
	(0.002)	(0.003)	(0.004)
FI: Financial Integration (log, lagged)	0.001	-0.002	0.006*
	(0.002)	(0.002)	(0.003)
Liquid Liabilities / GDP (log, lagged)	-0.001	-0.000	-0.005
	(0.002)	(0.003)	(0.00)
Deposits to Total Bank (incl. Central Bank) Assets (log, lagged)	-0.004	-0.004	0.005
	(0.006)	(0.004)	(0.005)
Volatility of Government Consumption	0.172***	0.164***	0.270***
	(0.03)	(0.04)	(0.02)
Volatility of the ratio of CPI to GDP deflator (lagged)	0.165**	0.212***	0.184***
	(0.06)	(0.07)	(0.03)
CUE: EMU (0-1)	-0.007	-0.005	-0.011
	(0.008)	(0.01)	(0.02)
CUX: CU outside EMU (0-1)	0.018	0.007	-0.015
	(0.02)	(0.03)	(0.02)
Maastricht Treaty (0-1)	-0.0135**	-0.011***	-0.015
	(0.006)	(0.004)	(0.012)
Observations	2248	1637	1644
Number of Countries	125	91	91
Time dummy	Yes	Yes	Yes
R-squared			0.26
Sargan-Hansen J Statistic	7.13	7.14	
(p-value)	(0.21)	(0.62)	
Cragg-Donald Under-identification Test	38.16	40.40	
(p-value)	(0.00)	(0.00)	

Notes: The dependent variable is the absolute value of the % change in private consumption since the previous year. The standard errors, reported in parenthesis, are corrected for clusters across country observations. GMM-IV is the generalized method of moments estimator. The instruments for output volatility (the absolute value of the % change in output since the previous year) are rest-of-world output volatility, lagged output volatility, twice-lagged values of liquid liabilities and bank deposit ratios, and twice-lagged values of volatilities of government consumption-GDP ratios and the absolute value of GDP price inflation. The Sargan-Hansen test is a test of over-identifying restrictions. Under the null, the test statistic is distributed as chi-square. P-values are reported in the parenthesis. The Cragg-Donald test statistic is a chi-square under the null hypothesis of under-identification. P-values are reported in the parenthesis. The asterisks ***, **, and * indicate that the coefficient is statistically different from zero respectively at the 1% , 5%, and 10% level of significance.