The Real Effects of Financial Integration

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Abstract

Fluctuations in GDP are more synchronized internationally than fluctuations in Consumption, and they remain so even between financially integrated economies, where the ranking should in theory be the reverse. This paper shows this happens because correlations in GDP fluctuations rise with financial integration. Finance serves to increase international correlations in both consumption and GDP fluctuations, which explains the persistent gap between the two in the data. The positive association between financial integration and GDP correlation constitutes a puzzle, as theory suggests a negative relation if anything. Nevertheless, it prevails in the data even after the effects of finance on trade and specialization are accounted for.

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1 Introduction

In theory, consumption patterns between financially integrated regions should be more synchronized than production, for two reasons. First, capital flows follow returns differentials, which results in negative output correlations.[1] Second, agents consume out of a fully diversified portfolio wealth, resulting in perfectly correlated consumption plans. The overwhelming rejection of this ranking in the data was famously labelled a "quantity puzzle" by Backus, Kehoe and Kydland (1994). This paper shows the main reason for the anomaly lies in the response of output correlations to financial links, not in that of consumption.

There are two prominent and non exclusive explanations to the quantity puzzle.

Hypothesis A - Capital flows are restricted, effective diversification is limited and consumption plans remain largely idiosyncratic, and less correlated internationally than GDP fluctuations.

Hypothesis B - Capital flows are governed by motives reflective of imperfect information, and tend to herd rather than respond to differentials in returns. Thus, fluctuations in output can become more rather than less synchronized between financially integrated regions. This paper constructs a cross-section of bilateral output and consumption correlations across countries to investigate the relevance of these conjectures.

Unsurprisingly, the data suggest that financial integration results in significantly higher consumption correlations. This result, akin to Lewis (1996), provides support in favor of hypothesis A. The quantity puzzle is a manifestation of restrictions to capital flows, and, *holding output correlations constant*, the discrepancy diminishes once restrictions to capital flows are accounted for. That said however, in the data output correlations are not invariant to financial flows, and indeed tend to rise with financial integration, as under hypothesis B. In fact, increases in output and consumption correlations are roughly of equal magnitudes, so much so that the discrepancy is invariant to capital flows. In the data, consumption remains less correlated than output even between financially integrated economies, and this happens not because risk-sharing and consumption correlations are low, but rather because finance synchronizes GDP fluctuations. While the former effect is consistent with theory, the latter is not, and holds therefore the key to the quantity puzzle.

[1] Kehoe and Perri (2002) refine the argument, introducing enforcement constraints whereby capital does not flow to the high return country, lest it chooses to default. The intuition is however similar: if capital flows, it is between economies that are out of phase.

Two immediate explanations spring to mind. First, there is increasing evidence that financial flows depend on the information afforded by goods trade, and are predicted by the same gravity model that captures trade in goods.[2] And theoretically, a balance of payments view suggests integration in the goods and assets markets may go hand in hand. Thus, the measured effect of finance on cycle synchronization could be but a reflection of the well-known fact that trade partners experience synchronized business cycles, due to Frankel and Rose (1998). Second, finance affords specialization, in either different or similar economic activities. One view contends that access to asset markets unhinges consumption from production, which then becomes free to specialize according to comparative advantage, for instance. Financially integrated economies would then tend to specialize differently, and be less synchronized as a result. On the other hand, finance may afford specialization in activities particularly needful of external funds, for instance risky ones as in Obstfeld (1994). Financially integrated economies would then tend to specialize similarly, and be more synchronized as a result.[3] Therefore, the measured effect of finance on synchronization could merely reflect finance-induced specialization.

This paper disentangles these channels, using a simultaneous equation approach to identify a strong residual direct effect of finance on cycle synchronization, over and above indirect channels working via goods trade or specialization. In particular, financial integration is shown to increase goods trade, as well as specialization. Depending on the measure used, finance-induced specialization appears to occur in similar economic activities, thus lending credence to Obstfeld (1994) conjecture. In most cases however, the residual (direct) effect of finance on cycles remains, and it is larger than the effect on consumption correlations. Understanding the reason why holds the key to the quantity puzzle.

The paper confronts two empirical difficulties. First, until recently, the measurement of international financial integration has been hampered by the lack of public data on bilateral capital flows for other economies than the US.[4] The alternative approaches making up for this absence include the standard indices of restrictions to capital accounts published by the IMF or proxies based on net external positions. Here however,

[2]See Oh, Portes and Rey (2001) or Lane and Milesi-Ferretti (2003).

[3]For evidence going the former way, see Kalemli-Ozcan et al (2001, 2003). For evidence going the latter way see Rajan and Zingales (1998). For evidence that both effects are at play at different horizons, see Fisman and Love (2003)

[4]Data on capital flows originating from the U.S are readily available, as described for instance in Griever, Lee and Warnock (2001).

actual data on bilateral asset holdings, recently made available for a large sample of country pairs in 2001, are used to directly measure the extent of financial integration.[5] A second issue pertains to the endogeneity of financial integration to business cycles. International business cycles theory suggests that, if unfettered, capital should flow between countries at different stages of their business cycles. This induces a negative endogeneity bias on regressions explaining cycle synchronization with access to finance. The paper uses institutions-based instruments for financial integration inspired from LaPorta et al (1998) to account for this possibility.[6]

The rest of the paper proceeds as follows. Section 2 reviews the relevant literature and introduces the paper's estimation and data. The main results are in Section 3, with estimates of the effect of finance on GDP correlations, followed by a decomposition into its direct and indirect components. Section 4 turns to risk-sharing, compares the effects of finance on correlations in consumption and in GDP, and shows the discrepancy is invariant to financial integration. Section 5 concludes.

2 Methodology

This Section reviews the relevant literature and introduces the estimation methodology. Data sources and a description of the main variables follow.

2.1 Literature

This paper borrows from two distinct literatures: one concerned with risk sharing and its relation with consumption correlations, the other concerned with international business cycles synchronization. They are both reviewed next.

Under complete markets, the social planner equates the marginal utilities of consumption across countries, adjusted for the real exchange rate if Purchasing Power Parity (PPP) does not hold. Abstracting from non traded goods -if they are separable in utility- isoelastic preferences then imply that consumption plans be perfectly correlated. They are not. Lewis (1999) surveys three explanations. (i) Traded and non

[5] For a description of these data, see Lane and Milesi-Ferretti (2003). They are concerned with the determinants of capital flows, while the focus here is on their consequences on the real economy.

[6] The presence of this bias only makes a positive coefficient harder to obtain. Although it is accounted for in what follows, endogeneity works against the results in the paper.

traded goods are imperfect substitutes in consumption, and it is only the marginal utilities of consumption in traded goods that are equated internationally. (ii) There are restrictions to international diversification, and (iii) the gains from risk sharing are too small to motivate actual diversification.

A considerable literature has evaluated the empirical content of these explanations. Tesar (1993) and Stockman and Tesar (1995) show that, in theory, introducing non-traded goods can lower the international correlation between consumption growth rates. But Lewis (1997) shows that domestic consumption continues to correlate significantly with domestic output even when non-traded goods are accounted for, an indication that consumption insurance is imperfect. However, Lewis (1996) shows that when corrections for both the presence of non-traded goods consumption and institutional restrictions to capital flows are performed, the coefficient becomes non significant. Her results are indicative that income insurance exists in the data when measured appropriately, and if not hampered by regulatory restrictions.[7]

Alternative, more recent, approaches propose to investigate the extent of risk-sharing allowing for deviations from PPP. In a sample of twelve OECD countries, Ravn (2003) finds that adjusting for variations in the real exchange rate is largely irrelevant for tests of risk sharing based on observed consumption plans, even though the adjustment is crucial in theory. Brandt, Cochrane and Santa Clara (2003) take the opposite route and reason that the real exchange rate is directly observable whereas marginal utilities are not. They argue the volatility of marginal utilities implied by equity premia dwarves the volatility of the real exchange rate, by a factor of three. Purely observable asset prices point to extensive risk sharing, that model-based quantities may well overlook completely.

While the evidence based on quantities is at best weakly supportive of risk sharing, asset prices imply on the contrary extensive international insurance. This paper deals exclusively with quantities (and the afferent puzzle), and therefore cannot shed light on this apparent contradiction. Rather, it purports to stress the systematic effect of financial integration on international output correlations. Quantity-based measures do suggest little risk sharing internationally, but that is not the only (nor perhaps the main) reason for the quantity puzzle.

Backus, Kehoe and Kydland (1994) remains the workhorse model of international

[7] Lane (2001) presents dissenting evidence, based on assets yields, suggestive that holdings of foreign assets do not generate income insurance. He concludes the jury is still very much out, as his results do not rule out some income insurance via capital gains rather than asset yields.

business cycles. Kehoe and Perri (2002) introduce a model in the same tradition, where limited enforcement is crucial in determining the international correlations of output and consumption. In Backus, Kehoe and Kydland (1994), complete markets result in negatively correlated GDP because capital flows into the economy hit by a positive technology shock, and away from the no-shock economy. Kehoe and Perri show that limited enforcement results in lower capital flows, as the value of defaulting would increase in the booming economy if it indeed were the recipient of international investment. As a result, the social planner endogenously limits capital flows, and international GDP correlations are higher. By the same token, without limited enforcement, citizens of the country with the positive shock would normally share their gains with the rest of the world. But having to do so once again increases the value of default, so risk sharing is limited and consumption growth rates are less correlated. Models with exogenously restricted access to bond markets have drastically different implications, as negative output correlations and large consumption correlations obtain, if to a lesser extent than in the canonical complete markets model. In short, the quantity puzzle is resolved, because there are endogenous limitations to capital flows and risk sharing, resulting in higher GDP correlations, and in lower consumption correlations. If large capital flows are observed, however, the theory continues to imply negatively correlated GDP fluctuations, even with limited enforcement.

We know little about the relation between financial integration and cycles synchronization in the data, probably more because there is little data than for lack of interest. Kose, Prasad and Terrones (2003) is an exception, which finds some evidence that financially open developing economies have synchronized cycles with a core of rich G7 countries. But their focus is mainly on correlations in output as opposed to consumption, and they do not use the CPIS data on effective asset cross-holdings. Bordo and Helbling (2003) document a long-run increase in cycles synchronization, but conclude little of it can be ascribed to financial integration as proxied by the removal of capital controls. They confirm the important conceptual difference between de jure measures based on restrictions to capital flows, and de factor ones, which did not exist for many countries until recently.

International correlations in GDP fluctuations are an object of intense scrutiny in their own right, beyond the role of finance. A considerable empirical literature has concerned itself with their determinants, and provides guidance in choosing the specification in this paper. Frankel and Rose find a large and significant effect of bilateral intensity, a result confirmed in numerous subsequent studies.[8] Imbs (2001), Clark and

[8] And sometimes questioned on theoretical ground, as for instance in Kose and Yi (2002).

vanWincoop (2001) or Kalemli-Ozcan, Sorensen and Yosha (2001) document a significant impact of specialization patterns, as economies with the same sectors tend to be subjected to similar shocks. Alesina, Barro and Tenreyro (2002) or Rose (2000) stress the importance of currency unions, working indirectly via increased trade. Finally, Imbs (2004) assesses the relative magnitude of these channels going both directly and indirectly from trade integration, specialization and financial integration to business cycles synchronization.

2.2 Estimation

The paper has three objectives: estimating the link between (i) financial integration and GDP correlations, (ii) financial integration and risk-sharing as measured by consumption correlations, and (iii) the difference between the two effects. The signs of relations (i) and (ii) are obtained following well established estimation methods. Evaluating (iii) requires combining insights coming from two different literatures.

Starting with Frankel and Rose (1998), a flurry of papers have taken interest in the empirical determinants of international GDP correlations. Most of them estimate variants of

$$\rho_{ij}^{Y} = \alpha_0 + \alpha_1 \, \Phi_{ij} + \alpha_2 \, T_{ij} + \alpha_3 \, S_{ij} + \alpha_4 \, X_{ij} + \varepsilon_{ij} \tag{1}$$

where ρ_{ij}^{Y} denotes the Pearson correlation between the cyclical components of GDP countries i and j, T_{ij} captures the intensity of bilateral goods trade between the two countries, S_{ij} is a measure of similarities in sectoral patterns of production, and X_{ij} is a vector of control variables affecting ρ_{ij}^{Y} directly, including for instance the convergence in policies or currency unions. α_1 is the coefficient of interest. Next section discusses in detail how all variables are measured.

Equation (1) only provides reduced form estimates for the effects finance, trade and structure on cycles synchronization, but no notion of indirect as against direct effects. For instance, estimates of α_1 in equation (1) embed the direct impact of finance on cycles, but also its putative indirect effects working via goods trade or specialization. The coefficient could be significantly positive just because access to financial markets boosts T_{ij} (and thus indirectly ρ_{ij}^{Y}), or affords specialization in risky sectors, without there being any direct effects of finance on cycles. To disentangle direct from indirect channels, a simultaneous equation approach akin to Imbs (2004) is proposed, which

estimates jointly the system (S):

$$\begin{aligned}
\rho_{ij}^{Y} &= \alpha_0 + \alpha_1\ \Phi_{ij} + \alpha_2\ T_{ij} + \alpha_3\ S_{ij} + \alpha_4\ X_{ij} + \varepsilon_{ij}^{1} \\
\Phi_{ij} &= \beta_0 + \beta_1\ T_{ij} + \alpha_2\ I_{ij}^{1} + \varepsilon_{ij}^{2} \\
T_{ij} &= \gamma_0 + \gamma_1\ \Phi_{ij} + \gamma_2\ I_{ij}^{2} + \varepsilon_{ij}^{2} \\
S_{ij} &= \delta_0 + \delta_1\ \Phi_{ij} + \delta_2\ I_{ij}^{3} + \varepsilon_{ij}^{3}
\end{aligned}$$

Any direct impact of finance on cycles are captured by estimates of α_1. In turn, $\gamma_1.\alpha_2$ and $\delta_1.\alpha_3$ capture the indirect effects of finance working via trade and specialization, respectively. The system also allows for the possibility that it is the pre-existence of trade linkages that tends to result in capital flows, with β_1.[9] Identification of the system (S) requires distinct instruments sets for Φ, T and S. One of this paper's contribution is to instrument financial integration with institutional variables, making econometric use of the result in La Porta et al (1998) that legal institutions are important determinants of financial development. Their result is extended to bilateral financial depth, and indeed, the development of domestic financial markets is likely to result in international financial linkages. This will for instance happen as international investors find it easier to access to domestic assets, or as the degree of sophistication associated with domestic financial transactions extend to international operations.

Instruments for trade and specialization are standard. An enormous empirical literature has relied on the gravity model of international trade in choosing instruments for T, as geographic variables are both obviously exogenous and strong predictors of trade flows. Specialization patterns, and in particular whether two countries share similar activities, is less easy to instrument. Imbs (2004) builds on Imbs and Wacziarg (2003) in arguing the level of development is a prominent determinant of specialization patterns. S is instrumented with both the pairwise sum and difference of per capita GDP, reasoning that rich economies tend to be more diversified, and thus potentially more similar, whereas poor countries are specialized, typically in different primary products.[10]

[9] The system could easily be complicated further, including channels between trade and specialization, as in Imbs (2004), with a view to decomposing the effects of trade into inter- and intra-industry components. This is however of no direct relevance to the present paper. As for the possiblity that specialization be trade-induced, Imbs (2004) -and others before- have concluded the effect is negligible.

[10] The validity of these instruments rests on the premise that specialization is a consequence of development, rather than the other way round. While this is controversial at best, Imbs and Wacziarg

These choices for I^1, I^2 and I^3 enable identification of the system (S), and also tackle issues of endogeneity, for instance of T to ρ^Y. In particular, financial integration is endogenous in equation (1), since agents may choose to diversify and invest in economies whose cyclical properties are different from their own. This is an attenuating bias, and thus makes the result that $\alpha_1 > 0$ even more remarkable, but instrumented variables estimations helps ensuring the bias is indeed that suggested by theory.

Equation (1) and the system (S) are both based on a cross-section of bilateral GDP correlations. The cross-sectional approach is ill-suited to answer an important dimension of this paper's title question: to what extent is a periphery of relatively poorer economies becoming more synchronized with a core of richer ones (but not between themselves) as they become recipients of larger capital flows.[11] To establish whether the cross-sectional evidence extend to a core-periphery approach, the paper proceeds by estimating equation (1) and the system (S) using variables computed between a core of 12 rich economies and a periphery of 31 countries. This also partly alleviates the concern that some of the cross-sectional variation in ρ^Y_{ij} be driven by unmeasured policy coordination. Indeed, member countries of the European Monetary Union, the European Union, or other policy arrangements involving rich OECD countries are part of the core, and GDP fluctuations between them are excluded from the analysis.

Under complete markets, fluctuations in consumption capture the residual uninsurable uncertainty. If a complete set of Arrow-Debreu securities is available, the remaining uncertainty in consumption stems from uninsurable shocks, whose realization affects identically all traders. Consumption plans are then perfectly correlated internationally. In particular, consumption plans should be unaffected by domestic income. This is the key to Lewis' (1996) result that β in $\Delta \ln C_{jt} = \theta_t + \beta \, \Delta \ln Y_{jt} + \varepsilon_{jt}$ ceases to be significant when non traded goods consumption and financial constraints are controlled for, where j indexes countries in her case.

While Lewis's approach provides a test for risk-sharing, it does not quantify directly the impact of restrictions to financial flows on risk sharing. An alternative, closer in spirit to this paper's objective, consists in a bilateral version of Lewis's estimation, and

(2003) find no evidence that the dynamics of specialization are related in any way with growth patterns. Further, this instrumentation is non-essential for the identification of the system (S), which can also be achieved simpy with $I^1 \neq I^2$. Indeed, no results change when S is not instrumented at all.

[11] This is more akin to Kose, Prasad and Terrones (2003), and justified also on grounds that capital flows often originate from "financial hubs", located in rich core economies. See Lane and Milesi-Ferretti (2003) for details.

writes

$$\rho_{ij}^{C} = \eta_0 + \eta_1 \ \Phi_{ij} + \eta_2 \ \rho_{ij}^{Y} + \varepsilon_{ij} \tag{2}$$

where ρ_{ij}^{C} denotes the correlation in consumption fluctuations between countries i and j. Equation (2) can readily include corrections for non traded goods consumption or for the real exchange rate. Of course Φ_{ij} could be low but risk sharing high if both countries choose to trade assets with the rest of the world rather than with each other. Thus, a non significant η_1 does not necessarily rule against risk sharing. Nevertheless, a significantly positive estimate for η_1 is *sufficient* to ascertain there is risk sharing between countries i and j, and furthermore makes it possible to assess the magnitude of the effect on consumption correlations. This last feature is crucial from the point of view of the quantity puzzle this paper is concerned with.

It is important to control for GDP correlations ρ_{ij}^{Y} in equation (2). First, consumption plans can appear to be synchronized internationally simply because output fluctuations are too, even though there is no risk sharing at all. Second, it is possible that financial integration be independently related with GDP correlations (indeed the very purpose of estimation (1)). Then, positive and significant estimates of η_1 in simple bivariate estimations of equation (2) could simply reflect that finance synchronizes GDP, and thus consumption plans, without any risk sharing at all.

GDP correlations in equation (2) are endogenous, the reason why estimating equation (1) made sense. The third relation this paper seeks to estimate is the differential effect of finance on ρ_{ij}^{C} and on ρ_{ij}^{Y}. This will be given by the joint estimates of α_1 and η_1 in the system formed by equations (1) and (2),

$$\begin{aligned} \rho_{ij}^{Y} &= \alpha_0 + \alpha_1 \ \Phi_{ij} + \alpha_2 \ T_{ij} + \alpha_3 \ S_{ij} + \alpha_4 \ X_{ij} + \varepsilon_{ij} \\ \rho_{ij}^{C} &= \eta_0 + \eta_1 \ \Phi_{ij} + \eta_2 \ \rho_{ij}^{Y} + \varepsilon_{ij} \end{aligned}$$

Armed with simultaneous estimates for α_1 and η_1, one can directly evaluate to what extent financial restrictions are the key to the quantity puzzle. Theory has it that $\alpha_1 < 0$ and $\eta_1 > 0$, which, if true, suggests the quantity puzzle simply arises from the fact that the world is not integrated financially. If however $\eta_1 > 0$ but $\alpha_1 > 0$, the quantity puzzle stems from the positive association between capital flows and GDP correlations. In both cases, point estimates can help address a quantitative question too: how much financial integration is necessary to actually equate consumption and output correlations in the data.

2.3 Measurement and Data

In the past, it has been notoriously difficult to measure effective financial integration between countries. Typical measures include indices capturing balance of payment restrictions, measures of net foreign positions or estimated indices of risk sharing. But restrictions only affect capital flows de jure, not necessarily de facto. And alternatives are at best estimated approximations. One of this paper's contributions is to use a recently released dataset with direct observations on bilateral asset holdings. The data are gathered by the IMF in the context of a Coordinated Portfolio Investment Survey (CPIS) covering assets holdings between 67 source and up to 223 destination countries in 2001. Holdings are decomposed into equities, short-term and long-term debt securities, which makes it possible to evaluate whether different components of international investment have distinct effects on real variables.[12] For each type of capital, bilateral holdings are computed as

$$\Phi_{ij} = I_{ij} + I_{ji}$$

where I_{ij} denotes investment flows from country i to country j, or, alternatively, in an intensive form given by

$$\Phi_{ij} = \frac{I_{ij} + I_{ji}}{I_i + I_j}$$

where $I_i = \sum_j I_{ij}$. Different estimations in the text make use of either expression, but a sensitivity analysis in Section 5 shows the main results do not depend on which measure is used.

The paper also uses standard measures for financial integration, namely the restrictions indices published in the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER).[13] They are summed pairwise, and report the average number of countries with restrictions to financial flows, for each country pair.[14] Results are reported for each sub-component of the index, as well as the total.

[12] There are limitations to the CPIS data as well. For instance, since it is based on surveys, under-reporting may be an issue, and some economies are simply absent from the collection. See Lane and Milesi-Ferretti (2003) for a detailed description of these data.

[13] These include four binary variables: (i) multiple exchange rates, (ii) current account restrictions, (iii) capital account restrictions and (iv) mandatory export proceeds surrender.

[14] The composite index from AREAER is averaged each year, and thus can take values 0.25, 0.5, 0.75 or 1. It is then summed pairwise, and averaged over the whole period. Using initial values makes no difference.

Measures of bilateral trade intensity are standard. In what follows, T is measured by the (scale independent) variant introduced by Deardorff (1998) and used in Clark and vanWincoop (1999) and Imbs (2004). It writes

$$T_{ij} = \frac{1}{t} \sum \frac{(EX_{i,j,t} + IM_{i,j,t}) \ . \ NYW_t}{NY_{i,t} \ . \ NY_{j,t}}$$

where $EX_{i,j,t}$ ($IM_{i,j,t}$) denotes total merchandise exports (imports) from country i to j in year t, NY_i denotes nominal GDP in country i and NYW is world nominal output. Bilateral trade data are from the IMF's Direction of Trade Statistics.

Following Clark and vanWincoop (2001) and Imbs (2004), sectoral real value added data are used to compute

$$S_{ij} = \frac{1}{T} \sum_t \sum_n^N |s_{n,i} - s_{n,j}|$$

where $s_{n,i}$ denotes the GDP share of industry n in country i. $S_{i,j}$ is the time average of the discrepancies in economic structures of countries i and j, and reaches its maximal value for two countries with no sector in common.[15] The sectoral shares s are computed using one-digit value added data covering all sectors of the eocnomy, from the United Nations Statistical Yearbook (UNYB), or, alternatively, two-digit manufacturing value added data from UNIDO.[16]

Finally, the variant of equation (2) focusing on traded-goods requires data on disaggregated consumption across countries. Lewis (1996) uses the United Nations International Comparison Program, which decomposes aggregate consumption into about one hundred goods in 1970, 1975, 1980 and 1985. Computing the international correlation in traded goods consumption ρ_{ij}^{TC} necessitates more time variation, which exists in an alternative, if coarser, dataset. The United Nations Statistical Yearbook provides a decomposition of consumption into roughly two-digit sectors across countries, and more importantly annually over the 1970-1996 period.[17] This is much less detailed than the

[15] Both the trade and specialization measures are based on time averages. Results do not change if the initial value is used instead.

[16] The UNIDO data covers manufactures only, and thus a shrinking share of most economies. The UNYB provide sectoral value added at the one-digit level for all sectors, but with reduced country coverage.

[17] The sectors covered -along with their allocation to a traded (T) or non-traded (N) sector are: Food (T), Non-alcoholic beverages (T), Alcoholic beverages (T), Tobacco (T), Clothing and Footwear (T), Gross rent (N), Fuel and Power (T), Furniture, furnishing and household equipment (T), Household

data in Lewis (1996), but serves the purpose of verifying whether the results in Lewis (1996) continues to hold using the bilateral approach pursued in this paper.

The variables in La Porta et al (1998) fall into four distinct categories: (i) legal families, (ii) shareholders rights, (iii) creditors rights and (iv) enforcement. The subset of variables used to instrument Φ_{ij} varies somewhat with different measures of financial intergation (e.g. restriction indexes versus actual bilateral holdings). The instruments for T are well-established and consist of so-called gravity variables reflective of geographic characteristics. For clarity of exposition, all lists of instruments are reported in Appendix A. They are all chosen to maximize the first-stage fit.

Combining all these data sources and constraints generates a sample covering a cross-section of 41 countries, or 820 bilateral observations, or alternatively, a core of 12 and a periphery of 31 economies. The countries are listed in the Appendix.

3 Finance and Output Correlations

This section presents estimates of equation (1) and the system (S). Pure cross-sectional results are first discussed, followed by the core-periphery evidence.

3.1 Main Results

Table 1 presents OLS estimates for equation (1), using first the restriction-based measure of Φ, and then the actual data on bilateral holdings. In all cases, finance is significantly positive at least at the 5 percent confidence level: large restrictions are associated with low GDP correlations, and large assets cross-holdings tend to be associated with high GDP correlations. Estimates of α_2 and α_3 are in line with existing results, both quantitatively and qualitatively, with trade affecting cycles correlations positively and specialization negatively, both at the 5 percent confidence level. Standard results are confirmed, but the new conclusion that financially integrated economies have more rather than less synchronized business cycles arises.

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operation (N), Medical care and health expenses (N), Transport and communication (N), Personal transport equipment (N), Recreational, entertainment, education and cultural services (N), Education (N), Personal care (N), Expenditures in restaurants, cafes and hotels (N), and Research and science (N).

A decomposition of the restriction indices into their four components suggests current account liberalizations are important in explaining cycle synchronization, whereas surrender of exports revenues is insignificant. Paradoxically, restrictions to the exchange rate have a positive effect on cycle correlations, a result perhaps suggestive of the endogeneity of exchange rate arrangements to the asymmetry of cycles. Decomposing the CPIS data is somewhat less informative, although it appears that the prevalence of long-run debt contracts, as opposed to equity holdings or short term debt, is at the source of the significant estimates of α_1.

Table 2 introduces instruments for finance, trade and specialization. Φ is instrumented using a subset of the variables introduced in La Porta et al (1998), chosen to maximize the first-stage fit, and listed in Appendix A. If OLS estimates of α_1 suffer from an endogeneity bias because capital flows between economies with asymmetric cycles, IV estimates should yields larger values for α_1. This is the case for both measures of Φ: α_1 roughly multiplies two-fold in both cases, once Φ is instrumented. Thus, the endogeneity of finance if anything goes against the main result in this paper. Instrumenting the other independent variables only reinforce the conclusions pertaining to trade and structure, as it did in Frankel and Romer (1999) or Imbs (2004). The decomposition of Φ into its components is less informative in Table 2, with no significant coefficient, although the point estimates have unchanged signs. This lack of conclusive results may come from the fact that the instrument sets are chosen to fit the aggregate measures of Φ, rather than their components.

3.2 Channels

Table 3 presents simultaneous estimates of the system (S), where the coefficients on the instruments have been omitted for clarity. The main attraction of these results is that they make it possible to disentangle the direct and indirect channels through which finance affects business cycles synchronization, which were embedded into single-equation estimates of (1). The first result worth noticing is that point estimates of α_1 become slightly smaller in most cases, as they should given that indirect channels are now purged from the point estimate. The presence of indirect channels is particularly prevalent when Φ is measured using the AREAER restrictions indexes: there is in particular strong evidence that financial liberalizations (as proxied by the lifting of restrictions to capital flows) tend to be associated with trade in the goods markets. This is consistent with the notion that policy reforms tend to bundle, with trade and financial liberalizations often happening simultaneously. In the case of actual capital

holdings, though, there is little support for any interaction at all between finance and trade. To summarize, the data suggest some of the effects of financial liberalization work through goods trade, but estimates of α_1 remains significant even after it is accounted for.

Another channel working via specialization is apparent in the data. The sign of δ_1 is a priori ambivalent, as financial integration could either favor specialization in different sectors, for instance according to comparative advantage, or in identical activities, for instance risky ones, more needful of external funds. The results in Table 3 suggest finance induced specialization is present in the data. δ_1 is actually positive and significant at the 1 percent confidence level in the first two columns of the Table: this means that restrictions to financial flows tend to result in higher values for S, that is specialization in different economic activities. The second column actually controls for effective specialization in countries i and j, using the pairwise sum of Herfindahl indices, but δ_1 remains significantly positive. This suggests that lifting restrictions would lower S, irrespective of the actual specialization pattern in countries i and j: it tends to make countries more similar in what they choose to produce, which in turn results in higher cycle correlations.[18] This effect is not unlike the theoretical effects of finance developed in Obstfeld (1994).

The evidence on indirect channels based on CPIS data is weaker, with hardly any significant impact of finance working through goods trade or specialization. But in all cases a residual direct positive effect of finance on cycle correlations subsists. It is not only because they trade more and specialize in specific sectors that financially integrated economies are synchronized: there is another, theoretically puzzling direct channel.

3.3 Core and Periphery

Tables 4 and 5 reproduce the previous results, in the alternative reduced dataset measuring cycle correlations, trade, specialization and financial integration between a core of 12 and a periphery of 31 countries, as opposed to all bilateral observations between 41 countries. The result is a maximum of 372 observations, thus a somewhat reduced cross-section, but one that lends itself more readily to investigating the real effects of

[18] This is not necessarily in contradiction with Kalemli-Ozcan et al (2003). δ_1 captures whether financially integrated economies have similar patterns of production, irrespective of how specialized they are. In particular, specialization could increase in parallel in both integrating countries.

integration between the financial hubs in Europe, the United States and Japan, and the rest of the world. In particular, Φ is now measured using unilateral CPIS data, with $\Phi_{ij} = I_i$. Financial integration is measured by the assets core economies choose to hold in a periphery country. To maximize coverage, S uses the UNIDO sample focused on three-digit manufacturing data. The sensitivity analysis in Section 5 presents results when Φ_{ij} is measured in intensive terms, i.e. $\Phi_{ij} = \frac{I_{ij}+I_{ji}}{I_i+I_j}$, and when the reduced UNYB sample is used to calculate S. No results change, but the sample is substantially smaller.

The first two columns in Table 4 present OLS estimates, and the last two instrument Φ, T and S with the same sets of instruments as before. The results are even stronger than previously, with effects of finance that are larger both statistically and economically than in the previous cross-section, constructed on all bilateral linkages between 41 countries. This suggests the evidence in the previous section is not due to strong linkages between rich countries, but indeed rather because of core-periphery linkages. Coefficients on Trade and Structure have the expected sign, and become slightly less significant, although still at the 5 percent confidence level. This happens even though, in the core-periphery sample, the instruments for both T and S are considerably weaker than in the large sample. For instance, even the extended set of gravity variables listed in Appendix A accounts for barely 5 percent of the variation in trade intensity, as opposed to more than 30 percent in the large sample.

Decomposing CPIS into its components once again points to debt contracts, particularly short term, as the main culprit for the positive effect of finance. As before, instrumenting the independent variables only reinforces the results, as would be the case if the endogeneity biases at play here were attenuating, as predicted by theory. Interestingly, once instrumented, equity holdings are estimated to result in lower business cycles correlations, consistent with the international business cycle workhorse model. Perhaps surprisingly the last column in Table 4 finds little or no effect of trade and structure on cycles correlations, but this might very well be due to the relative weakness of the gravity variables in explaining trade patterns between the core and periphery economies in the sample.[19]

Finally, Table 5 presents simultaneous equation estimates of the system (S) in the core-periphery sample. All results continue to prevail: Φ affects ρ_{ij}^Y directly, with coefficients significant at the 5 percent confidence level, even though it does also tend

[19]Instruments for Finance, on the other hand, perform equally well in the full sample and the reduced one in this section, with first-stage R^2 greater than 0.4.

to increase trade. The main difference here is the absence of any significant finance-induced response of S.

4 Risk Sharing and the Quantity Puzzle

This section focuses on the impact of financial integration on consumption correlations, first directly, then in relation to the quantity puzzle. Results pertaining to a cross-section of 41 countries are first discussed, followed by a reduced sample focusing on a core of 12 rich countries.

4.1 Consumption Correlations

This section seeks to establish the significant role of financial integration in affecting consumption correlations. Point estimates make it possible to quantify how much of a change in integration is necessary to equate international correlations in consumption and in output, on average. This corresponds to the view that consumption plans are less correlated than GDP because of impediments to risk sharing, i.e. that the quantity puzzle arises only from the consumption side. Put differently, it assumes GDP correlations are invariant to financial linkages.

Table 6 reports OLS estimates for equation (2), using both measures for Φ. In all cases, η_2 is strongly significant and positive. This suggests consumption plans are largely conditioned by available domestic output. Of course, it could also reflect that consumption is part of GDP, and it is GDP correlations that respond to fluctuations in consumption. This is addressed later in the context of a simultaneous system of equations where the endogeneity of ρ_{ij}^{Y} is allowed for, following the logic developed in equation (1) and the previous section. More to the point, there is significant evidence that financially integrated economies have more synchronized consumption plans, in particular when using the AREAER restrictions indexes. The first and second columns of the table suggest economies with restrictions to capital flows (and especially to the current account) have less synchronized consumption plans. The result is akin to Lewis (1996), who cannot reject income insurance once financial restrictions are controlled for, and based on the same dataset if not the same methodology. The second column suggests restrictions to the current account play a prominent role in preventing risk sharing.

Results for equation (2) based on the cross-holdings CPIS data are less marked. The overall estimate of η_1 is not significant, suggesting income insurance does not work via cross-holdings across all asset classes.[20] Breaking down the data into the components of the CPIS measure does however suggest more contrasted results, with income insurance working via equity holdings. On the other hand however, long-term debt contracts are associated with significantly lower consumption correlations, as if they actually worsened income insurance. These estimates are based on few observations, and hardly warrant any generalization. They do nevertheless suggest that risk sharing varies with classes of assets, and caution against hasty dismissals on the basis of aggregate data on financial flows or stocks.

The need to integrate financial markets may well be endogenous, determined for instance by some (exogenously given) tendency for consumption plans to be idiosyncratic across countries. That would happen in economies with given fully diversified production, and less of a need to integrate as a consequence. This is an attenuating endogeneity bias, since it suggests finance is redundant when consumption plans are correlated. Even though this bias goes against large estimates for η_1, Table 7 presents instrumented variables estimations of equation (2). The results are largely unchanged: point estimates are almost identical, and the only notable difference is the lack of significance for any component of the CPIS variable in explaining consumption correlations. As before, the evidence that risk sharing is prevented by restrictions to capital flows (and in particular restrictions to the current account) is present in the data.

For completeness, Table 8 presents estimates for equation (2) where ρ_{ij}^C is computed using consumption of traded-goods only. As these data are scarce at the yearly frequency, the size of the sample is substantially reduced relative to Tables 6 and 7. Furthermore, estimates of η_1 in equation (2) do not provide direct tests of income insurance, for a non-significant coefficient does not necessarily imply lack of risk sharing. Table 8 only purports to investigate whether significant point estimates persist when focused on traded goods only, as they would if the presence of risk sharing in the data were obscured by the presence of uninsurable fluctuations in non-traded goods consumption (and as they should to confirm the results in Lewis (1996)). The estimates of η_1 in Table 8 remain significant in all cases where they previously were, i.e. particularly when Φ is measured using the AREAER restriction indexes. As before, restrictions to the current account appear to play a prominent role in limiting international risk

[20] Lane (2001) finds that investment income flows do not provide income insurance either.

sharing.[21,22]

The view that the quantity puzzle arises from low consumption correlations, because risk sharing is imperfect in the data, is one that would contend the international synchronization of consumption plans should reach, if not exceed that of GDP fluctuations if only one could correct appropriately for frictions to financial flows. In other words, $\eta_1 > 0$, whereas α_1 is zero. The question is part qualitative (is α_1 indeed zero?), part quantitative (given estimates for η_1, what is needed for ρ_{ij}^C to exceed ρ_{ij}^Y, on average?). Holding ρ_{ij}^Y constant for now (i.e. assuming $\alpha_1 = 0$), one can use the point estimates in Table 7 to investigate how much financial liberalization would be needed to push consumption correlations above ρ_{ij}^Y on average in the data. This helps assess the plausibility of the view that ascribes the quantity puzzle to consumption correlations only.

From the estimates in Table 7, if only consumption correlations are allowed to respond to financial integration, susbtantial changes in Φ are necessary. In the data, on average $\bar{\rho}^C = 0.068$ and $\bar{\rho}^Y = 0.1079$, and a one-standard deviation fall in Φ increases ρ_{ij}^C by 0.033. Thus a one- to two-standard deviation fall in Φ would be sufficient to solve the quantity puzzle. In the AREAER data, a one-standard deviation fall corresponds to a jump from a country pair akin to Canada - Norway or Austria - Japan, to for instance Switzerland - United States, countries where all AREAER components equal zero over the whole period.[23] A two-standard deviation increase would correspond to a jump from such country pairs as Ireland - Mexico or Egypt - Switzerland, thus a rather substantial policy change. Focusing on the current account, the estimates for η_1 in the second column of Table 7 imply a one-standard deviation fall in Φ increases ρ_{ij}^C by 0.051. But a one-standard deviation increase in the index measuring restrictions to the current account is a sizeable policy change: it for instance amounts to moving from the situation in Peru, where Φ_{CA} roughly equals 0.5 with all other rich countries, to Switzerland, where it is zero.

In short, it seems the hypothesis that the quantity puzzle only exists because finan-

[21] Estimates of η_2 decrease substantially in magnitude between Tables 7 and 8. This is also consistent with Lewis' (1996) result that domestic output is less relevant to traded goods consumption than to the overall aggregate.

[22] In unreported results, consumption correlations were computed adjusting for the real exchange rate, that is, allowing for deviations from PPP. The estimates do not change sizeably from Table 7, confirming the results in Ravn (2003).

[23] The AREAER index equals zero for most country pairs involving Switzerland and another rich OECD economy.

cial flows are hindered in the data, and ρ_{ij}^C is abnormally low as a result, is quantitatively implausible. But none of these estimates (and few existing theories) account for the possibility that output correlations themselves respond positively to financial integration, thus driving endogenously the discrepancy upwards. The next section assesses the relevance of this conjecture in the context of the quantity puzzle.

4.2 The Quantity Puzzle

Table 9 reports estimates of α_1, α_2, α_3, η_1 and η_2 as implied by the simultaneous estimation of the system formed by equations (1) and (2). The endogeneity of ρ_{ij}^Y in equation (2) is now accounted for, via equation (1); further, Φ is instrumented using the same set of variables as in the previous single-equation estimations. Simultaneity does not alter the earlier results: restrictions-based measures of Φ affect consumption correlations significantly, while cross-holdings seem irrelevant. But both measures have a strong synchronizing effect on GDP correlations. The advantage of the simultaneous approach lies in the possibility of a direct comparison of the estimates for α_1 and η_1.

Table 9 confirms that estimates for α_1 are substantially larger in magnitude than for η_1. From the stanpoint of the quantity puzzle, the economically and statistically relevant empirical regularity is not (only) the presence or absence of risk sharing, but rather the surprisingly strong impact financial integration has on GDP correlations. Imperfect financial linkages in the data result in lower realizations of ρ_{ij}^C, but more importantly, in much lower realizations of ρ_{ij}^Y as well, which makes the assumption that GDP correlations are invariant to financial integration particularly difficult to maintain. The quantity puzzle becomes twofold: (i) why is α_1 positive? (ii) is ρ_{ij}^Y still larger than ρ_{ij}^C once the effect of finance on *both* is accounted for? Question (ii) is the accurate test of the international business cycles model, although it still leaves question (i) unanswered.

Empirically, abstracting from the effects of Φ on ρ_{ij}^Y means using the estimates of α_1 in Table 9 to assess how much lower GDP correlations would be in the absence of any effects of finance on cycle synchronization. When evaluating how much ρ_{ij}^C increases in a world with lower average financial restrictions (e.g. by one-standard deviation), one should also subtract from ρ_{ij}^Y the effect this liberalization has on GDP correlations. The resulting differential effect documents how financial integration affects the quantity puzzle in a world where Φ only affects ρ_{ij}^C, i.e. one closer to the international business cycles workhorse model. Based on the AREAER data, a one-standard deviation fall

in Φ increases on average ρ_{ij}^{Y} by 0.068 and ρ_{ij}^{C} by 0.030. In other words, holding GDP correlations constant, the discrepancy between the two diminishes by almost 0.100.

Based on CPIS data, the effect is even larger. Estimates of α_1 imply ρ_{ij}^{Y} rises on average by 0.117 in response to a one-standard deviation increase in assets cross-holdings, whereas η_1 is not significant. In other words, in these data the bulk of the quantity puzzle originates in the tendency for GDP correlations to increase with financial links, not in low risk sharing. A theory that ignores this effect should be put to a test that controls for it, i.e. one that holds GDP correlations constant, exactly 0.117 closer to ρ_{ij}^{C} than the raw data suggest. It then becomes possible that the quantity puzzle should prevail in the data because the existing financial linkages have a much larger positive effect on GDP correlations than they do on consumption correlations.

Tables 10 and 11 reproduce the analysis in the reduced sample formed by linkages between a core of 12 and a periphery of 31 economies. Since the focus is now on country pairs that are mostly formed of one rich and one developing economy, the restriction based measure of Φ is abandoned, for lack of sufficient variation. The results are therefore presented for the CPIS data only.

Table 10 focuses on equation (2), and finds no evidence of income risk sharing working via assets holdings. This may suggest there is little risk sharing between our core and periphery, or that income insurance in the periphery is not captured by the bilateral approach in equation (2). Lack of significance of η_1 does not mean lack of risk sharing.

Finally, Table 11 presents the results for equations (1) and (2) estimated simultaneously. The single equation conclusions continue to prevail. Assets bilateral cross-holdings provide little income insurance, and they do tend to result in synchronized GDP fluctuations. Once again, the interesting result pertains to the relative magnitude of the two effects. In this sample, the point estimate for α_1 implies a one-standard deviation rise in Φ augments ρ_{ij}^{Y} by 0.188. The presence of some financial links in the data could indeed be the very reason for the quantity puzzle: as pairs of countries integrate their asset markets, risk sharing may improve and consumption correlations rise as a result. But in these data GDP correlations increase by much more, so an econometrician will naturally be led to believe the data invalidate the standard model. If they do, it is solely because of the effect finance has on cycles synchronization, indeed the true question behind the quantity puzzle.

5 Sensitivity Analysis

This section ensures the robustness of the main results. Appendices C and D present variations of the estimations in the main text, for both the large 41 countries sample and the core-periphery approach, respectively. Simultaneous estimates of the system (S) are presented, first with additional controls, and with alternative measures. The same variations are then applied to the system formed by equations (1) and (2), namely the one addressing directly the quantity puzzle.

5.1 Large Sample

5.1.1 Controls

Significant estimates for α_1 in the system (S) may simply arise from the tendency for rich countries within the sample of 41 economies to both display synchronized GDP fluctuations and be integrated on the asset market (although the reduced core-periphery sample already works to assuage this concern). This suggests controlling for per capita GDP in the first equation of the system. Table C1 describes how the results are altered when the specification is thus modified: the AREAER restriction-based measure becomes insignificant, but only through its direct effect: the indirect channels via specialization and trade remain large economically and statistically. This suggests restrictions to financial flows mostly occur in lesser developed economies. However, when using the CPIS data, α_1 remains significant even holding per capita GDP constant: it is not merely positive because of a inherent difference between rich and poor countries in the sample.

Alternatively, α_1 could appear to be significant because financially integrated economies both have large financial sectors, and co-fluctuate as a result. Table B1 also presents estimates correcting for this possibility. The pairwise sums of output shares for the Financial Services, Insurance and Real Estate (FIRE) sector are included in the set of independent variables, a proxy meant to capture whether pairs of countries with high Φ also both have large output shares in the FIRE sector. While the restrictions-based measure of Φ indeed loses its direct significance (but the indirect channels survive), α_1 remains significantly positive when estimated on the basis of the CPIS data. Interestingly, in both cases the $FIRE$ variables is significantly negative in the Structure equation, i.e. the financial sector is indeed an important component of S, the measure of sectoral similarities.

Table C2 purports to investigate whether coefficient estimates of the system (S) are affected by the coordination of macroeconomic policies, most prominently monetary. This is also one of the purposes of using a reduced core-periphery sample, where most country pairs committed to a monetary union (or indeed a trade agreement) are excluded from the analysis. It is reassuring that the core-periphery approach should yield stronger results if anything. Nevertheless, Table C2 includes controls for currency unions, differentials in inflation rates, and the volatility of the nominal exchange rate. The bottomline is that none of these controls modify in any manner the significance of α_1, nor do they alter substantially any other point estimates. Two interesting exceptions are the results that currency unions tend to boost trade -a well known fact established in Rose (2000), and tend also to foster specialization in different sectors.

5.1.2 OECD Sample and Alternative Measures

It is also possible that the main results in this paper should be driven by discrepancies between rich and poor economies, that is by a phenomenon that does not exist amongst rich OECD countries. To verify whether this is the case, Table C3 presents results where the sample is reduced to the pairwise linkages between 21 OECD countries. Unsurprisingly, restrictions-based measures of Φ do not have any effects on GDP correlations (although they still correlate strongly with trade linkages), since AREAER indexes of restrictions to capital flows hardly have any variation in OECD economies. Nevertheless, once again, the CPIS data continues to predict a similar pattern to the one in the complete sample, and in particular a large significant direct effect on GDP correlations.

Table C3 also presents results when the measure of sectoral similarities S is computed on the basis of three-digit manufacturing data. The advantage is larger coverage, for these data are available for more countries. The drawback is the focus on manufacturing sectors only, indeed a shrinking share of the economy in most developed countries. The main results are unchanged: finance continues to matter directly for GDP correlations, and S still enters with a negative sign, namely sectoral patterns do affect cycles synchronization. Using this alternative measure, there is more evidence that financial linkages build upon existing trade relations than the other way round. This suggests the trade-enhancing effects of financial linkages is not a robust feature of the data, and the two are closely intertwined.[24]

[24] Disentangling the channel of causality between trade and finance could be done with time variation in measures of Φ, which does not exist yet, but is soon to come given the CPIS exercise is annual.

Table C4 uses the filter introduced in Baxter and King (1999) to isolate the cyclical component of GDP.[25] The results are stronger for both measures of Φ. In all cases, the direct effect of finance on GDP correlations is significant and large, and when Φ is measured in the AREAER data, financially integrated economies trade more, and tend to specialize in similar sectors. The last column in Table B4 uses an intensive measure of Φ in the CPIS data, once again with little effect on the estimate of interest since α_1 still comes out significantly positive. The only notable change is the (weakly significant) negative effect of trade on finance.

Finally, Table C5 extends some of the previous sensitivity analysis to consumption correlations, focusing on the filter used to isolate the cyclical components of GDP and consumption. The variations in Tables C1 to C4 are omitted for clarity, since most of them pertain to output but not consumption correlations. No results are affected, except the evidence in favor of risk sharing, i.e. significant estimates for η_1 is now stronger when Φ is measured in the CPIS data. But in all cases α_1 is significant: no matter the measure, the answer to the quantity puzzle lies in the response of GDP correlations to financial integration.

5.2 Core-Periphery

Appendix D presents some sensitivity analysis pertaining to the reduced sample. Since policy controls and variables pertaining to per capita GDP are less relevant to the core-periphery approach, the focus in Tables D1 and D2 is on measures of S, Φ, and the filter used.

The main text discusses estimations of the system (S) in the core-periphery sample when S is measured using (a larger sample of) manufacturing output data observed at the three-digit aggregation level. While this affords more observations, it is in effect different from what is done for the 41-country sample. Table D1 first shows the main results still obtain when S is measured using one-digit data from UNYB. The main difference in the results pertains to the weak instrumentation of T and S. Perhaps surprisingly, the gravity model performs poorly in the core-periphery sample chosen here, a weakness that affects all coefficients in the simultaneous estimation. It might explain the sign of the estimates for α_3. In spite of this weakness however, α_1 remains significantly positive in all cases. Indeed, it is the sole point estimates whose

[25] The filter isolates fluctuations between 2 and 8 years, as per Baxter and King's recommendations for annual data. The recommended number of initial and final observations are also discarded.

significance or sign does not change with the different specifications reported on Table D1. While the impact of trade or structure on GDP correlations varies somewhat with the measure for Φ (column (ii)) and the filter (column (iii)), the direct positive effect of financial integration on GDP correlations is always large and significant.

Finally, Table D2 focuses on the quantity puzzle using different filters. The Baxter-King filter yields results that are identical to those implied by the Hodrick-Prescott approach, with if anything less evidence in favor of risk sharing. The point estimate for η_1 remains much lower than for α_1. Financial integration has much more of an effect on GDP correlations than it does on consumption.[26]

6 Conclusion

This paper presents systematic evidence on the effects of financial integration on the international correlations in both output and consumption, with a view to shedding light on the quantity puzzle. Consistent with theory, financial linkages increase consumption correlations, in some cases. Less consistent with theory, a variety of measures suggest more integrated economies also have more synchronized GDP fluctuations, in virtually all cases. The latter effect is larger than the former, thus explaining why GDP fluctuations are more correlated on average than consumption plans. The quantity puzzle does not arise from lack of risk sharing, and low consumption correlations as a result, but rather from the theoretically intriguing fact that financial integration does affect GDP correlations, too.

[26] If GDP is measured with error in country i, the resulting country-specific variance will perturb all country pairs in the sample where country i is involved. The cross-section of pairwise correlations will display heteroscedasticity of a type that standard White corrections cannot account for. Clark and vanWincoop (1999) suggest the use of a GMM estimator to account for this possibility, an approach Imbs (2004) extends to a similar context of simultaneous equations. For the sake of brevity, GMM estimates are not reported in the text. The main conclusions of the paper do however continue to prevail, at times even stronger.

Appendix:

A. Instruments Lists:

Financial Integration Φ as measured by the AREAER restrictions indexes:

(i) Pairwise sum of per capita GDP

(ii) An indicator variable for the civil legal tradition

(iii) Measures of shareholders rights, i.e. variables capturing if votes are cast cumulatively or proportionately, minority shareholders are oppressed, shareholders have pre-emptive rights, proxy by mail are valid votes, as well as the percentage necessary to call an extraordinary shareholder's meeting

(iv) Measures of creditors rights, i.e.: the percentage of capital required as legal reserves, whether management is allowed to stay in reorganization and whether there is automatic stay on asset

(v) Enforcement variables, i.e.: the efficiency of the judicial system, a rule of law index and ratings of accounting standards.

Financial Integration Φ as measured by the CPIS data (in the large sample):

(i) Pairwise sum of per capita GDP

(ii) Measures of shareholders rights, i.e. variables capturing if shares can be blocked prior to general meetings, votes are cast cumulatively or proportionately, minority shareholders are oppressed, shareholders have pre-emptive rights, proxy by mail are valid votes, as well as the percentage of votes necessary to call an extraordinary meeting and an index of anti-director rights

(iii) An index of creditors' rights, the percentage of capital required as legal reserves and whether secured creditors are paid first

(iv) Enforcement variables, i.e.: measures of corruption, and the risks of expropriation and contract repudiation.

Financial Integration Φ as measured by the CPIS data (in the core-periphery sample):

(i) Pairwise sum of per capita GDP

(ii) Indicator variables for the French, German and British legislative families

(iii) Measures of shareholders rights, i.e. variables capturing whether shares can be blocked prior to general meetings, votes are cast cumulatively or proportionately, proxy by mail are valid votes, and whether one share carries one vote

(iv) Measures of creditors rights, i.e.: the percentage of capital required as legal reserves, whether secured creditors are paid first, and whether management stays after reorganizations

(v) Enforcement variables, including accounting standards and the rule of law.

Bilateral Trade T in the large sample: indicator variables for the presence of a common language and a border, kilometric distance between main cities and the pairwise sum of geographic areas.

Bilateral Trade T in the core-periphery sample: kilometric distance, both raw and GDP-weighted, indicator variables for the presence of trade agreements, islands, landlocked economies and the existence of a past colonial link, pairwise population and GDP products, and the pairwise sum of geographic areas.

Specialization Patterns S: pairwise sums and differences in per capita GDP.

B. Country Coverage

Large Sample

Argentina	Guatemala	Peru
Australia	Iceland	Philippines
Austria	India	South Africa
Belgium	Ireland	Spain
Bolivia	Israel	Sri Lanka
Brazil	Italy	Switzerland
Canada	Japan	Thailand
Colombia	Mauritius	Trinidad
Costa Rica	Mexico	Turkey
Denmark	Morocco	The United Kingdom
Egypt	The Netherlands	United States
El Salvador	Norway	Uruguay
Finland	Pakistan	Venezuela
France	Panama	

Core-Periphery

Core: Austria, Belgium, Canada, Denmark, France, Italy, Japan, the Netherlands, Spain, Switzerland, the United Kingdom, United States.

Periphery: Argentina, Australia, Brazil, Chile, Colombia, Costa Rica, Ecuador, Egypt, Finland, Greece, Hong Kong, Iceland, India, Indonesia, Ireland, Israel, Malaysia, Mexico, Morocco, New Zealand, Norway, Paraguay, Peru, Philippines, Singapore, South Africa, Sweden, Thailand, Turkey, Uruguay, Venezuela.

C. Sensitivity - Large Sample

Table C1: GDP Correlations - Controls

	Restr.	Restr.		Holdings	Holdings
GDP Correlations Equation					
Finance	0.0162 0.83	-0.0130 -1.10	Finance	2.1946 3.36***	1.5910 2.81***
Trade	0.1780 3.50***	0.2364 4.69***	Trade	0.2202 3.76***	0.2331 4.65***
Structure	-0.3916 -2.78***	-0.2966 -2.02**	Structure	-0.7321 -3.80***	-0.5906 -3.32***
GDPpc	9.5488 2.49**		GDPpc	-3.3077 -0.93	
FIRE		0.4755 2.80***	FIRE		0.0123 0.06
Finance Equation					
Trade	0.0957 0.61	-0.0876 -0.59	Trade	0.0204 1.17	0.0315 1.73*
FIRE		2.4105 5.05***	FIRE		0.1896 2.17**
Trade Equation					
Finance	-0.0835 -4.95***	-0.0906 -5.44***	Finance	1.5665 1.30	1.0075 0.86
Structure Equation					
Finance	0.0274 2.79***	0.0391 3.92***	Finance	0.0228 0.07	0.1018 0.33
Specialization	0.8359 4.05***	0.8279 4.05***	Specialization	0.6813 3.16***	0.6433 2.99***
FIRE		-0.3269 -3.29***	FIRE		-0.1999 -1.95**
Obs.	347	347	Obs.	250	250

Notes: The dependent variable is the pairwise correlation of HP-filtered GDP. "Trade" denotes bilateral trade intensity T, "Structure" is the index S of similarity in sectoral output, constructed using all one-digit activities. The "Restrictions" estimations use the average of the four AREAER measures of restrictions to capital flows to measure "Finance". The "Holdings" estimations use the IMF's Coordinated Portfolio Investment Survey, in million USD. All instruments are listed in Appendix A. All variables enter in levels. "GDPpc" denotes the pairwise sum of per capita GDP, and "FIRE" is the pairwise sum of the shares in overall output of the Finance, Insurance and Real Estate sector.

Table C2: GDP Correlations - Policy					
	Restr.	Restr.		Holdings	Holdings
GDP Correlations Equation					
Finance	-0.0239 -2.08**	-0.0236 -1.91**	Finance	1.7419 3.26***	2.0100 3.54***
Trade	0.2149 3.78***	0.2165 4.24***	Trade	0.1892 3.73***	0.2229 4.32***
Structure	-0.4317 -2.95***	-0.4938 -3.45***	Structure	-0.5329 -3.12***	-0.5643 -3.39***
Currency	-0.5511 -1.67*		Inflation	-0.0007 -0.73	
NER		0.0060 0.73	NER		0.0033 0.76
Finance Equation					
Trade	0.0953 0.52	0.1507 1.00	Trade	0.0363 1.97**	0.0266 1.48
Currency	-0.0975 -0.12		Inflation	-0.0000 -0.10	
NER		0.1157 4.95***	NER		0.0002 0.15
Trade Equation					
Finance	-0.0827 -5.13***	-0.0854 -4.61***	Finance	2.3064 1.82*	1.4487 1.18
Currency	2.6859 5.62***		Inflation	-0.0011 -0.51	
NER		0.0084 0.57	NER		-0.0073 -0.81
Structure Equation					
Finance	0.0269 2.78***	0.0249 2.38**	Finance	-0.1583 -0.54	0.0235 0.08
Specialization	0.8391 4.10***	0.7695 3.60***	Specialization	0.6946 2.74***	0.6803 2.81***
Currency	0.3676 2.96***		Inflation	0.0000 0.12	
NER		-0.0044 -1.10	NER		-0.0000 -0.04
Obs.	347	347	Obs.	228	250

Notes: The dependent variable is the pairwise correlation of HP-filtered GDP. "Trade" denotes bilateral trade intensity T, "Structure" is the index S of similarity in sectoral output, constructed using all one-digit activities. The "Restrictions" estimations use the average of the four AREAER measures of restrictions to capital flows to measure "Finance". The "Holdings" estimations use the IMF's Coordinated Portfolio Investment Survey, in million USD. All instruments are listed in Appendix A. "Currency" denotes a variable indicating currency unions, "NER" is the 5-year average standard deviation of the nominal exchange rate's growth rate, and "Inflation " is a 5-year average inflation differential.

Table C3: GDP Correlations - Alternative Measures					
	Restr. (OECD)	Restr. (UNIDO)		Holdings (OECD)	Holdings (UNIDO)
GDP Correlations Equation					
Finance	-0.0162 -0.73	-0.0194 -2.41**	Finance	1.0760 2.54**	2.8724 4.34***
Trade	0.1010 2.51**	0.1224 6.58***	Trade	0.1256 2.73***	0.0968 5.62***
Structure	-0.7552 -3.56***	-0.4457 -7.75***	Structure	-0.7426 -4.12***	-0.2824 -3.56***
Finance Equation					
Trade	-0.0145 -0.15	-0.2168 -2.79***	Trade	0.0512 1.99**	0.0134 4.51***
Trade Equation					
Finance	-0.0911 -1.71*	-0.1868 -5.58***	Finance	1.2539 0.93	2.3104 0.67
Structure Equation					
Finance	0.0102 0.57	-0.0496 -7.26***	Finance	0.2287 0.92	-1.5129 -3.79***
Specialization	0.2216 0.70	2.7015 15.60***	Specialization	0.2335 0.65	3.2071 16.68***
Obs.	136	580	Obs.	120	452

Notes: The dependent variable is the pairwise correlation of HP-filtered GDP. "Trade" denotes bilateral trade intensity T, "Structure" is the index S of similarity in sectoral output, constructed using three-digit manufacturing activities from the UNIDO dataset in columns (ii) and (iv), and the UNYB measure in others. The "Restrictions" estimations use the average of the four AREAER measures of restrictions to capital flows to measure "Finance". The "Holdings" estimations use the IMF's Coordinated Portfolio Investment Survey, in million USD. All instruments are listed in Appendix A. All variables enter in levels. The "OECD" specifications focus on a sub-sample of 21 OECD countries, detailed in the Appendix.

Table C4: GDP Correlations - Alternative Measures			
	Restr. (BK)	Holdings (BK)	Holdings (Intensive)
GDP Correlations Equation			
Finance	-0.0300 -3.06***	2.1122 4.27***	0.0087 4.30***
Trade	0.1946 4.46***	0.1521 3.32***	0.1822 4.16***
Structure	-0.4565 -3.73***	-0.8547 -5.69***	-1.0167 -7.32***
Finance Equation			
Trade	0.1447 0.94	0.0167 0.98	-5.1294 -1.88*
Trade Equation			
Finance	-0.0822 -4.88***	1.6181 1.34	0.0000 0.01
Structure Equation			
Finance	0.0269 2.75***	0.0010 0.00	0.0016 1.24
Specialization	0.8353 4.05***	0.6727 3.14***	0.5815 2.66***
Obs.	347	250	250

Notes: The dependent variable is the pairwise correlation of Baxter–King filtered GDP. "Trade" denotes bilateral trade intensity T, "Structure" is the index S of similarity in sectoral output, constructed using all one-digit activities. The "Restrictions" estimations use the average of the four AREAER measures of restrictions to capital flows to measure "Finance". The "Holdings" estimations use the IMF's Coordinated Portfolio Investment Survey, in million USD. All instruments are listed in Appendix A. All variables enter in levels. The "Intensive" specification use CPIS data where assets holdings are normalized with total holdings in each country.

Table C5: GDP Correlations - Quantity Puzzle			
	Restr. (BK)		Holdings (BK)
ρ^C		ρ^C	
Finance	0.0032 0.39	Finance	0.9547 2.25**
Output	0.6039 6.71***	Output	0.2047 2.39**
ρ^Y		ρ^Y	
Finance	-0.0477 -5.74***	Finance	1.7290 3.49***
Trade	0.0686 3.12***	Trade	0.1031 4.29***
Structure	-0.3079 -3.67***	Structure	-0.3664 -3.49***
Obs.	351	Obs.	253

Notes: The dependent variable under the "ρ^C" heading is the pairwise correlation fluctuations in consumption, as implied by the Baxter-King filter. "Output" denotes the pairwise correlation of BK-filtered GDP, which is also the dependent variable under the "ρ^Y" heading. "Trade" denotes bilateral trade intensity T, "Structure" is the index S of similarity in sectoral output, constructed using one-digit data. The "Restrictions" estimations use the average of the four AREAER measures of restrictions to capital flows to measure "Finance". The "Holdings" estimations use the IMF's Coordinated Portfolio Investment Survey, in million USD. All instruments are listed in Appendix A. All variables enter in levels.

D. Sensitivity: Core-Periphery Sample

Table D1: Core - Periphery: Sensitivity

	UNYB	Intensive	BK
GDP Correlations Equation			
Finance	12.873 2.72***	4.5228 7.56***	12.1521 3.44***
Trade	0.2650 3.49***	-0.3193 -4.44***	0.1168 2.31**
Structure	0.7844 3.19***	-0.0617 -0.50	0.1773 1.77*
Finance Equation			
Trade	0.0035 1.11	0.1269 6.76***	0.0057 2.23**
Trade Equation			
Finance	16.4687 1.86*	6.0034 9.25***	28.2384 3.57***
Structure Equation			
Finance	8.4302 2.86***	-0.4330 -1.20	1.0541 0.46
Specialization	0.3457 0.98	2.6767 11.75***	2.5569 11.11***
Obs.	151	230	230

Notes: The dependent variable is the pairwise correlation of HP-filtered GDP (except for the specification marked "BK", where the Baxter-King filter is used instead), computed between a core (12 countries) and a periphery (31 countries). "Trade" denotes bilateral trade intensity T, "Structure" is the index S of similarity in sectoral output, constructed using all one-digit data in the column marked "UNYB", and three-digit manufacturing data in the others. "Finance" is measured using the IMF's Coordinated Portfolio Investment Survey, in million USD, except in column (ii) where it is in intensive form. All instruments are listed in Appendix A. All variables enter in levels.

Table D2: Core - Periphery: Quantity Puzzle	
	Holdings (BK)
ρ^C	
Finance	-0.8516 -0.30
Output	0.5816 4.91***
ρ^Y	
Finance	12.6618 3.95***
Trade	0.0339 1.29
Structure	0.0401 0.50
Obs.	250

Notes: The dependent variable under the "ρ^C" heading is the pairwise correlation of fluctuations in consumption, isolated using the Baxter-King filter. "Output" denotes the pairwise correlation of BK-filtered GDP, which is also the dependent variable under the "ρ^Y" heading. "Trade" denotes bilateral trade intensity T, "Structure" is the index S of similarity in sectoral output, constructed using three-digit manufacturing data. The "Holdings" estimations use the IMF's Coordinated Portfolio Investment Survey, in million USD. All instruments are listed in Appendix A. All variables enter in levels.

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Table 1: GDP Correlations

	Restr. (Tot.)	Restr. (Det.)		Holdings (Tot.)	Holdings (Det.)
Finance	-0.0117 -2.04**		Finance	0.8263 4.02***	
ER		0.0797 2.82***	Equity		0.0142 0.02
CA		-0.0456 -1.73*	Short		1.7647 0.56
CAPA		-0.0337 -1.07	Long		1.7365 1.82*
Exports		-0.0078 -0.26			
Trade	0.0420 2.98***	0.0379 2.70***	Trade	0.0435 2.37**	0.0420 2.28**
Structure	-0.2658 -4.41***	-0.2607 -4.33***	Structure	-0.2916 -3.36***	-0.2942 -3.33***
Obs.	819	819	Obs.	465	465

Notes: The dependent variable is the pairwise correlation of HP-filtered GDP. "Trade" denotes bilateral trade intensity T, "Structure" is the index S of similarity in sectoral output, constructed using all one-digit activities. The "Restrictions" estimations use the average of the four AREAER measures of restrictions to capital flows to measure "Finance". The "Holdings" estimations use the IMF's Coordinated Portfolio Investment Survey in million USD. Both also decompose financial integration into its components. All variables enter in levels.

Table 2: GDP Correlations - Instrumented Variables

	Restr. (Tot.)	Restr. (Det.)		Holdings (Tot.)	Holdings (Det.)
Finance	-0.0264 -2.26**		Finance	1.6394 2.95***	
ER		0.0188 0.28	Equity		-3.9163 -1.13
CA		0.0109 0.18	Short		28.8000 1.31
CAPA		-0.0914 -1.09	Long		5.1563 1.43
Exports		-0.0366 -0.50			
Trade	0.2004 3.80***	0.2161 3.54***	Trade	0.1976 3.85***	0.1798 3.12***
Structure	-0.3674 -2.45**	-0.3119 -2.02**	Structure	-0.4649 -2.71***	-0.6699 -2.59***
Obs.	347	347	Obs.	250	250

Notes: The dependent variable is the pairwise correlation of HP-filtered GDP. "Trade" denotes bilateral trade intensity T, "Structure" is the index S of similarity in sectoral output, constructed using all one-digit activities. The "Restrictions" estimations use the average of the four AREAER measures of restrictions to capital flows to measure "Finance". The "Holdings" estimations use the IMF's Coordinated Portfolio Investment Survey, in million USD. Both also decompose financial integration into its components. All instruments are listed in Appendix A. All variables enter in levels.

Table 3: GDP Correlations - Simultaneous Estimations					
	Restr. (Tot.)	Restr. (Tot.)		Holdings (Tot.)	Holdings (Tot.)
GDP Correlations Equation					
Finance	-0.0219 -1.90**	-0.0234 -2.05**	Finance	1.4217 2.58***	1.8758 3.43***
Trade	0.2228 4.28***	0.2114 4.15***	Trade	0.2021 4.03***	0.1943 3.84***
Structure	-0.4696 -3.27***	-0.4461 -3.11***	Structure	-0.8006 -4.85***	-0.6201 -3.73***
Finance Equation					
Trade	0.2754 1.67*	0.0872 0.57	Trade	0.0269 1.51	0.0227 1.31
Trade Equation					
Finance	-0.0798 -4.73***	-0.0824 -4.89***	Finance	1.6175 1.33	1.5775 1.31
Structure Equation					
Finance	0.0327 3.30***	0.0268 2.74***	Finance	0.3227 1.06	0.0090 0.03
Specialization		0.8365 4.05***	Specialization		0.6872 3.18***
Obs.	347	347	Obs.	250	250

Notes: The dependent variable is the pairwise correlation of HP-filtered GDP. "Trade" denotes bilateral trade intensity T, "Structure" is the index S of similarity in sectoral output, constructed using all one-digit activities. The "Restrictions" estimations use the average of the four AREAER measures of restrictions to capital flows to measure "Finance". The "Holdings" estimations use the IMF's Coordinated Portfolio Investment Survey, in million USD. All instruments are listed in Appendix A. All variables enter in levels. All variables enter in levels.

Table 4: Core - Periphery: GDP Correlations					
	Total	Detail		Total - IV	Detail - IV
Finance	4.2817 2.30**		Finance	8.6680 2.18**	
Equity		1.0254 0.29	Equity		-38.4994 -1.95*
Short		90.3604 1.61	Short		936.8165 2.15**
Long		3.3101 0.53	Long		3.7641 0.11
Trade	0.0669 2.65***	0.0578 2.18**	Trade	0.0863 1.36	-0.0084 -0.08
Structure	-0.1591 -2.36	-0.1521 -1.97**	Structure	-0.4024 -2.83**	-0.1580 -0.65
Obs.	364	328	Obs.	230	207

Notes: The dependent variable is the pairwise correlation of HP-filtered GDP, computed between a core (12 countries) and a periphery (31 countries). "Trade" denotes bilateral trade intensity T, "Structure" is the index S of similarity in sectoral output, constructed using three-digit manufacturing data. "Finance" is measured using the IMF's Coordinated Portfolio Investment Survey, in million USD. Financial integration is also decomposed into its components. All instruments are listed in Appendix A. All variables enter in levels.

Table 5: Core - Periphery: Simultaneous Estimations		
	Total	Total
GDP Correlations Equation		
Finance	8.3889 2.13**	7.7672 1.99**
Trade	0.0531 0.85	0.1111 1.98**
Structure	-0.5537 -3.98***	-0.4222 -3.72***
Finance Equation		
Trade	0.0095 3.33***	0.0057 2.14**
Trade Equation		
Finance	29.3565 3.63***	27.8435 3.52***
Structure Equation		
Finance	0.8666 0.31	1.0515 0.46
Specialization		2.5188 10.93***
Obs.	230	230

Notes: The dependent variable is the pairwise correlation of HP-filtered GDP, computed between a core (12 countries) and a periphery (31 countries). "Trade" denotes bilateral trade intensity T, "Structure" is the index S of similarity in sectoral output, constructed using three-digit manufacturing data. "Finance" is measured using the IMF's Coordinated Portfolio Investment Survey, in intensive terms. All instruments are listed in Appendix A. All variables enter in levels.

Table 6: Consumption Correlations

	Restr. (Tot.)	Restr. (Det.)		Holdings (Tot.)	Holdings (Det.)
Finance	-0.0191 -2.60***		Finance	-0.0795 -0.32	
ER		0.0459 1.16	Equity		1.8651 1.97**
CA		-0.1014 -2.74***	Short		-2.0726 -0.61
CAPA		0.0222 0.48	Long		-2.0341 -2.01**
Exports		-0.0193 -0.44			
Output	0.4751 10.84***	0.4700 10.58***	Output	0.4576 8.84***	0.4562 8.86***
Obs.	347	347	Obs.	250	250

Notes: The dependent variable is the pairwise correlation of HP-filtered Consumption. "Output" denotes the pairwise correlation of HP-filtered GDP, used as a dependent variable in previous estimations. The "Restrictions" estimations use the average of the four AREAER measures of restrictions to capital flows to measure "Finance". The "Holdings" estimations use the IMF's Coordinated Portfolio Investment Survey, in million USD. Both also decompose financial integration into its components. All variables enter in levels.

Table 7: Consumption Correlations - Instrumented Variables					
	Restr. (Tot.)	Restr. (Det.)		Holdings (Tot.)	Holdings (Det.)
Finance	-0.0213 -2.79***		Finance	0.0684 0.14	
ER		0.0659 1.21	Equity		-2.2909 -0.74
CA		-0.1455 -2.80***	Short		19.4813 1.11
CAPA		0.0151 0.23	Long		0.4169 0.12
Exports		0.0209 0.30			
Output	0.4709 10.76***	0.4684 10.06***	Output	0.4519 8.43***	0.4568 7.72***
Obs.	351	351	Obs.	253	253

Notes: The dependent variable is the pairwise correlation of HP-filtered Consumption. "Output" denotes the pairwise correlation of HP-filtered GDP, used as a dependent variable in previous estimations. The "Restrictions" estimations use the average of the four AREAER measures of restrictions to capital flows to measure "Finance". The "Holdings" estimations use the IMF's Coordinated Portfolio Investment Survey in million USD. Both also decompose financial integration into its components. All instruments are listed in Appendix A. All variables enter in levels.

Table 8: Traded Goods Consumption Correlations - Instrumented Variables					
	Restr. (Tot.)	Restr. (Det.)		Holdings (Tot.)	Holdings (Det.)
Finance	-0.0205 -1.72*		Finance	0.1757 0.42	
ER		0.1531 1.77*	Equity		1.4718 0.65
CA		-0.1746 -2.50**	Short		16.6015 1.25
CAPA		-0.0111 -0.15	Long		-3.7606 -1.41
Exports		-0.0051 -0.07			
Output	0.1620 2.94***	0.1244 2.09**	Output	0.2718 3.83***	0.2865 3.70***
Obs.	190	190	Obs.	136	136

Notes: The dependent variable is the pairwise correlation of fluctuations in the ratio of traded goods to total consumption as implied by the HP-filter. "Output" denotes the pairwise correlation of HP-filtered GDP, used as a dependent variable in previous estimations. The "Restrictions" estimations use the average of the four AREAER measures of restrictions to capital flows to measure "Finance". The "Holdings" estimations use the IMF's Coordinated Portfolio Investment Survey in million USD. Both also decompose financial integration into its components. All instruments are listed in Appendix A. All variables enter in levels.

Table 9: Quantity Puzzle - Simultaneous Estimations			
	Restrictions		Holdings
ρ^C		ρ^C	
Finance	-0.0179 -1.72*	Finance	-0.1166 -0.24
Output	0.5369 4.32***	Output	0.6036 5.84***
ρ^Y		ρ^Y	
Finance	-0.0399 -4.11***	Finance	1.5013 2.73***
Trade	0.0897 3.45***	Trade	0.1138 4.22***
Structure	-0.3286 -3.30***	Structure	-0.2822 -2.41**
Obs.	351	Obs.	253

Notes: The dependent variable under the "ρ^C" heading is the pairwise correlation of HP-filtered consumption. "Output" denotes the pairwise correlation of HP-filtered GDP, which is also the dependent variable under the "ρ^Y" heading. "Trade" denotes bilateral trade intensity T, "Structure" is the index S of similarity in sectoral output, constructed using one-digit data. The "Restrictions" estimations use the average of the four AREAER measures of restrictions to capital flows to measure "Finance". The "Holdings" estimations use the IMF's Coordinated Portfolio Investment Survey in million USD. All instruments are listed in Appendix A. All variables enter in levels.

Table 10: Core - Periphery: Consumption Correlations

	Total	Detail		Total - IV	Detail - IV
Finance	-1.6672		Finance	-0.7059	
	-0.95			-0.21	
Equity		2.4708	Equity		15.8796
		0.74			0.77
Short		-48.8069	Short		-550.1752
		-0.91			-1.28
Long		-3.8662	Long		35.3781
		-0.66			1.50
Output	0.4394	0.4296	Output	0.3994	0.4258
	8.76***	8.16***		6.52***	4.14***
Obs.	364	328	Obs.	250	225

Notes: The dependent variable is the pairwise correlation of HP-filtered Consumption, computed between a core (12 countries) and a periphery (31 countries). "Output" denotes the pairwise correlation of HP-filtered GDP, used as a dependent variable in previous estimations. "Trade" denotes bilateral trade intensity T, "Structure" is the index S of similarity in sectoral output, constructed using three-digit manufacturing data. "Finance" is measured using the IMF's Coordinated Portfolio Investment Survey, in million USD. Financial integration is also decomposed into its components. All instruments are listed in Appendix A. All variables enter in levels.

Table 11: Core - Periphery: Quantity Puzzle	
	Holdings
ρ^C	
Finance	-9.4561 -1.54
Output	1.0759 8.43***
ρ^Y	
Finance	9.7188 2.75***
Trade	0.0549 1.90*
Structure	-0.2451 -2.78***
Obs.	250

Notes: The dependent variable under the "ρ^C" heading is the pairwise correlation of HP-filtered consumption. "Output" denotes the pairwise correlation of HP-filtered GDP, which is also the dependent variable under the "ρ^Y" heading. "Trade" denotes bilateral trade intensity T, "Structure" is the index S of similarity in sectoral output, constructed using three-digit manufacturing data. The "Holdings" estimations use the IMF's Coordinated Portfolio Investment Survey, in million USD. All instruments are listed in Appendix A. All variables enter in levels.