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DO FREE TRADE AGREEMENTS ENHANCE THE TRANSMISSION OF SHOCKS ACROSS COUNTRIES?

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DO FREE TRADE AGREEMENTS ENHANCE THE TRANSMISSION OF SHOCKS ACROSS COUNTRIES?

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Resumen
Actualmente experimentamos un proceso de integración del comercio mundial: más de la mitad de dicho comercio es realizado por país que pertenecen a bloques comerciales. El objetivo del presente trabajo es contrastar si los acuerdos de libre comercio o integración económica (ALC ó AIR, respectivamente) reforzaron el canal de "comercio" en la transmisión internacional de ciclos económicos. Utilizando información anual para 147 países en el periodo 1960-99, hallamos los siguientes resultados: (i) mayor intensidad comercial entre dos países genera una mayor sincronización de los ciclos económicos, (ii) el impacto de un creciente comercio es aún mayor para países que tienen un ALC, (iii) el impacto de mayor comercio bilateral sobre la sincronización de ciclos es mayor en pares de países industriales que en pares de países en desarrollo, (iv) el impacto dentro de cada grupo de pares de países es mayor en aquellos que poseen un ALC, (v) los efectos económicos de una mayor intensidad comercial en presencia de ALCs son mayores durante los años 90s.

Abstract
World Trade has experienced an increased integration over the last 15 years. More than half of world trade currently takes place under actual or future trading blocks. Our main goal is to test whether free trade or regional integration agreements (FTA or RIA, respectively) have strengthened the trade channel of international transmission of business cycles. With annual information for 147 countries over the 1960-99 period, we conduct our analysis for a panel data of country pairs (33676 country pairs), and we find the following results: (i) Higher trade intensity between two countries generates a stronger cycle synchronization. (ii) This impact is even stronger among country pairs with a free trade agreement. (iii) The impact of trade intensity on cycle synchronization is stronger among industrial than among developing country pairs. (iv) The impact within each group of country pairs is higher for the ones engaged in FTAs. (v) Economic effects of higher trade intensity in the presence of FTAs are stronger during the 1990s.

The ideas expressed in this paper are those of the author, and do not necessarily reflect those of the Central Bank of Chile or its board of members.
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1. Introduction

The World Economy has experienced an important surge in trade globalization in the last two decades, with multiple free trade and regional integration agreements being celebrated.[1] There were more than 140 regional trade agreements in force by 1999, with most of them involving developing or transition economies (IMF, 2001). Also, during the past 20 years, world trade has grown twice as fast as world output (6 vs. 3 percent), deepening economic integration (IMF, 2001, Kouparitsas, 2001). To the extent that countries are becoming more integrated into the world economy, their macroeconomic fluctuations have become increasingly affected by external disturbances, which includes output fluctuations in other economies. Shocks occurring in one country could be transmitted to another country through three basic channels: international trade in goods and services, international trade of financial assets, and direct linkages between sectors of production across countries.

The role of international trade in transmitting business cycle fluctuations across countries has been widely recognized and analyzed (Canova and Dellas, 1993; Baxter, 1995). Trade linkages have proved to be quite important in the literature of optimum currency areas (OCAs). It has been argued that countries with higher trade integration would benefit from sharing a common currency and are more likely to be members of a currency union Also, countries with higher business cycle synchronization (*i.e.* higher output correlation) are more likely to be members of a currency union (Mundell, 1961; Frankel and Rose, 1997, 1998).

Recent empirical research has found that country pairs with stronger international trade linkages tend to have more highly correlated business cycles not only among industrial countries (Frankel and Rose, 1997, 1998; Clark and van Wincoop, 2001; Rose and Engel, 2001) but also among developing countries although at a weaker degree (Calderon, Chong and Stein, 2002). In this paper, we would like to investigate whether the existence of a free trade agreements among countries strengthens the trade channel of international transmission of shocks.[2]

Using 10-year period data on cyclical synchronization and trade intensity for 147 countries over the 1960-97 period (that is, 33676 country pairs). However, we also analyze our results for the cross-section of country pairs in the 1990-99 period since there are 2 different aspects in the recent proliferation of RIAs, relative to the earlier wave: (i) many developing countries have undertaken a trade liberalization policy unilaterally or before joining a trade agreement, and (ii) the recent wave includes a significant number of North-South FTAs (Schiff, 2001).

[1] Currently, more than half of the world trade is performed under actual or prospective trading blocks, and almost every country is either a member of or is negotiating its participation in one or more trade agreements (Schiff, 2001). For example, the EEC has become a single market (the European Union) with a single currency (the Euro), with other non-EU european countries signing FTAs with the EU or analyzing the possibility of accession to this market. The ASEAN free trade area was created by countries in South East Asia. The Americas have witnessed the creation of Mercosur and NAFTA in the last decade and is currently negotiating the FTAA. Finally, Chile and Mexico have been signing bilateral trade agreements with countries or blocs within and outside their region (Levy-Yeyati *et al.* 2002).

[2] According to the previous literature, we undertake our analysis by considering the fact that the synchronization of business cycles is endogenous with respect to trade integration (Frankel and Rose, 1997, 1998).

Among our main results, we have:

- Higher trade intensity may induce more symmetrical business cycles among country pairs. This result is consistent with the findings of Rose and Engel (2001) and Calderón, Chong and Stein (2002).
- The impact of higher trade intensity on cycle synchronization is even stronger among country pairs that are part of free trade or regional integration agreements. Hence, the transmission of international business cycle shocks is futher enhanced by the presence of FTAs among open economies.
- We specifically find that a one standard deviation increase in trade intensity (normalized by output) during the 1990s increases the (BP-filtered) output correlation for countries with FTAs from an initial average of 0.26 to 0.35, whereas the analogous surge in trade intensity elevates the output correlation from 0.05 to 0.08 in countries without FTAs.
- The effect of higher trade intensity on business cycle correlation is higher among industrial country pairs than among developing country pairs. Also, the impact within each group is stronger among country pairs with FTAs than among country pairs without them.
- A one standard deviation increase in bilateral trade intensity will increase output correlation from 0.53 to 0.64 among industrial country pairs with FTA in the 1990s, from 0.21 to 0.29 among developing country pairs with FTAs. On the other hand, it increases the output correlation of industrial and developing country pairs without FTA from 0.15 to 0.18 and from 0.044 to 0.056 in the 1990s, respectively.
- The impact of changes in trade intensity is higher among North-South cycles than among South-South cycles.

The rest of the paper is organized as follows. Section 2 discusses the data used in our analysis. Section 3 outlines the econometric methodology used in our empirical evaluation. Section 4 presents the results of our estimations and, finally, Section 5 concludes.

2. The Data

We collected annual data for 147 countries over the 1960-99 period on both real GDP and bilateral trade and free trade agreements (FTAs) in order to test the importance of FTAs to enhance the trade channel of international transmission of business cycle shocks. See Appendix I for the list of countries involved in our analysis.

Bilateral Intensity of International Trade. Our main indicator is the ratio of bilateral trade between countries i and j relative to these countries' output. For robustness checks, we also use the ratio of bilateral trade flows between countries i and j relative to these countries' total trade flows, and a more theoretical measure derived from gravity equation models by Deardorff (1998), which includes the share of output of both countries in world's total output. The annual data on bilateral trade flows (exports FOB and imports CIF) [3] for a large set of countries was obtained from the IMF's Direction of

[3] Data for imports FOB was limited. It only represented 20 percent of the coverage obtained with imports CIF.

Trade Statistics, whereas the data on output and total trade flows was obtained from the World Bank's World Development Indicators.[4]

Cycle Synchronization. We have two ways to measures the extent to which business cycles comove. First, we compute the correlation between the cyclical component of (log) of the real GDP for countries i and j (Frankel and Rose, 1997, 1998). Data on real GDP in local currency at constant prices is obtained from the World Bank's World Development Indicators.[5] Our preferred method to compute the business cycle for our sample of countries is the band-pass filter (Baxter and King, 1999). For robustness checks, we also use other detrending techniques: quadratic trend, first differences, and the Hodrick-Prescott filter. After obtaining the cyclical component of output for all the countries in our sample, we compute bilateral output correlations. Here, higher output correlation implies a higher degree of business cycle synchronization. Second, we compute an indicator of business cycle asymmetries for a country pair (Bayoumi and Eichengreen, 1997, 1998) as the standard deviation of the changes in the relative output between countries i and j. The lower the value of this standard deviation, the higher the degree of business cycle synchronization.

Our measures of cyclical synchronization between countries i and j, as well as our average measures of bilateral trade intensity are computed over a given span of time. Specifically, we split our sample into four equally-sized parts: 1960-69, 1970-79, 1980-89, and 1990-99.

Free Trade Agreements. We obtain the data on the free trade agreements signed by different countries and their year of creation from Levy-Yeyati, Stein and Daude (2002). See Appendix II for the complete list of FTAs.

3. Methodology

We would like to test whether FTAs enhance the trade channel of international transmission of business cycle shocks among countries across the world. To accomplish this task, we run the following regression:

$$cs(i,j)_{t,t+k} = \eta_{(i,j)} + \beta_0\, xm(i,j)_{t,t+k} + \beta 1\ FTA^*\, xm(i,j)_{t,t+k} + u(i,j)_t \qquad (1)$$

where $cs(i,j)_{t,t+k}$ denotes the measures of cycle synchronization (as proxied by output correlations or cyclical asymmetries computed over the k periods), $xm(i,j)_{t,t+k}$ represents the average bilateral trade intensity computed over k periods, FTA is a 0-1 dummy representing the fraction of years within a decade that a free trade agreement is in place for any country pair, and $\eta_{(i,j)}$ represents variables that capture country pair effects.

[4] A typical problem from data on bilateral flows is the mismatch between export flows from country i to country j and import flows of country j from country i. Here, we take the data reported by the country with higher income in the country-pair.

[5] In addition to output, Frankel and Rose (1997, 1998) use alternative measures of economic activity, such as industrial production, employment, and unemployment. Since these measures are not widely available for the much larger sample of countries included in our study, all of our results are based on measures of output correlation. In any case, it is reassuring that the results in Frankel and Rose (1997, 1998) do not seem to be sensitive to the measure of economic activity used.

From the empirical evidence, we expect β_0 to be positive and significant (Frankel and Rose, 1997, 1998; Calderón *et al.* 2002), that is, higher bilateral trade might lead to more synchronized cycles for any pair of countries.[6] As discussed by the literature, there may possibly exist problems of endogeneity between cycle synchronization and trade intensity (Frankel and Rose, 1998, 2002; Rose and Engel, 2002).[7] Hence, our OLS estimates of β_0 may be inconsistent.

To circumvent the endogeneity problem, we use the gravity equation model of bilateral trade to instrument for our measure of bilateral trade intensity (Wei, 1996; Deardorff, 1998),

$$xm(i,j)_{t,t+k} = \alpha_0 + \alpha_1 \ln y(i)_t + \alpha_2 \ln y(j)_t + \alpha_3 dist(i,j) + \alpha_4 Border(i,j) + \alpha_5 \ln REM(i) + \alpha_6 \ln REM(j) + \alpha_7 LANG(i,j) + e(i,j)_t \quad (2)$$

where y_i and y_j represent initial real GDP in countries i and j, dist(i,j) is the distance between countries i and j (in logs), and Border(i,j) is a dummy variable equal to one for countries that share a common border, REM(i) and REM(j) are measures of remoteness for countries i and j,[8] and LANG(i,j) is a dummy for common language. We expect that bilateral trade between countries i and j will increase if their outputs increase, if they are closer in distance, and if they share a common border, if both are very far from alternative trading partners, and if they share a common language.

4. Empirical Assessment

In this section we present our regression analysis that links trade integration, business cycle synchronization, and free trade agreements. To accomplish this task we use 10-year average observations for 33676 country pairs (from 147 countries) over the 1960-99 period. In addition, since most FTAs were signed in the 1990s, we also present our results for the cross-section of country pairs during this decade.

Our dependent variable, business cycle synchronization, is measured by either the cyclical output correlation (using alternative detrending techniques to compute the cyclical component) or an indicator of business cycle asymmetries. Our explanatory

[6] Theoretically, the sign of β_0 depends on the predominant shocks that affect these economies. If industry shocks are the dominant source of business cycles and openness to trade leads to complete specialization (as Heckscher-Ohlin would predict), we would expect β_0 to be negative. On the other hand, if industry shocks lead to vertical specialization (and, therefore, more intra-industry trade), or if global shocks dominate economic fluctuations then we would expect β_0 to be positive.

[7] Trade intensity and cycle synchronization may be jointly driven by joining a currency union, , which at the same time reduces transactions costs in trade flows, and links the macroeconomic policies of their members. Hence, countries joining a currency union might exhibit a positive correlation between trade integration and business cycle synchronization.

[8] An indicator of geographical remoteness for countries i and j that measures how far each country lies from alternative trading partners. Usually, trade intensity increases the farther the countries in the pair are to alternative markets. We follow Stein and Weinhold (1998) to construct a measure of the remoteness of country i as the weighted average of that country's distances to all of its trading partners (except for the country j involved in a determined country pair), using as weights the share of the partner's output in world GDP. That is, for a determined (i,j)-country-pair, the remoteness of country i is defined as

$$REM_i = \sum_{m \neq j} \left(\frac{y_m}{y^W} \right) d_{im} .$$

variables are the trade intensity between two countries, and a dummy variable that indicates the presence of a free trade agreement in a country pair. We evaluate the importance of FTAs in the international transmission of shocks across countries by testing the significance of the interaction effect between trade intensity and the presence of FTAs among countries.

4.1 Basic Statistics

In Table 1 we present some basic statistics for our dependent variable (i.e. business cycle synchronization) and the coefficient of bilateral trade intensity during the 1960-99 and 1990-99 periods. Given that our sample includes country pairs with negligible trade, we focus on median values (rather than averages) since they are less affected by the presence of extreme values.

First, we find that business cycles are more synchronized among industrial country pairs than among any other country pairs, with a median value of 0.2935 (0.2918) for the (band-pass filtered) output correlation over the 1960-99 (1990-99). On the other hand, we find that North-South cycles are more correlated than South-South cycles, with median cycle correlation of 0.0852 and 0.0364, respectively (see Figure 1). This result is robust to the de-trending technique and consistent with the findings of Calderón, Chong and Stein (2002).

Second, we find that business cycles in country pairs with free trade agreements (FTAs) are more synchronized than in other country pairs. The band-pass filtered output correlation for country pairs with FTAs is 0.2763 (in the 1990s), whereas the cycle correlation for country pairs without FTAs is 0.0554.

Third, the presence of an FTA is also associated with a higher business cycle synchronization among sub-samples of country pairs. That is, cycle correlation will be higher among industrial country pairs, developing country pairs and mixed industrial-developing country pairs with FTAs (see Figure 2). Output correlation for industrial country pairs with FTA is 0.5342 in the 1990s, whereas it is 0.2127 for industrial country pairs without FTA.

Fourth, a free trade agreement between countries implies only a slight increase in correlation for both the sample of developing country pairs, and mixed industrial-developing country pairs. For the former group, the correlation is 0.0471 for developing country pairs with FTAs (relative to 0.0361 for countries without FTA), whereas for the latter group, the correlation is 0.1006 for mixed country pairs with FTA (relative to 0.0852 country pairs without FTA).[9]

Finally, we observe that the highest output correlation among selected FTAs is obtained by the ASEAN (0.5844) and the European Union (0.3797), with the smallest correlation exhibted by NAFTA (0.0823). For more details, see Table 1 and Figure 3.

[9] In the 1990s, we observe a surge in FTAs celebrated across the world. Here, we find that having celebrated FTAs is associated to higher output correlation not only among industrial countries (0.56 in countries with FTAs vs. 0.21 in countries without FTAs) but also among developing countries (0.14 vs. 0.04, respectively). Analogously, we find that groups of country pairs (*i.e.* all, developing and industrial country pairs) with FTAs exhibit less asymmetric business cycles.

4.2 Correlation Analysis

In Table 2 we present the correlation between business cycle synchronization and bilateral trade intensity among groups of country pairs (all, industrial, and developing country pairs) over the 1960-99 and 1990-99 period. Here, we distinguish whether the country pair has a free trade agreement in place or not.

First, we find that the higher the trade intensity between two countries, the stronger is the degree of association between their output fluctuations. Consistent with Calderón et al. (2002), we find that the association between trade intensity and cycle correlation is the highest among industrial country pairs.

Second, the positive relationship between trade intensity and output correlation is stronger among country pairs with FTAs (0.1958) than among country pairs without FTAs (0.0671). We also find that higher trade intensity is associated with smaller degrees of asymmetry among business cycles, with the relationship being stronger among country pairs with FTAs.

Third, the relationship between trade intensity and output correlation is positive and stronger among industrial countries with FTAs (0.1803) than among industrial countries without FTAs (0.0668) over the 1960-99 period. Surprisingly, the correlation is positive but smaller for the former group of country pairs during the 1990s (0.0671) and negative for the latter group (-0.0232).

Fourth, we also find a positive association between trade intensity and output correlation among developing and (IND, DEV) country pairs, which is higher for country pairs with FTAs than for the ones without them. Also, the correlations for these groups of country pairs are higher during the 1990s (where most of these FTAs were signed). Specifically, we find that the correlation between these two variables over the 1990s is 0.3058 for developing countries with FTAs (relative to 0.1004 for developing countries without FTAs) and 0.6365 for (IND, DEV) country pairs with FTAs (relative to 0.0089 for mixed pairs without FTAs).[10]

Finally, we find that the relationship between trade intensity and output correlation is positive in all selected FTAs, except for the Andean community (with a negative correlation of –0.1699). We observe the highest positive correlation between trade and cycle synchronization among NAFTA countries (0.9513) and CACM (0.4951). The correlation between countries of the European Union is not higher than 0.10, while the correlation for Mercosur is 0.0909 (see Table 2).

4.3 Regression Analysis

Before we estimate the parameters of interest in equation (1), we should note that OLS estimates would be inconsistent due to the endogeneity of bilateral trade intensity.[11] In

[10] In the 1990s, we observe that the relevance of FTAs for international transmission of shocks is even greater for developing country pairs and mixed industrial-developing country pairs.

[11] Our dependent variable (i.e. business cycle synchronization) and different specifications for all country pairs, with all of them including time dummies for the 1970-79, 1980-89 and 1990-99 periods, with the

order to find instruments for the ratios of bilateral trade intensity, we rely on the empirical literature of the gravity equation model of international trade.[12]

The first stage of our regression analysis would be to estimate a simple version of the gravity equation model for our sample of country pairs. Our dependent variable is the bilateral trade intensity between countries i and j (normalized by trade or output), and our explanatory variables are: distance between countries i and j, remoteness of countries i and j, dummy variables for common border, and common language. Except for the dummy variables, the determinants are expressed in logs (see equation 2).

In table 3 we report the result of our first stage regressions. Our estimate of the gravity equation model is consistent with the theory and existing evidence: countries that share a common border, that are closer in distance and have trading partners that are farther away from the rest of the world, and speak the same language, trade more intensively. Once we compute the adjusted values of bilateral trade intensity across country pairs, we proceed to perform our IV regressions.

4.3.1 Full Sample of Country Pairs

In table 4 we present our regression analysis for relationship between business cycle synchronization, bilateral trade intensity and free trade agreements for the full sample of country pairs. [13] In this sub-section we only distinguish among country pairs with and without FTAs.

First, we generally find that higher trade intensity between two countries enhance the output correlation (or generate more symmetrical business cycles) for these countries. This result is consistent with the findings in Calderón, Chong and Stein (2002).

Second, we find that our interaction effect between FTAs and bilateral trade intensity is positive and significant regardless of the cycle synchronization or trade intensity measure. That is, we find that the impact of higher trade intensity on cyclical output synchronization is even stronger among countries with FTAs. This result implies that the transmission of international shocks via trade is further enhanced by the presence of free trade agreements among open economies.

Third, we find that a one standard deviation increase in the bilateral trade intensity (when normalized by output) of a country would increase the (band-pass filtered) output correlation by 0.0084 when the country pair do not have a free trade agreement (FTA), and by 0.0565 when the country share an FTA with other countries. We should also note that a similar increase in the bilateral trade intensity has a higher economic impact on output correlation during the 1990s. Specifically, output correlation increases by 0.0258 for country pairs without FTAs, and by 0.0852 for country pairs that have an FTA.

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constant representing the 1960-69 period (base category). Although the estimates for the time dummies are not reported, they are jointly significant in the majority of cases.

[12] See Frankel and Romer (1999), Rose (2000), and Rose and Engel (2002) for a detailed list of possible determinants of bilateral trade.

[13] Note that we also control for country pair specific effects and time dummies for the 4 decades that span our sample.

In summary, a one standard deviation increase in bilateral trade intensity in the 1990s increases the output correlation for countries with FTAs from an initial median of 0.2763 to 0.3716 (0.3615) when normalized by output (trade), whereas the analogous surge in trade intensity elevates the output correlation from 0.0554 to 0.0783 (0.0812) in countries without FTAs when normalized by output (trade).

Recent empirical efforts in the literature have studied the different dynamics in the propagation of disturbances and the business cycle linkages among industrial countries (North) and developing countries (South) as well as between these regions (Kouparitsas, 1996, 2001; IMF, 2001; Kose, 2002). The existence of North-North, North-South and South-South cycles with their different dynamics motivates us to evaluate if the impact of greater trade linkages and FTAs on business cycle synchronization is different whether trade is intra-regional (North-North, South-South) or inter-regional (North-South).[14]

4.3.2 Industrial and Developing Country Pairs

According to Calderón, Chong and Stein (2002) the impact of trade intensity on cycle correlation varies according to the level of development of the countries in the pair analyzed. They find that the slope coefficient of trade intensity is the highest among industrial country pairs, and that the impact of trade is larger among North-South than among North-North cycles.

What do we expect from this set of regressions? We expect that the impact of trade intensity is higher among industrial country pairs with FTAs than among any other country pair. The impact of trade among developing country pairs is ambiguous. It has been argued that South-South RIAs not only are likely to lower bloc welfare (Viner, 1950), but also to result in an asymmetric distribution of gains and losses among member countries (Panagariya, 1997) and to generate economic divergence (Venables, 1999; The World Bank, 2000).[15] In addition, developing countries are more likely to benefit from economies of scale in a North-South RIA than in a South-South RIA because of a lareger and more open Northern partner, and a greater likelihood that market forces will prevail.[16] Finally, trade serves as a channel for the diffusion of technology and knowledge (Coe and Helpman, 1995). Developing countries may achieve more knowledge and higher TFP growth in a North-South rather than in a South-South RIA (Blyde, 2001; Olarreaga et al. 2001).

[14]There is evidence that the correlation between major advanced economies and developing countries are significantly lower than correlation among the cycles of industrial countries. This finding reflects the greater diversity of developing countries in terms of governance, institutional arrangements and economic structures as well as their greater vulnerability to external and domestic shocks (IMF, 2001).

[15] Poorer members of South-South FTAs have smaller capital-labor ratios than those of more advanced members (or the world average K-L ratio). Hence, these countries may obtain the largest benefits from trading with the rest of the world, and the biggest losses from signing South-South FTAs than the more developed members (Schiff, 2001). The opposite happens with North-North agreements (Ben-David, 1993).

[16] Developing countries also benefit from the relocation of manufacturing output from its Northern partner in a North-South cycle (Feenstra and Hanson, 1997).

Here we analyze the role of FTAs in the transmission of shocks among different sub-samples of country pairs, that is, among industrial, developing and industrial-developing country pairs. We report our results in Table 5, and among our main findings we have:

First, we find that the impact of bilateral trade intensity on business cycle correlation is stronger among industrial country pairs than among any other country pair. We also find that the impact of trade intensity on output correlation is higher among North-South than among South-South cycles. This result is robust for different measures of bilateral trade intensity and de-trended output correlations (with the exception of the quadratic trend).

Second, the slope coefficient for trade intensity within each group of country pairs is higher for the country pairs with FTAs than among the countries without FTAs. In addition, we find that the economic effects of changes in trade intensity on output correlation are somewhat stronger when we analyze the 1990-99 period (see Table 5).

Third, we find that the coefficient of trade intensity is larger for (IND, DEV) pairs with FTA is positive and larger than the (IND,DEV) pairs without FTA, and that this difference is statistically significant. This implies that the presence of a FTA enhances the trade channel in the transmission of shocks across North-South cycles.

Fourth, we find that the coefficient of trade intensity among developing country pairs with FTA is positive and significant, whereas the one for developing country pairs without FTA is negative and not significant. According to this result, trade generates more synchronized cycles in South-South country pairs only under the presence of FTAs.

Finally, in order to interpret the economic significance of our findings, we will assess the impact of higher trade intensity (e.g. a one standard deviation increase) on the (band-pass filtered) output correlation using our estimates for the 1990-99 period. An increase in bilateral trade intensity normalized by trade (output) will increase output correlation among industrial country pairs with FTAs from an initial median value of 0.5342 to 0.6518 (0.6436), whereas it increase from 0.2127 to 0.2859 (0.3020) among industrial country pairs without FTAs. An analogous surge in bilateral trade intensity normalized by trade (output) may increase the cycle correlation among developing country pairs with FTA from 0.1451 to 0.1922 (0.1814), whereas it increased from 0.0435 to 0.058 (0.0555) among developing countries without FTAs. Finally, we find that an increase in bilateral trade normalized by trade (output) will generate an increase in the output correlation of mixed (IND, DEV) country pairs with FTA by 0.0467 (0.0346), while the increase for mixed pairs without FTA is 0.0305 (0.0405).

5. Conclusions

The main goal of the present paper is to assess whether the presence of free trade and/or regional integration agreements (FTAs and/or RIAs) matters for the transmission of international business cycle shocks. That is, we want to determine whether the presence of FTAs or RIAs enhanced the importance of the trade channel in the international transmission of business cycles. In order to accomplish this task, we collected 10-year period data on cyclical synchronization and trade intensity for 147 countries across the

world over the 1960-99 period (that is, 33676 country pairs). We find the following results:

First, cycle synchronization is inambiguously enhanced by higher trade intensity among country pairs. This result is consistent with the evidence already found in the literature (Frankel and Rose, 1998; Rose and Engel, 2001; Calderon, Chong and Stein, 2002).

Second, the presence of free trade or regional integration agreeements (FTAs or RIAs, respectively) enhanced the impact of higher bilateral trade intensity on business cycle synchronization. Specifically, we find that an increase in trade intensity normalized by output (by one standard deviation) increases the (BP-filtered) output correlation for countries with FTAs from an initial median value of 0.26 to 0.35, whereas the analogous surge in trade intensity elevates the output correlation from 0.05 to 0.08 in countries without FTAs during the 1990s.

Third, the impact of higher bilateral trade intensity on output correlation is stronger among industrial country pairs than among developing country pairs. In addition, the impact of trade intensity within each group is stronger among country pairs with free trade agreements (FTAs) than among country pairs without them.

Fourth, we find that a surge in bilateral trade intensity will improve the (BP-filtered) output correlation among industrial country pairs with FTAs from 0.53 to 0.64, and among developing country pairs with FTAs from 0.21 to 0.30 during the 1990s. As stated above, the increase in output correlation is smaller for countries without FTAs. That is, output correlation increases from 0.15 to 0.18 for industrial country pairs without FTAs and from 0.044 to 0.056 for developing country pairs without FTAs.

Finally, we find that the impact of trade intensity on cycle correlation is higher among North-South FTAs than among South-South FTAs. This result is consistent with the possibilities of trade creation and competitive market considerations prevailing for developing countries.

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Appendix I: Sample of Countries

I. Industrial Countries (23)

AUS	Australia	FIN	Finland	LUX	Luxembourg
AUT	Austria	FRA	France	NLD	Netherlands
BEL	Belgium	GBR	United Kingdom	NOR	Norway
CAN	Canada	GRC	Greece	NZL	New Zealand
CHE	Switzerland	IRL	Ireland	PRT	Portugal
DEU	Germany	ISL	Iceland	SWE	Sweden
DNK	Denmark	ITA	Italy	USA	United States
ESP	Spain	JPN	Japan		

II. Developing Countries (124)

East Asia and the Pacific (19)

BRN	Brunei	KOR	Korea, Rep.	SGP	Singapore
CHN	China	MMR	Myanmar (Burma)	SLB	Solomon Is.
COM	Comoros	MYS	Malaysia	THA	Thailand
FJI	Fiji	NCL	New Caledonia	TWN	Taiwan
HKG	Hong Kong	PHL	Philippines	VUT	Vanuatu
IDN	Indonesia	PNG	Papua New Guinea	WSM	Samoa
KIR	Kiribati				

Eastern Europe and Central Asia (10)

ALB	Albania	HUN	Hungary	ROM	Romania
BGR	Bulgaria	LVA	Latvia	RUS	Russian Fed.
CZE	Czech Rep.	POL	Poland	SVK	Slovak Rep.
EST	Estonia				

Latin American and the Caribbean (33)

ARG	Argentina	DMA	Dominica	NIC	Nicaragua
ATG	Antigua	DOM	Dominican Rep.	PAN	Panama
BHS	Bahamas	ECU	Ecuador	PER	Peru
BLZ	Belize	GRD	Grenada	PRI	Puerto Rico
BMU	Bermuda	GTM	Guatemala	PRY	Paraguay
BOL	Bolivia	GUY	Guyana	SLV	El Salvador
BRA	Brazil	HND	Honduras	SUR	Suriname
BRB	Barbados	HTI	Haiti	TTO	Trinidad & Tobago
CHL	Chile	JAM	Jamaica	URY	Uruguay
COL	Colombia	LCA	St. Lucia	VCT	St. Vincent
CRI	Costa Rica	MEX	Mexico	VEN	Venezuela

Middle East and North Africa (17)

ARE	Utd.Arab Em.	ISR	Israel	OMN	Oman
CYP	Cyprus	JOR	Jordan	SAU	Saudi Arabia
DZA	Algeria	KWT	Kuwait	SYR	Syria
EGY	Egypt	LBY	Libya	TUN	Tunisia
IRN	Iran	MAR	Morocco	TUR	Turkey
IRQ	Iraq	MLT	Malta		

South Asia (6)

BGD	Bangladesh	IND	India	NPL	Nepal
BTN	Bhutan	LKA	Sri Lanka	PAK	Pakistan

Sub-Saharan Africa (39)

AGO	Angola	GNB	Guinea-Bissau	RWA	Rwanda
BDI	Burundi	KEN	Kenya	SDN	Sudan
BEN	Benin	LBR	Liberia	SEN	Senegal
BFA	Burkina Faso	LSO	Lesotho	SLE	Sierra Leone
BWA	Botswana	MDG	Madagascar	SOM	Somalia
CAF	C.Africa R.	MLI	Mali	SWZ	Swaziland
CIV	Ivory Coast	MOZ	Mozambique	SYC	Seychelles
CMR	Cameroon	MRT	Mauritania	TCD	Chad
COG	Congo	MUS	Mauritius	TGO	Togo
ETH	Ethiopia	MWI	Malawi	ZAF	South Africa
GAB	Gabon	NAM	Namibia	ZAR	Congo, Dem. Rep.
GHA	Ghana	NER	Niger	ZMB	Zambia
GMB	Gambia	NGA	Nigeria	ZWE	Zimbabwe

Appendix II: Free Trade Agreements

Free Trade Agreement	Creation	Members
European Union (EU)	1957	Austria (since 1995), Belgium, Denmark (since 1973), Finland (since 1995), France, Germany, Greece (since 1981), Ireland (since 1973), Italy, Luxembourg, Netherlands, Portugal (since 1986), Spain (since 1986), Sweden (since 1995), United Kingdom (since 1973).
European Free Trade Association (EFTA)	1960	Austria (until 1994), Denmark (until 1972), Finland (1986-94), Iceland (since 1970), Liechtenstein (since 1991), Norway, Portugal (until 1985), Sweden (until 1994), Switzerland, United Kingdom (until 1992).
European Economic Area (EEA)	1994	All members of the European Union, Iceland, Liechtenstein, Norway.
Central European Free Trade Area (CEFTA)	1992	Czech Republic, Hungary, Poland, Slovak Republic, Slovenia (since 1995).
North American Free Trade Agreement (NAFTA)	1989	Canada, United States, Mexico (since 1994).
Mercado Común del Sur (MERCOSUR)	1995	Argentina, Brazil, Paraguay, Uruguay.
Andean Community (former Andean Pact)	1969	Bolivia, Colombia, Ecuador, Peru, Venezuela
Central American Common Market (CACM)	1959	Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua
Group of Three	1994	Colombia, Mexico, Venezuela
Bolivia-Mexico FTA	1995	Bolivia, Mexico
Association of Southeast Asian Nations (ASEAN)	1992	Brunei, Indonesia, Malaysia, Philippines, Singapore, Thailand, Vietnam (since 1995)
Australia-New Zealand Closer Economic Relations	1983	Australia, New Zealand
South African Custom Union	1910	Botswana, Lesotho, Namibia (since 1990), South Africa, Swaziland

Source: Levy-Yeyati, Stein and Daude (2002)

Table 1
Business Cycle Synchronization and Trade Intensity: Sample Statistics

	Detrended Output Correlation				Cyclical	Bilateral Trade Intensity	
Sample	**Q-Trend**	**Differences**	**HP-Filter**	**Band-Pass**	**Asymmetries**	**% Total Trade**	**% Output**
I. 1960-1999							
All Country Pairs	**0,0937**	**0,0394**	**0,0685**	**0,0565**	**0,0562**	**0,0045**	**0,0021**
Countries with FTA	0,4543	0,2969	0,2802	0,2707	0,0306	0,3668	0,2158
Countries without FTA	0,0859	0,0348	0,0644	0,0524	0,0567	0,0041	0,0019
Industrial Country Pairs (IND)	**0,4057**	**0,2754**	**0,2920**	**0,2935**	**0,0267**	**0,3403**	**0,1485**
Countries with FTA	0,5686	0,4290	0,4095	0,4096	0,0235	0,4959	0,2666
Countries without FTA	0,2684	0,1744	0,2261	0,2165	0,0282	0,2618	0,0816
Developing Country Pairs (DEV)	**0,0789**	**0,0200**	**0,0465**	**0,0364**	**0,0629**	**0,0013**	**0,0006**
Countries with FTA	0,2352	0,0938	0,0810	0,0471	0,0553	0,1279	0,1061
Countries without FTA	0,0776	0,0193	0,0459	0,0361	0,0630	0,0012	0,0006
Mixed (IND, DEV) Country Pairs	**0,0919**	**0,0673**	**0,1015**	**0,0852**	**0,0460**	**0,0161**	**0,0072**
Countries with FTA	0,3471	-0,0285	0,0701	0,1006	0,0365	0,8426	0,3363
Countries without FTA	0,0919	0,0674	0,1016	0,0852	0,0460	0,0161	0,0072
Specific FTAs:							
European Union	0,5068	0,4060	0,3906	0,3797	0,0259	0,6088	0,3880
EEC	0,5161	0,3840	0,3651	0,3577	0,0262	0,5691	0,3444
NAFTA	-0,1093	0,1440	0,0990	0,0823	0,0309	6,3376	1,6332
MERCOSUR	0,0898	0,2737	0,1848	0,2059	0,0432	1,2162	0,2342
Andean Community	0,5865	0,2330	0,2322	0,2496	0,0485	0,4781	0,1809
CACM	0,5246	0,2125	0,1710	0,1645	0,0463	1,2364	0,7388
ASEAN	0,2412	0,5304	0,6061	0,5844	0,0438	0,7080	0,7311
II. 1990-1999							
All Country Pairs	**0,1606**	**0,0364**	**0,0787**	**0,0600**	**0,0507**	**0,0043**	**0,0025**
Countries with FTA	0,6464	0,2487	0,2770	0,2763	0,0344	0,4376	0,2854
Countries without FTA	0,1523	0,0311	0,0753	0,0554	0,0511	0,0039	0,0023
Industrial Country Pairs (IND)	**0,6664**	**0,2827**	**0,3339**	**0,2918**	**0,0230**	**0,3730**	**0,1865**
Countries with FTA	0,8129	0,4755	0,5771	0,5342	0,0203	0,5904	0,3852
Countries without FTA	0,4154	0,1984	0,2405	0,2127	0,0237	0,2419	0,1074
Developing Country Pairs (DEV)	**0,1095**	**0,0204**	**0,0589**	**0,0465**	**0,0555**	**0,0018**	**0,0011**
Countries with FTA	0,2790	0,1433	0,1802	0,1451	0,0451	0,1934	0,1637
Countries without FTA	0,1075	0,0185	0,0568	0,0435	0,0557	0,0017	0,0010
Mixed (IND, DEV) Country Pairs	**0,2588**	**0,0556**	**0,1185**	**0,0815**	**0,0412**	**0,0119**	**0,0066**
Countries with FTA	0,4100	-0,1650	-0,1692	-0,0631	0,0396	0,9233	0,4438
Countries without FTA	0,2587	0,0563	0,1188	0,0815	0,0412	0,0118	0,0065
Specific FTAs:							
European Union	0,5068	0,4060	0,3906	0,3797	0,0259	0,6088	0,3880
EEC	0,5161	0,3840	0,3651	0,3577	0,0262	0,5691	0,3444
NAFTA	-0,1093	0,1440	0,0990	0,0823	0,0309	6,3376	1,6332
MERCOSUR	0,0898	0,2737	0,1848	0,2059	0,0432	1,2162	0,2342
Andean Community	0,5865	0,2330	0,2322	0,2496	0,0485	0,4781	0,1809
CACM	0,5246	0,2125	0,1710	0,1645	0,0463	1,2364	0,7388
ASEAN	0,2412	0,5304	0,6061	0,5844	0,0438	0,7080	0,7311

Table 2
Business Cycle Synchronization and Trade Intensity: Sample Correlation

	Correlation between Output Synchronization and Trade Intensity Using Bilateral Trade as a ratio to Total Trade					Correlation between Output Synchronization and Trade Intensity Using Bilateral Trade as a ratio to Total Output				
Sample of Country Pairs	**Quadratic Trend**	**First Differences**	**HP Filter**	**Band-Pass Filter**	**B. Cycle Asymmetries**	**Quadratic Trend**	**First Differences**	**HP Filter**	**Band-Pass Filter**	**B. Cycle Asymmetries**
I. 1960-1999										
All Country Pairs	**0,0500**	**0,0838**	**0,0828**	**0,0885**	**-0,0973**	**0,0472**	**0,0870**	**0,0841**	**0,0885**	**-0,0634**
Countries with FTA	0,1433	0,1904	0,1631	0,1803	-0,1636	0,1508	0,2133	0,1778	0,1949	-0,1249
Countries without FTA	0,0266	0,0587	0,0621	0,0668	-0,0766	0,0251	0,0642	0,0658	0,0690	-0,0419
Industrial Country Pairs (IND)	**0,0484**	**0,1351**	**0,1222**	**0,1374**	**-0,0508**	**0,0985**	**0,2018**	**0,1748**	**0,1841**	**-0,0802**
Countries with FTA	0,0110	0,1197	0,1336	0,1347	0,0375	0,0772	0,1786	0,1699	0,1761	0,0140
Countries without FTA	0,0298	0,0905	0,0698	0,0948	-0,1004	0,0177	0,1308	0,1044	0,1124	-0,1443
Developing Country Pairs (DEV)	**0,0576**	**0,0743**	**0,0702**	**0,0717**	**-0,0468**	**0,0435**	**0,0762**	**0,0702**	**0,0736**	**-0,0304**
Countries with FTA	0,2946	0,2413	0,1325	0,1667	-0,1922	0,1891	0,2271	0,1634	0,1889	-0,1298
Countries without FTA	0,0434	0,0649	0,0666	0,0672	-0,0369	0,0339	0,0693	0,0662	0,0693	-0,0216
Mixed (IND, DEV) Country Pairs	**-0,0129**	**0,0301**	**0,0293**	**0,0357**	**-0,0371**	**-0,0144**	**0,0199**	**0,0364**	**0,0381**	**-0,0145**
Countries with FTA	0,4714	0,2986	0,1922	0,3665	-0,0754	0,3949	0,3024	0,1789	0,3770	0,0028
Countries without FTA	-0,0177	0,0306	0,0306	0,0361	-0,0364	-0,0170	0,0200	0,0373	0,0383	-0,0134
Specific FTAs:										
European Union	-0,0756	0,1282	0,0787	0,1138	0,1207	-0,0186	0,1623	0,1181	0,1419	0,0618
EEC	-0,0835	0,1452	0,1065	0,1324	0,0998	-0,0251	0,1707	0,1329	0,1508	0,0446
NAFTA	0,1572	0,9998	0,9983	0,9513	-0,9452	0,0618	0,9933	0,9993	0,9174	-0,9722
MERCOSUR	0,5649	0,0817	0,0605	0,0909	0,5178	0,5273	0,0135	-0,0114	0,0028	0,5342
Andean Community	-0,1201	0,2260	0,1367	0,1055	0,0217	-0,1265	0,2356	0,1213	0,0833	0,0016
CACM	0,0747	0,1525	0,0139	0,0292	-0,0033	0,1109	0,1971	0,0196	0,0546	0,0578
ASEAN	0,3352	0,3810	0,1380	0,1456	-0,1985	0,2925	0,4010	0,2685	0,2867	-0,2470
II. 1990-1999										
All Country Pairs	**0,0683**	**0,1020**	**0,0951**	**0,1023**	**-0,0852**	**0,0659**	**0,1083**	**0,1001**	**0,1087**	**-0,0636**
Countries with FTA	0,0499	0,2469	0,1837	0,1958	-0,0709	0,1062	0,2638	0,2061	0,2245	-0,0875
Countries without FTA	0,0526	0,0616	0,0620	0,0671	-0,0704	0,0481	0,0756	0,0730	0,0798	-0,0469
Industrial Country Pairs (IND)	**-0,0427**	**0,1158**	**0,1254**	**0,1157**	**0,1128**	**0,0462**	**0,2056**	**0,1915**	**0,2028**	**0,0627**
Countries with FTA	-0,2587	0,1205	0,0878	0,0671	0,1184	-0,1144	0,1665	0,1269	0,1295	0,0676
Countries without FTA	0,0609	-0,0737	-0,0058	-0,0232	0,0969	0,0824	0,0636	0,0778	0,0825	0,0362
Developing Country Pairs (DEV)	**0,1048**	**0,1236**	**0,1024**	**0,1147**	**-0,0715**	**0,0722**	**0,1129**	**0,0964**	**0,1060**	**-0,0476**
Countries with FTA	0,3652	0,3738	0,2384	0,3058	-0,2961	0,1996	0,2981	0,2288	0,2583	-0,1851
Countries without FTA	0,0895	0,1070	0,0930	0,1004	-0,0570	0,0675	0,1075	0,0932	0,1015	-0,0381
Mixed (IND, DEV) Country Pairs	**-0,0285**	**-0,0110**	**-0,0029**	**0,0094**	**-0,0166**	**-0,0452**	**-0,0514**	**-0,0141**	**-0,0062**	**-0,0020**
Countries with FTA	0,5600	0,7336	0,4405	0,6365	-0,2549	0,4100	0,7969	0,4351	0,6721	-0,2019
Countries without FTA	-0,0421	-0,0126	-0,0010	0,0089	-0,0154	-0,0514	-0,0530	-0,0126	-0,0067	-0,0004
Specific FTAs:										
European Union	-0,1843	0,0878	0,0348	0,0679	0,1966	-0,0794	0,1391	0,0929	0,1176	0,0837
EEC	-0,1716	0,1165	0,0811	0,1024	0,1718	-0,0727	0,1561	0,1218	0,1386	0,0688
NAFTA	0,1572	0,9998	0,9983	0,9513	-0,9452	0,0618	0,9933	0,9993	0,9174	-0,9722
MERCOSUR	0,5649	0,0817	0,0605	0,0909	0,5178	0,5273	0,0135	-0,0114	0,0028	0,5342
Andean Community	0,0425	0,0260	-0,2086	-0,1699	0,0573	0,0203	0,0526	-0,2053	-0,2009	0,0433
CACM	0,3377	0,3679	0,4104	0,4951	-0,5858	0,1158	0,1760	0,2415	0,2454	-0,2614
ASEAN	0,3352	0,3810	0,1380	0,1456	-0,1985	0,2925	0,4010	0,2685	0,2867	-0,2470

Table 3
Determinants of Bilateral Trade Intensity
Dependent Variable: Bilateral Trade Flows between country i and j

Variable	Normalized by Trade	Normalized by Output	Deardorff's Measure
Constant	0,04823 **	0,02153 **	-0,37809 *
	(0,003)	(0,002)	(0,235)
Distance (in logs)	-0,00099 **	-0,00087 **	-0,32718 **
	(0,000)	(0,000)	(0,010)
Border dummy	0,00644 **	0,00211 **	0,33136 **
	(0,001)	(0,000)	(0,046)
Remoteness of Country j	0,00191 **	0,00081 **	0,15232 **
	(0,000)	(0,000)	(0,018)
Remoteness of Country k	0,00242 **	0,00070 **	0,22381 **
	(0,000)	(0,000)	(0,017)
Common Language	0,00043 **	0,00014 **	0,20375 **
	(0,000)	(0,000)	(0,013)
Observations	15968	17403	17342
R**2	0,1453	0,101357	0,265125

Table 4
Output Synchronization, Trade Intensity and Free Trade Agreements: Regression Analysis
Dependent Variable: Business Cycle Synchronization
Estimation Method: Instrumental Variables with Country-Pair Specific Effects

		Detrended Output Correlation				Cyclical
Explanatory Variable	**Group**	**Q-Trend**	**Differences**	**HP-Filter**	**Band-Pass**	**Asymmetries**
I. All Country Pairs, 1960-99						
Bilateral Trade Intensity	With FTA	37,0984 **	29,8749 **	27,3492 **	25,7665 **	-3,0650 **
(as a ratio of Total Trade)		(5,608)	(4,083)	(4,469)	(4,546)	(0,324)
	Without FTA	8,5352 **	6,6073 **	6,5902 **	6,0988 **	-0,0038
		(2,888)	(2,000)	(2,094)	(2,045)	(0,182)
	R**2	0,0184	0,0136	0,0162	0,0164	0,0825
	Nobs.	16647	16647	16647	16647	16854
Bilateral Trade Intensity	With FTA	70,4604 **	56,3655 **	52,5731 **	49,1292 **	-5,7215 **
(as a ratio of Total Output)		(10,330)	(7,586)	(8,179)	(8,252)	(0,608)
	Without FTA	13,8198 **	11,7817 **	10,7854 **	10,2824 **	1,4334 **
		(5,642)	(3,927)	(4,082)	(4,010)	(0,400)
	R**2	0,0193	0,0141	0,0159	0,0165	0,1044
	Nobs.	15460	15460	15460	15460	15644
II. All Country Pairs, 1990-99						
Bilateral Trade Intensity	With FTA	46,4310 **	34,5477 **	33,0909 **	32,6166 **	-1,8103 **
(as a ratio of Total Trade)		(9,987)	(7,035)	(7,495)	(7,387)	(0,511)
	Without FTA	35,1414 **	20,2897 **	16,1914 **	14,7672 **	0,6218 *
		(5,200)	(3,815)	(3,971)	(3,785)	(0,358)
	R**2	0,0276	0,0259	0,0188	0,0220	0,0862
	Nobs.	4978	4978	4978	4978	4978
Bilateral Trade Intensity	With FTA	103,8688 **	71,1057 **	70,6634 **	68,7886 **	-3,5349 **
(as a ratio of Total Output)		(18,239)	(13,313)	(14,129)	(13,858)	(0,909)
	Without FTA	74,2116 **	43,5180 **	34,8353 **	31,6929 **	1,7283 **
		(10,214)	(7,390)	(7,618)	(7,307)	(0,689)
	R**2	0,0258	0,0238	0,0186	0,0213	0,0886
	Nobs.	5217	5217	5217	5217	5217

Table 5
Output Synchronization, Trade Intensity and Free Trade Agreements: Regression Analysis
Dependent Variable: Business Cycle Synchronization
Estimation Method: Instrumental Variables with Country-Pair Specific Effects

	Detrended Output Correlation				Cyclical
Sample of Country Pairs	**Q-Trend**	**Differences**	**HP-Filter**	**Band-Pass**	**Asymmetries**
I. All Country Pairs, 1960-99					
- Bilateral Trade Intensity (normalized by total trade)					
(IND,IND) with FTA	42,8438 **	40,0485 **	39,6189 **	38,0137 **	-3,9499 **
	(7,491)	(5,322)	(5,476)	(5,639)	(0,436)
(IND,IND) without FTA	13,8462 *	22,0925 **	26,8209 **	24,8224 **	-4,6239 **
	(8,592)	(5,638)	(6,193)	(6,000)	(0,430)
(DEV,DEV) with FTA	25,5186 **	11,9257 *	5,3750	3,3619	-1,6226 **
	(8,226)	(6,290)	(7,446)	(7,501)	(0,516)
(DEV,DEV) without FTA	6,7381 **	3,9444 *	1,7592	1,6190	1,1233 **
	(3,184)	(2,178)	(2,286)	(2,235)	(0,210)
(IND,DEV) with FTA	60,8941 **	8,9607	-6,3866	10,5172	-0,2012
	(19,659)	(8,568)	(10,578)	(9,150)	(0,504)
(IND,DEV) without FTA	14,0240 **	11,8182 **	18,7043 **	17,4115 **	-2,7364 **
	(6,063)	(4,472)	(4,673)	(4,570)	(0,402)
R**2	0,0195	0,0156	0,0186	0,0191	0,1145
Nobs.	15460	15460	15460	15460	15644
- Bilateral Trade Intensity (normalized by total output)					
(IND,IND) with FTA	91,4896 **	81,9895 **	79,4870 **	76,6940 **	-8,4516 **
	(13,985)	(10,069)	(10,354)	(10,601)	(0,777)
(IND,IND) without FTA	30,3538 *	48,8017 **	57,1488 **	51,8776 **	-9,8835 **
	(17,266)	(11,610)	(12,381)	(12,073)	(0,826)
(DEV,DEV) with FTA	35,4425 **	17,5172 *	9,3771	4,4802	-1,3060
	(15,398)	(11,113)	(12,467)	(12,372)	(1,014)
(DEV,DEV) without FTA	8,4031	5,8132	-0,4288	-0,2155	3,9807 **
	(6,388)	(4,381)	(4,580)	(4,504)	(0,485)
(IND,DEV) with FTA	157,6323 **	38,3336	5,0484	39,4099	-3,2073
	(71,368)	(41,028)	(46,285)	(38,113)	(3,720)
(IND,DEV) without FTA	27,4621 **	22,1340 **	34,9205 **	33,4804 **	-3,7083 **
	(10,770)	(7,906)	(8,197)	(8,097)	(0,704)
R**2	0,0190	0,0157	0,0195	0,0196	0,0944
Nobs.	16647	16647	16647	16647	16854

Table 6
Output Synchronization, Trade Intensity and Free Trade Agreements: Regression Analysis
Dependent Variable: Business Cycle Synchronization
Estimation Method: Instrumental Variables with Country-Pair Specific Effects

	Detrended Output Correlation				Cyclical
Sample of Country Pairs	**Q-Trend**	**Differences**	**HP-Filter**	**Band-Pass**	**Asymmetries**
I. All Country Pairs, 1990-99					
- Bilateral Trade Intensity (normalized by total trade)					
(IND,IND) with FTA	46,3638 **	39,3516 **	43,1493 **	39,6173 **	-1,8524 **
	(13,282)	(9,298)	(9,621)	(9,618)	(0,709)
(IND,IND) without FTA	52,4163 **	35,4375 **	39,3536 **	32,3448 **	-3,2991 **
	(16,489)	(11,149)	(12,929)	(12,248)	(1,023)
(DEV,DEV) with FTA	42,3191 **	25,1475 **	13,0691	18,0946 *	-1,9273 **
	(12,878)	(10,482)	(12,204)	(11,827)	(0,407)
(DEV,DEV) without FTA	21,7677 **	14,6079 **	8,6313 **	8,4508 **	1,6302 **
	(5,619)	(4,028)	(4,310)	(4,090)	(0,425)
(IND,DEV) with FTA	58,0605 **	7,2887	-6,0685	10,7337	-0,2029
	(21,073)	(9,797)	(11,554)	(10,049)	(0,313)
(IND,DEV) without FTA	69,9848 **	33,0988 **	32,5073 **	28,8334 **	-1,2630 *
	(11,811)	(8,948)	(8,702)	(8,346)	(0,715)
R**2	0,0318	0,0279	0,0227	0,0246	0,0922
Nobs.	4978	4978	4978	4978	4978
- Bilateral Trade Intensity (normalized by total output)					
(IND,IND) with FTA	108,2529 **	86,4533 **	93,3866 **	86,5767 **	-3,8973 **
	(25,273)	(18,212)	(19,033)	(18,955)	(1,343)
(IND,IND) without FTA	112,6361 **	80,5503 **	88,5464 **	76,1520 **	-6,9227 **
	(32,094)	(23,009)	(25,719)	(24,432)	(1,917)
(DEV,DEV) with FTA	75,2587 **	40,2288 **	26,0272	31,7860 *	-2,7350 **
	(24,198)	(19,178)	(20,434)	(19,859)	(0,792)
(DEV,DEV) without FTA	39,4011 **	28,5970 **	14,6881 *	13,5724 *	3,5847 **
	(11,652)	(8,153)	(8,576)	(8,224)	(0,838)
(IND,DEV) with FTA	132,6186 *	7,6732	-17,2384	23,5314	0,7822
	(73,856)	(35,037)	(37,380)	(33,379)	(2,126)
(IND,DEV) without FTA	147,1843 **	71,1833 **	71,5120 **	65,3217 **	-0,8893
	(19,959)	(15,379)	(15,210)	(14,636)	(1,207)
R**2	0,0313	0,0269	0,0241	0,0258	0,0940
Nobs.	5217	5217	5217	5217	5217

Figure 1. Business Cycle Synchronization Across the World

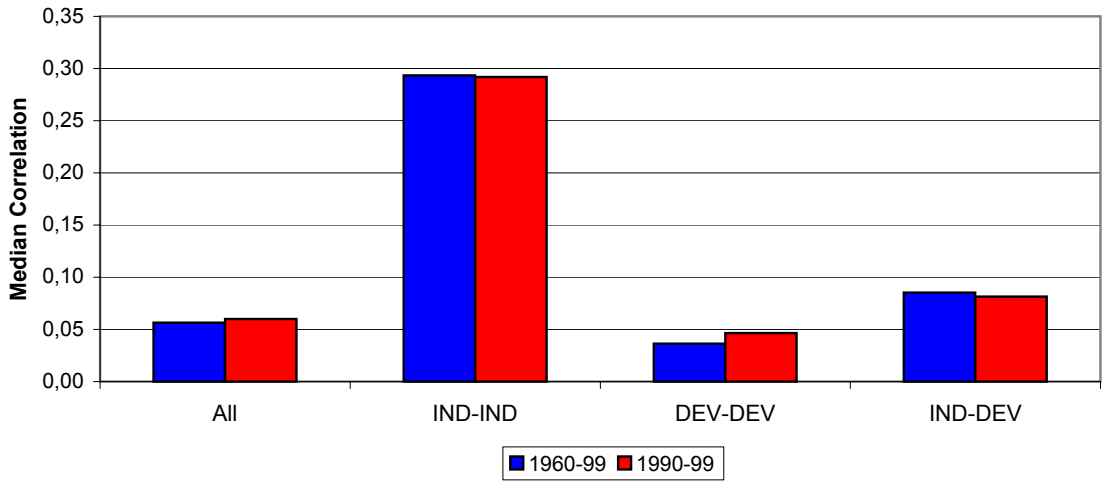


Figure 2. Business Cycle Synchronization and Free Trade Agreements (FTAs)

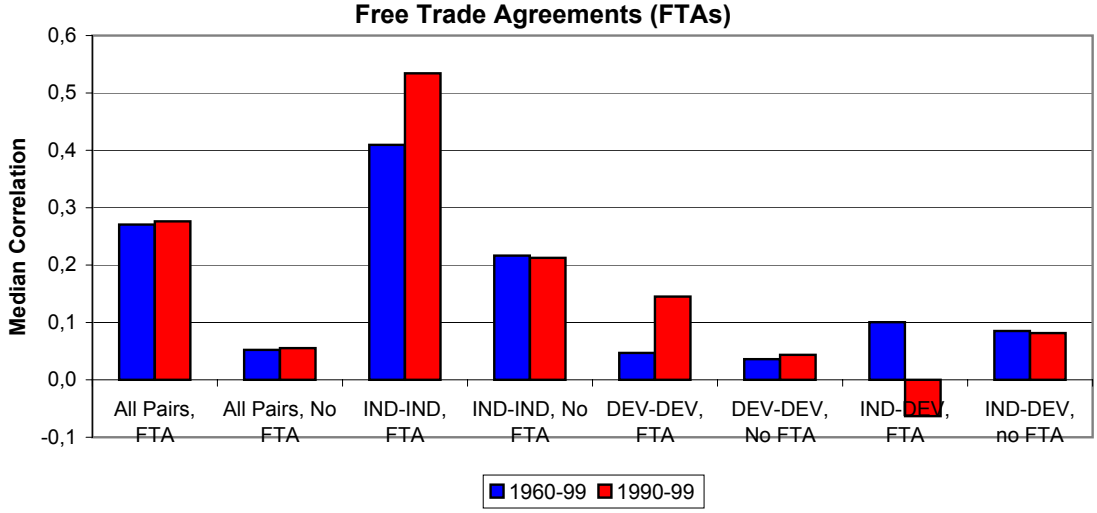


Figure 3. Business Cycle Synchronization for Selected FTAs

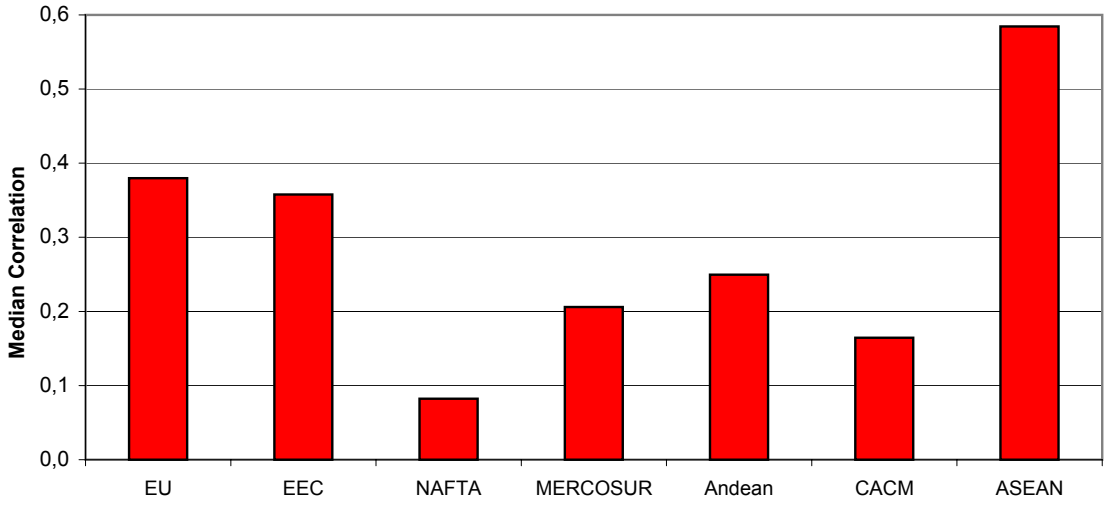


Figure 4. Response of the Cycle Correlation to a One-Standard Deviation Increase in Bilateral Trade Intensity (BTI), 1960-99

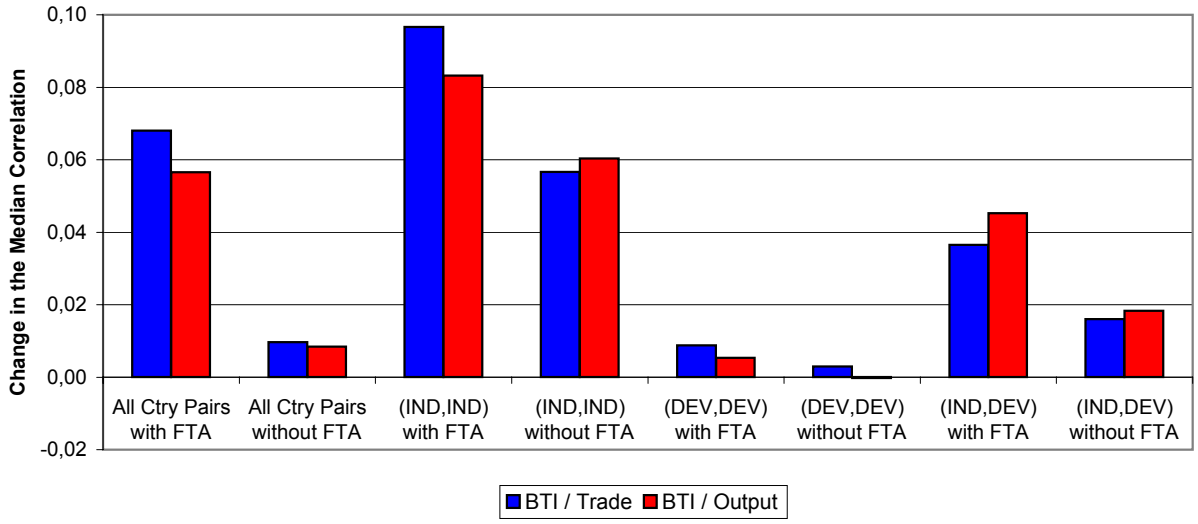
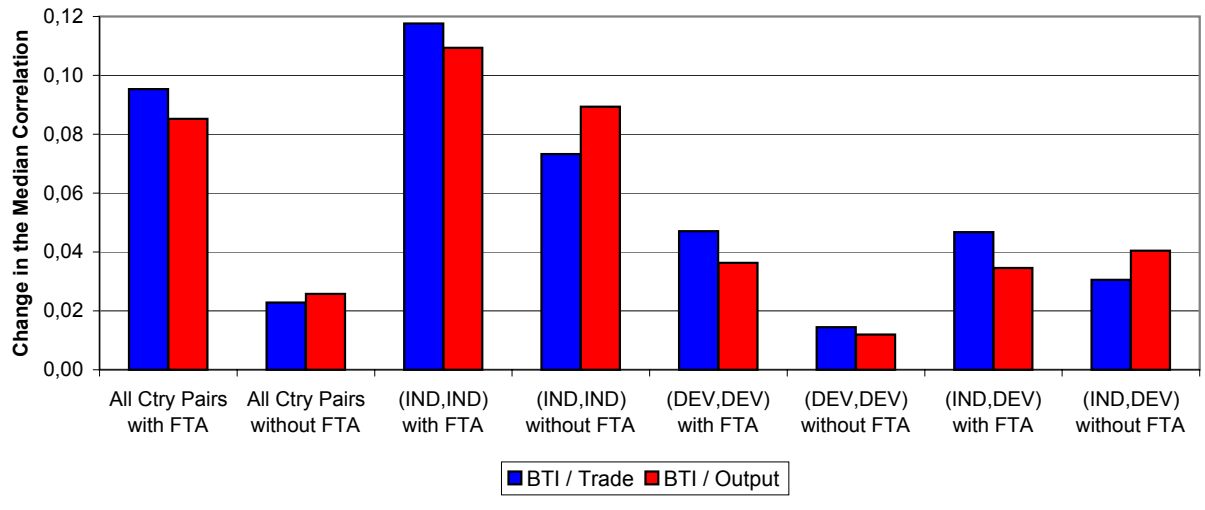


Figure 5. Response of the Cycle Correlation to a One-Standard Deviation Increase in Bilateral Trade Intensity (BTI), 1990-99



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