FTA and the transmission of shocks across countries

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- Our main purpose is assesses the impact of the sign of Free Trade Agreement on the synchronization of Business Cycle.
- There is extensive theoretical literature analyzing the channels through which business cycle fluctuations in one country are transmitted to other countries.
- Important determinants: trade, similarity in industrial structures, currency unions, factor endowments, gravity variables, as important determinants of business-cycle comovement.
- Several studies have focused on the determinants of bilateral trade and the so-called “gravity variables” have been the primary focus of empirical studies of international trade. This gravity equation typically explains cross-sectional variation in country pairs´ trade flows in terms of the countries´ income, populations, bilateral distance, and dummy variables for common languages, for common land borders, and for the presence or absence of free trade agreements (*FTA*). Hence, there is space for an indirect impact of FTA on output comovement via its impact on trade.
- In summary, we have to take into account the direct impact of trade agreements on output correlation and its indirect impact trough the effect on bilateral trade which in theory may affect the cross-country synchronization of business cycles. As in the study of Imbs (2004) we are going to use a simultaneous-equation methodology to assess the theoretical possibility for these direct and indirect channels.

Methodology

- We estimate the following simultaneous-system of equations:

$$\rho_{i,j,\tau} = \alpha_{\square} + \alpha_1 T_{i,j,\tau} + \alpha_2 FTA_{i,j,\tau} + \alpha_3 I_{i,j,\tau} + u_{1i,j}$$
$$T_{i,j,\tau} = \beta_{\square} + \beta_1 FTA_{i,j,\tau} + \beta_2 X_{i,j,\tau} + u_{2i,j}$$
$$FTA_{i,j,\tau} = \gamma_{\square} + \gamma_1 Z_{i,j,\tau} + u_{3i,j}$$

- where *i,j* indexes country pairs, $\rho_{i,j,\tau}$ denotes bilateral business cycles correlation, *T* is bilateral trade, *FTA* indicates if the pair of countries have signed a Free Trade Agreement. Business Cycles Correlations, Bilateral trade, and Free trade Agreements all are endogenous variables, while we treat *I, X* and *Z* as exogenous variables.

- In the case of the output correlation equation, its determinants have been the object of intense scrutiny. In the present paper we are going to focus in two variables which are going to form the I-vector: ASP and GLI (with α_3 y α_4 as their respective coefficients).
- The Trade Equation estimates the impact of FTA (dummy variable) and the X-vector on bilateral trade flows. In X we have included largely used gravity variables. Gosh and Yamarik (2004) use an extreme bound analysis and find empirical evidence using cross-section data that the estimated impact of most FTAs are fragile.

- As in Baier and Bergstrand (2002, 2006) and Levy-Yeyati et al. (2003) we follow the 2SIV methodology in order to address the endogeneity problem of the FTA dummy variable.

- The methodology requires finding instruments for the FTA dummies, and implementing a two-stage procedure. In the first step, we run a logit model of the FTA dummies on all the exogenous variables included in the model, plus some additional exogenous controls (instruments). As instruments for FTA, Z, we use a set of variables that the literature indicates as variables who could affect the probability of sign a Free Trade Agreement between a pair of countries but which are not correlated with unobservable for the econometrician in the trade equation. These instruments can explain the sign of Trade Agreement based on welfare enhancing considerations as well on the political economy literature.

The Data

- Our sample covers annual observations for 91 developed and developing countriesover the period 1960-2004 and we analyze a panel data sample where we split the period considered in three equally sized parts: 1960-1974, 1975-1989, 1990-2004.
- Bilateral correlations in Business Cycles are computed on the basis of Frankel and Rose's work (1997, 1998) and compute the correlation between the cyclical components of output for countries i and j,

$$corr(y_i^c, y_j^c) = \frac{cov(y_i^c, y_j^c)}{\sqrt{var(y_i^c) var(y_j^c)}}$$

- Bilateral Intensity of International Trade between countries i and j in period τ (of lenght T) is approximated with the following measures:

$$T^F_{i,j,\tau} = \ln\left(\frac{1}{T}\sum_t \frac{1+f_{i,j,\tau}}{F_{i,\tau} F_{j,\tau}}\right) \quad \text{and} \quad T^Y_{i,j,\tau} = \ln\left(\frac{1}{T}\sum_t \frac{1+f_{i,j,\tau}}{Y_{i,\tau} Y_{j,\tau}}\right)$$

- We also evaluate the impact of *intra-industry trade intensity* on business cycle synchronization. To accomplish this task, we constructed the Grubel-Lloyd (1975) measure of intra-industry trade between countries *i* and *j*, *GLIi,j*:
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$$GLI_{i,j} = 1 - \frac{\sum_k \left| x_{i,j}^k - m_{i,j}^k \right|}{\sum_k \left(x_{i,j}^k + m_{i,j}^k \right)}$$

- where and are exports from country *i* to country *j* and imports from country *i* to country *j*, respectively, and *k* represents an index over industries.

- Another possible determinant of business cycle correlation is the extent of the similarities or differences between the structures of production or trade among countries. We first consider a measure of the *similarities in the structure of production*. Letting and denote the GDP shares for industry *k* in countries *i* and *j* (*k=1,2,...,N* industries), we compute an index of asymmetries in structures of production (or industry specialization) as:

$$ASP_{i,j,\tau} = \frac{1}{T} \sum_t \sum_{k=1}^{N} \left| s_{ki} - s_{kj} \right|$$

- The gravity variables in the trade equation are standard and include the following: a measure of the (log mile) distance between countries *i* and *j* (in logs), a set of dummy variables equal to one if both countries share a common border, pertain to the same region and have the same language. We expect that bilateral trade between countries *i* and *j* increase if they are closer in distance, speak the same language, have a common border and pertain to the same region. We include an indicator of geographical remoteness for countries *i* and *j* that measures how far each country lies from alternative trading partners —*REMi* and *REMj*, respectively

- Following previous work we propose as FAT's instruments: the (log) distance between countries, the real GDPs, differences in the capital labor ratio in the country pair and a measure of Investment Profile for the country pair, which tries to assess the "cost" of bilateral trade policy negotiations.

The Impact of FTA on Business Cycle Correlation

Table 1: OLS Estimation

Business Synchronization Equation		
	T^F	T^Y
GLI	0.500 (11.78)	0.504 (12.13)
ASP	-0.051 (-3.02)	-0.065 (-4.02)
Trade	0.007 (5.35)	0.007 (5.75)
FTA	0.059 (3.54)	0.055 (3.3)
Trade Equation		
	T^F	T^Y
FTA	0.429 (3.31)	0.579 (4.2)
lnDistjk	-1.068 (-11.47)	-1.219 (-13.3)
remote	6.403 (11.16)	5.781 (10.24)
bderjk	1.246 (3.49)	0.954 (2.7)
ComLang	0.784 (5.34)	0.707 (4.94)
ComReg	0.716 (4.41)	0.603 (3.74)
n_land	-1.698 (-14.47)	-1.602 (-13.77)
n_isle	-0.540 (-5.11)	-0.390 (-3.73)
lnDensityj	0.242 (5.98)	0.317 (8.46)
lnDensityk	0.263 (7.38)	0.285 (8.2)

Table 2: First Stage Probit Estimates to Generate Predicted P(FTA) Associated with the Trade Equation

Dependent variable: FTA	
lnDistjk	-1.336 (-19.78)
rGDP	0.075 (3.70)
dKL	-0.043 (-3.29)
dInvProf	-0.753 (-3.50)

Table 3: 2SIV Results of the System

Business Cycle Synchronization Equation		
	T^Y	T^F
GLI	0.428 (0.055)	0.436 (0.057)
ASP	-0.068 (0.017)	-0.056 (0.019)
Trade	0.012 (0.003)	0.010 (0.003)
FTA	0.091 (0.029)	0.103 (0.030)
R_cycle if FTA=1	0.277	0.281
R_cycle if FTA=0	0.060	0.062
Trade Equation		
	T^Y	T^F
FTA	0.726 (0.191)	0.835 (0.192)
lnDistjk	-0.972 (0.088)	-0.759 (0.088)
Remote	5.622 (0.559)	6.275 (0.555)
Bderjk	0.774 (0.401)	1.255 (0.331)
ComLang	0.599 (0.127)	0.652 (0.136)
ComReg	0.779 (0.153)	0.946 (0.153)
N_land	-1.049 (0.126)	-1.154 (0.124)
N_isle	-0.494 (0.100)	-0.613 (0.098)
lnDensityj	0.409 (0.035)	0.363 (0.037)
lnDensityk	0.253 (0.036)	0.241 (0.034)

Measuring the impact

Total Effect of Trade on Business Synchronization		
	T^Y	T^F
	Direct	*Direct*
Fta trade	$\alpha_1\beta_1$= 0.008712	$\alpha_1\beta_1$= 0.00835
Geographic Trade	$A_1\beta_2$=0.01233	$\alpha_1\beta_2$= 0.010102

Total Effect of FTA on Business Synchronization				
	T^Y		T^F	
	Direct	*Indirect*	*Direct*	*Indirect*
FTA	α_2= 0.091		α_2= 0.103	
Via Trade		$\alpha_1\beta_1$=0.00871		$\alpha_1\beta_1$=0.00835