REVIEW OF INTERNATIONAL ECONOMICS

Business Cycle Comovement and Labor Market Institutions: An Empirical Investigation

Data Appendix

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A Description of data and sources

The dataset is downloadable from the corresponding author's website:
http://thepthida.sopraseuth.free.fr.

GDP series

We consider the following list of OECD countries: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, the Netherlands, Norway, New Zealand, Portugal, Spain, Sweden, Switzerland, the United Kingdom and the United States.

Cross-country correlations for quarterly GDP are based on the OECD BSDB database (1964:1-1999:4) completed over the 2000:1-2003:4 period using the Quarterly National Accounts database (OECD sources). We use the gross domestic product (at market prices) in volume. We extrapolate GDP series in level for 2000:1 and so on, by combining the value in 1999:4 (available in BSDB) and the quarterly growth for GDP (volume) provided by the Quarterly National Accounts for the 2000-2003 period. Data inspection shows a structural break on German data due to the German reunification, and another one on French data due to May 1968's events. Based on the methodology proposed by Milliard, Scott and Sensier (1997), we detect outliers on the series converted into growth rates. This leads to identify one outlier for German series (1990:1) and two for the French ones (1968:2 and 1968:3). The corresponding points in the series taken in growth rates are replaced by averaging the closest growth rates. The GDP series are then converted back into level. Bilateral correlations are computed over 4 decades: 1964:1-1973:4 (decade 1), 1974:1-1983:4 (decade 2), 1984:1-1993:4 (decade 3) and 1994:1-2003:4 (decade 4). Cross-country correlations are calculated over GDP series taken in log and filtered according to Hodrick and Prescott's (1997) methodology.

LMIs

The LMI dataset comes from Nickell (2006). The LMIs used in the database are defined as follows:

- Employment Protection Laws (EPL). It is built as an index with range 1 through 3, increasing with the degree of employment protection. It consists of the laws, regulations and administrative decisions that constraint the contractual conditions under which a worker can be dismissed; the laws and regulations relating to the compensation an employer is obliged to pay when regulations determining remedies for wrongful or unfair dismissal.

- Net Union Density ($udnet$). It is built in percentage level. It represents the percentage of employees who are union members. This variable is intended to capture unions' bargaining power.

- Bargaining Coordination (co). The index is defined within the range 1-3 (denoted cow in Nickell's (2006) database). This index is increasing in the degree of coordination in the bargaining process. Value of 1 mean uncoordinated process, values equal to 1.5, 2 and 2.5 denote intermediate degrees of coordination. The value of 3 denotes strong coordination.

- Unemployment benefit generosity (UB) corresponds to the nrw series in Nickell's (2006) database. This series has been built by Allard (2005). It combines the amount of the subsidy with their tax treatment, their duration and the conditions that must be met in order to collect them. This allows to capture the generosity of the unemployment benefit system along the dimensions of the benefit level, its conditionality and duration.

- Tax wedge components are threefold: 1) the employer's tax rate or employment tax (tw_1) refers to the employer's social security contributions as % of wages and salaries, 2) the direct tax rate (tw_2) gives the amount of direct taxes as % of households' current receipts and 3) the indirect tax rate (tw_3) is the total indirect tax as % private final expenditures). All tax rates are expressed in percentage level.

Control variables

- Differences in factor endowments are computed using capital per worker using aggregate investment (Source: Easterly and Levine, 2001).

- The computation of bilateral trade intensity is taken from the database provided by Darvas *et al.* (2005). It is available on Andrew Rose's web page.[1] We use the measure of bilateral trade intensity, reported to the total of GDPs in both countries, averaged over the decade ("trdgdp1" in their database).

- Total trade intensity. As in Baxter and Kouparitsas (2005), the extent of total trade carried out by the pair of countries (i, j) is computed as:

$$TT_{ijt} = \frac{x_{it} + m_{it} + x_{jt} + m_{jt}}{y_{it} + y_{jt}} \tag{1}$$

  where x_{it} and m_{it} denote country i's total exports and imports measured at the beginning of each decade t, and y_{it} denotes country i's total GDP. We build this variable using data from the NBER UN Trade database and Penn World Tables, available on the NBER website (Feenstra *et al.*, 2005).

- Trade similarity. Baxter and Kouparitsas (2005) underline that, if countries export and/or import similar baskets of goods, then they would be affected similarly by

changes to the world prices of their import and export goods. In addition, countries with similar baskets of traded goods would be affected similarly in the event of sector-specific perturbations hitting their export and/or import sectors. Following Baxter and Kouparitsas (2005), we build the following measure of similarity in trade:

$$\text{Trade similarity}_{ijt} = \frac{\sum_{k=1}^{K} s_{ikt} s_{jkt}}{\sqrt{\sum_{k=1}^{K} s_{ikt}^2} \sqrt{\sum_{k=1}^{K} s_{jkt}^2}}$$

As s_{ikt} denotes the sector k's share of country i's total imports (at the beginning of each decade t), "Trade similarity" identifies similarity in imports. Data are taken from the NBER UN Trade Data base, available on the NBER website (Feenstra *et al.*, 2005).

- Messina (2005) documents remarkable differences in the relative sizes of the service employment share across countries with similar income per capita. In addition, the weight of the service sector in OECD countries has gone through considerable changes in the last decades.[2] We consequently examine the impact of divergence in service employment share, measured by the absolute value of the difference between service employment shares of the two countries of the pair. We thus expect a negative sign associated with this variable (denoted "D serv share") in the regressions. It is built as follows:

$$\text{D serv. share}_{ijt} = |\text{Service}_{it} - \text{Service}_{jt}|$$

where Service_{it} denotes country i's service employment share (at the beginning of decade t).

- Difference in primary budget positions and in interest rates are taken from data provided by Darvas *et al.* (2005) (respectively denoted "pbudgd" and "irate" in their database). Divergence in budget positions is the average (over the decade) of the absolute value of primary budget balance/GDP differential of the two countries, and divergence in interest rates is the average of the absolute value of short-run interest rates differential of the two countries.

  In the robustness analysis, we instrument divergence in primary budget positions by the following variables, that come from their database as well: Government non-wage consumption/GDP differential of the two countries ("govtcons" in Darvas et al.'s database), government investment/GDP differential of the two countries ("govtinv") and direct Business tax/GDP differential of the two countries ("bustax"). All are built as average of the absolute value of the cross-country differential. We retain these variables as they can be considered as valid instruments (*i.e.*, they are correlated with the endogenous explanatory variable, conditional on the other covariates, while they are uncorrelated with the error term in the explanatory equation). We indeed ensure that these variables satisfy the tests associated with instrumental variables procedures, as reported in Tables 1, 2 and 3 of the paper.

  We instrument the interest rate differential by two variables, the interest rate differential at the beginning of the decade and a financial integration measure. We use

Darvas et al.'s database to built the interest rate differential at the beginning of each decade. To built the financial integration variable, we use the international capital markets restrictions measure coming from the Economic Freedom database, provided by the Fraser Institute (Gwartney and Lawson, 2007). The variable is summed pairwise, for all country pairs and by decade. The highest the value of the variable, the larger degree of financial integration of the country pair.[3] Even though the F-statistic and over-identification tests confirm the validity of both instruments, the Durbin-Wu-Hausman test indicates that we cannot reject the null assumption that the IV and OLS estimates are similar. Preliminary experiments lead to a similar conclusion when we use the interest rate differential at the beginning of the period as single instrument. Based on these results, we can be confident that there is no endogeneity problems associated with our measure of monetary convergence.

- Gravity variables used to instrument bilateral trade are taken from Andrew Rose's webpage.[4]

B Descriptive statistics

Table 1 reports descriptive statistics related to GDP comovement and LMIs, with, for each variable, within and between variances. Between variance refers to the cross-sectional variance across the country pairs of the sample. Within variance refers to the time-variability dimension of variables.

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Notes

[1]Available on `http://faculty.haas.berkeley.edu/arose/RecRes.htm`

[2]The average service employment share has increased from 45.8% at the beginning of the 1960s to 66.3% in the early 1990s.

[3]See the working paper version of the paper (Fonseca *et al.*, 2008) for a more detailed discussion about the role of financial integration in business cycle comovement.

[4]Available on `http://faculty.haas.berkeley.edu/arose/RecRes.htm`

Variable		Mean	Std. Dev.	Min	Max	Observations	
ρ^y	overall	0.290	0.320	-0.549	0.900	N	760
	between		0.213	-0.311	0.738	n	190
	within		0.239	-0.380	0.914	T	4
Bilat. trade	overall	0.530	0.803	0.010	7.211	N	760
	between		0.786	0.018	6.977	n	190
	within		0.172	-0.371	1.607	T	4
Import similarity	overall	0.642	0.1743	0.174	0.980	N	760
	between		0.119	0.274	0.886	n	190
	within		0.127	0.269	0.924	T	4
D budget	overall	3.066	1.903	0.137	10.827	N	561
	between		1.293	0.916	7.302	n	171
	within		1.402	-1.581	9.277	T	3.281
Int. rate diff.	overall	3.119	2.162	0.058	12.649	N	660
	between		1.475	0.827	8.293	n	190
	within		1.614	-1.741	8.029	T	3.474
D EPL	overall	0.676	0.471	0	2	N	760
	between		0.381	0.05	1.841	n	190
	within		0.278	-0.436	1.853	T	4
D $Udnet$	overall	20.928	15.721	.100	80.917	N	741
	between		13.250	1.157	65.677	n	190
	within		8.357	-9.580	48.621	T	3.9
D Co	overall	0.677	0.512	0	2	N	741
	between		0.384	0	1.825	n	190
	within		0.334	-0.398	1.902	T	3.9
D UB	overall	7.715	6.418	0	36.3	N	760
	between		3.763	1.2	18.1	n	190
	within		5.205	-8.860	28.640	T	4
D tw_1	overall	9.032	6.541	.083	28.033	N	706
	between		5.826	0.390	25.313	n	190
	within		3.147	-4.741	21.970	T	3.72
D tw_2	overall	7.962	11.269	0.01	79.41	N	703
	between		10.955	0.325	74.66	n	190
	within		7.615	-27.598	43.522	T	3.7
D tw_3	overall	6.117	4.525	0	26.947	N	760
	between		3.631	0.863	19.445	n	190
	within		2.710	-2.928	16.361	T	4
EPL	overall	2.012	0.835	0.041	4	N	760
	between		0.703	0.394	3.830	n	190
	within		0.454	-0.254	3.455	T	4
$Udnet$	overall	83.713	25.291	25.7	169.617	N	741
	between		23.296	29	148.610	n	190
	within		9.840	44.950	113.428	T	3.9
Co	overall	4.274	0.840	2	6	N	741
	between		0.694	2.1	5.525	n	190
	within		0.470	2.574	5.474	T	3.9
UB	overall	19.27	12.425	0	61	N	760
	between		7.174	3.225	38	n	190
	within		10.154	-11.055	51.945	T	4
tw_1	overall	23.173	11.572	2	57.66	N	706
	between		10.340	2.222	49.29	n	190
	within		5.332	1.681	41.028	T	3.72
tw_2	overall	33.988	13.191	8.40	104.5	N	703
	between		13.02	16.577	89.94	n	190
	within		7.80	2.622	65.354	T	3.7
tw_3	overall	36.563	7.987	14.463	61.22	N	760
	between		6.604	19.433	50.953	n	190
	within		4.512	27.250	49.758	T	4

Table 1: *Descriptive Statistics*