

Putting the Parts Together: Trade, Vertical Linkages,  
and Business Cycle Comovement  
WEB APPENDIX

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# Appendix A Supplementary Tables

**Table A1.** Country Summary Statistics: 1970–99

Country	Average correlation	Trade/GDP	Country	Average correlation	Trade/GDP
Australia	0.128	0.175	Bangladesh	0.101	0.120
Austria	0.161	0.427	Bolivia	0.099	0.230
Belgium-Luxembourg	0.247	0.874	Chile	0.152	0.268
Canada	0.195	0.369	Colombia	0.233	0.163
Denmark	0.175	0.421	Costa Rica	0.182	0.383
Finland	0.156	0.409	Cyprus	0.170	0.571
France	0.271	0.265	Ecuador	0.134	0.192
Greece	0.214	0.240	Egypt, Arab Rep.	-0.047	0.222
Ireland	0.145	0.734	Fiji	0.121	0.522
Italy	0.272	0.266	Guatemala	0.057	0.231
Japan	0.253	0.139	Honduras	-0.018	0.436
Netherlands	0.226	0.672	Hong Kong, China	0.135	1.278
New Zealand	0.021	0.351	Hungary	0.059	0.414
Norway	0.180	0.368	India	0.030	0.081
Portugal	0.197	0.363	Indonesia	0.103	0.238
Spain	0.258	0.197	Israel	0.138	0.352
Sweden	0.131	0.421	Jordan	0.064	0.388
United Kingdom	0.169	0.325	Korea, Rep.	0.169	0.384
United States	0.231	0.109	Malawi	-0.073	0.250
			Malaysia	0.115	0.830
			Malta	0.113	1.047
			Mauritius	-0.057	0.686
			Mexico	-0.090	0.189
			Panama	-0.095	0.892
			Peru	0.039	0.198
			Philippines	0.021	0.352
			Senegal	0.015	0.299
			Singapore	0.238	1.926
			South Africa	0.100	0.240
			Sri Lanka	-0.061	0.293
			Syrian Arab Republic	0.097	0.180
			Tanzania	0.166	0.181
			Trinidad and Tobago	0.080	0.536
			Turkey	0.027	0.160
			Uruguay	0.117	0.211
			Zimbabwe	0.059	0.131
Mean	0.191	0.375		0.095	0.354

Notes: The first column reports the average correlation of real manufacturing output growth between a country and the rest of the countries in the sample. Trade/GDP is the average share of manufacturing trade of a country to its GDP over the period.

**Table A2.** Subsample Summary Statistics for Manufacturing Sector: 1970–99

Sample	Average correlation	Trade/GDP
Full	0.115	0.0011
OECD/OECD	0.397	0.0036
non-OECD/non-OECD	0.065	0.0011
OECD/non-OECD	0.091	0.0005

Notes: Average correlation is the sample average of bilateral correlation of manufacturing output growth. Trade/GDP is sample average of the share of total bilateral sectoral trade of two countries to their GDP.

**Table A3.** Sector Summary Statistics: 1970–99

ISIC	Sector name	Average $\rho_{ii}$	Average $\rho_{ij}$	Trade/ GDP	Vertical Intensity	Upstream Intensity
311	Food products	0.054	0.057	0.053	0.195	0.150
313	Beverages	0.068	0.066	0.006	0.022	0.524
314	Tobacco	0.029	0.027	0.005	0.105	0.082
321	Textiles	0.133	0.087	0.022	0.313	0.481
322	Wearing apparel, except footwear	0.093	0.064	0.020	0.106	0.678
323	Leather products	0.034	0.046	0.003	0.273	0.517
324	Footwear, except rubber or plastic	0.045	0.049	0.001	0.017	0.709
331	Wood products, except furniture	0.076	0.080	0.008	0.323	0.204
332	Furniture, except metal	0.078	0.082	0.002	0.014	0.571
341	Paper and products	0.228	0.094	0.008	0.301	0.312
342	Printing and publishing	0.069	0.064	0.003	0.081	0.685
351	Industrial chemicals	0.126	0.086	0.030	0.421	0.192
352	Other chemicals	0.095	0.075	0.014	0.141	0.355
353	Petroleum refineries	0.079	0.063	0.036	0.084	0.060
354	Misc. petroleum and coal products	0.040	0.040	0.001	0.012	0.498
355	Rubber products	0.082	0.066	0.004	0.064	0.563
356	Plastic products	0.131	0.093	0.004	0.070	0.570
361	Pottery, china, earthenware	0.126	0.086	0.001	0.052	0.146
362	Glass and products	0.119	0.091	0.002	0.088	0.282
369	Other non-metallic mineral products	0.104	0.085	0.004	0.118	0.193
371	Iron and steel	0.155	0.087	0.016	0.236	0.258
372	Non-ferrous metals	0.150	0.086	0.015	0.606	0.195
381	Fabricated metal products	0.109	0.076	0.014	0.103	0.433
382	Machinery, except electrical	0.045	0.048	0.045	0.088	0.545
383	Machinery, electric	0.068	0.053	0.031	0.327	0.268
384	Transport equipment	0.071	0.047	0.107	0.368	0.580
385	Professional & scientific equipment	0.056	0.047	0.009	0.043	0.423
390	Other manufactured products	0.045	0.056	0.011	0.060	0.533
AVERAGE		0.090	0.068	0.017	0.165	0.393

Notes: The first two columns report the average correlation of real sector-level output growth between a pair of countries, averaged over country pairs within a sector and with all other sectors of the economy, respectively. Trade/GDP is, for each sector, the average (across countries) of the share of sectoral trade of a country to its GDP. Vertical Intensity and Upstream Intensity are calculated from the BEA input-output matrix after aggregating up to the 28 manufacturing sectors for which there is production data. Vertical Intensity is the diagonal term of the I-O matrix. It represents the value of output of the sector needed as an intermediate input to produce a dollar of final output in that same sector. Upstream Intensity is the sum across rows for a given column of the I-O matrix, excluding the diagonal. It represents the value of output of all other sectors needed as intermediate inputs to produce one dollar of final output a given sector.

**Table A4.** Estimates of the Impact of Total Bilateral Trade on Aggregate Comovement in Real GDP and Total Manufacturing Real Output

				<b>Aggregate</b>		
	<i>Trade/ GDP</i>	<i>Trade/ Output</i>	<i>Trade/ Total Trade</i>			
	(1)	(2)	(3)			
Trade	17.56**	16.08**	20.04**			
	(3.59)	(3.33)	(3.59)			
Observations	1967	1967	1967			
$R^2$	0.383	0.383	0.385			
				<b>Manufacturing</b>		
	<i>Trade/ GDP</i>	<i>Trade/ Output</i>	<i>Trade/ Total Trade</i>			
	(1)	(2)	(3)			
Trade	13.55**	14.43**	15.58**			
	(3.95)	(3.30)	(3.86)			
Observations	1496	1496	1496			
$R^2$	0.465	0.467	0.467			
$\mu_{c1} + \mu_{c2}$	yes	yes	yes			

Notes: Robust standard errors in parentheses. \*\* significant at 1%; \* significant at 5%; + significant at 10%. The sample period is 1970–99. The dependent variables are the correlations of the growth of real GDP (top panel) and the growth of real manufacturing output (bottom panel). All regressors are in natural logs.  $\mu_{c1}$  and  $\mu_{c2}$  denote the country fixed effects All specifications are estimated using OLS.

**Table A5.** Impact of Trade on Comovement at the Sector-Level: All Specifications for HP-Filtered Data

	<i>Specification I</i>				<i>Specification II</i>			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Trade	7.24** (0.07)	4.05** (0.10)	3.71** (0.11)	2.75** (0.12)	7.11** (0.07)	3.92** (0.10)	3.57** (0.11)	2.62** (0.12)
Trade×Same Sector	–	–	–	–	3.41** (0.39)	3.71** (0.37)	3.81** (0.34)	3.95** (0.38)
Same Sector	–	–	–	–	108.31** (10.58)	116.39** (9.88)	118.47** (9.16)	–
Observations	653,588	653,588	653,588	653,588	653,588	653,588	653,588	653,588
$R^2$	0.015	0.091	0.198	0.176	0.016	0.091	0.198	0.176
	<i>Specification III</i>				<i>Specification IV</i>			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Trade	6.84** (0.08)	3.68** (0.10)	3.36** (0.12)	2.41** (0.12)	6.85** (0.08)	3.65** (0.11)	3.33** (0.12)	2.42** (0.12)
Trade×Same Sector	–	–	–	–	1.16+ (0.62)	1.83* (0.59)	2.28** (0.55)	1.95* (0.61)
Trade×IO	15.34** (1.38)	17.44** (1.32)	16.70** (1.27)	16.60** (1.29)	12.31** (2.10)	16.92** (2.05)	15.60** (2.04)	13.03** (1.98)
Trade×Same Sector×IO	–	–	–	–	1.59 (3.44)	-4.35 (3.26)	-5.14+ (3.06)	-0.52 (3.24)
Same Sector×IO	–	–	–	–	-46.42 (45.05)	-97.75* (42.31)	-108.49* (39.57)	–
Same Sector	–	–	–	–	46.68* (17.27)	65.65** (16.31)	77.25** (15.12)	–
Input-Output	246.72** (17.87)	264.12** (16.85)	253.96** (16.12)	–	236.73** (26.92)	266.10** (26.11)	249.06** (25.71)	–
Observations	653,588	653,588	653,588	653,588	653,588	653,588	653,588	653,588
$R^2$	0.016	0.092	0.198	0.176	0.016	0.092	0.198	0.176
$\mu_{c1} + \mu_{c2} + \mu_i + \mu_j$	no	yes	no	no	no	yes	no	no
$\mu_{c1} \times \mu_i + \mu_{c2} \times \mu_j$	no	no	yes	no	no	no	yes	no
$\mu_{c1} \times \mu_{c2} + \mu_i \times \mu_j$	no	no	no	yes	no	no	no	yes

Notes: Robust standard errors in parentheses. \*\* significant at 1%; \* significant at 5%; + significant at 10%. The sample period is 1970–99. The dependent variable is the correlation of the HP-filtered real output between sector  $i$  and sector  $j$  of the country pair. In all specifications, the trade variable is normalized by GDP.  $\mu_{c1}$  and  $\mu_{c2}$  are country 1 and 2 fixed effects, respectively.  $\mu_i$  and  $\mu_j$  are sector  $i$  and  $j$  fixed effects, respectively. Variable definitions and sources are described in detail in the text.

## Appendix B    Logs and Levels Estimates

The estimation in the paper is carried out using logs of trade ratios on the right-hand side. The literature is split on whether logs or levels specification is more appropriate. While the original Frankel and Rose (1998) paper and several subsequent studies take logs, Kose and Yi (2006) use both levels and logs but argue that the levels specification has a more appealing quantitative interpretation. Thus, it is important to assess both which specification is favored by the data, and whether our results are robust to estimation in levels.

We chose the log specification as the baseline because the trade ratios in levels are extremely skewed, and thus a tiny share of the top values of the trade ratios affect the estimated coefficient a great deal. What the log specification does is reduce the influence of the largest trade values, providing a better fit for the data and more stable estimates. Table B1 reports the results of estimating the canonical Frankel-Rose regressions for the aggregate data in levels (Panel I) and in logs (Panel II). All the specifications include both sets of country effects. The first column reports the full sample estimates; the second column trims the most extreme 1% of the trade observations in the sample, the third column, 2.5% of the sample, the fourth, 5% of the sample, and the last column, 10% of the sample. In each case, following the best practice in the literature, we trim symmetrically on both ends (that is, in trimming 1%, we remove 0.5% of the top trade observations, and 0.5% of the bottom). The results are striking. When just 1% of the observations are removed, the levels coefficient doubles, from 9.775 to 19.336. Even more problematically, trimming more data raises the coefficient even more, to 26.007, 31.268, and then 35.175 when 10% of the sample is dropped. This is clear evidence that the levels coefficient is unstable, taking different values at different points in the sample.

Remarkably, the same problem does not occur when using logs. Panel II reports the results. The coefficients are not sensitive to trimming, oscillating between 18.45 and 15.91, with the standard error of about 4 in each specification.<sup>1</sup> Thus, the log specification appears

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<sup>1</sup>As in the main text, for ease of reading the tables and to reduce the number of decimal points, the regression coefficients and standard errors for the log (but not the level) regressions are multiplied by 1000.



to capture adequately the strong nonlinearity in the data.<sup>2</sup>

The problem of unstable coefficients is not confined to the aggregate specifications. Table B2 reports the results of estimating the levels regression on the full sample (column 1), trimming the outlying 1% of the sample symmetrically (i.e. 0.5% from both the top and bottom of the distribution of the trade variable), trimming 2.5% of the sample, 5% of the sample, and 10% of the sample in successive columns. It is clear that the coefficients are very sensitive to the very top values. In the first panel, for example, while the full sample coefficient is 4.47, losing the top 0.5% of trade observations raises it four-fold to 20.24, top 1.25% to 30.7, where it stays when the data are trimmed further. However, the first panel is by far the most stable. In all three of the other trade measures, the coefficients do not level off, rather they keep rising all the way up to the 10% trim. When trade is normalized by output, the coefficient starts out negative and significant, becomes insignificant when 2.5% of observations are removed, and then turns positive and significant for the 5% and 10% trims. In the other two specifications, the coefficient is positive and strongly significant throughout, but rises in magnitude for each successive trim of the data.

We also carried out the trimming exercise on a subsample that excludes the zero trade observations, reaching identical results. That is, the large differences in the levels coefficients (due to trimming) are not driven by zeros. Instead, they are driven by the largest trade observations. As a side note, none of the results appear to be affected by zeros, in the sense that in all cases, the levels coefficients with and without zeros in the sample are very similar.

Table B3 reports the same trimming exercise on logged trade data. It is remarkable that the coefficient is much more stable across all the untrimmed and trimmed samples, indicating that logging the trade variables downweights the extreme observations and thus makes the estimated coefficients more reliable throughout the sample.

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<sup>2</sup>This in turn implies that the estimated magnitudes of the impact of trade on comovement are very sensitive to trimming in the levels specification, and are not sensitive in the log specification. Moving from the 25th to the 75th percentile in the distribution of the bilateral trade variable corresponds to the same change in trade in both the level and the log specifications (since the percentiles correspond to the same actual observations in both). Depending on the trimming, in the levels specification the change in left-hand side variable changes by a factor of 3.6; in the logs specification, the difference is only 12%.

While qualitatively the results are robust to estimating in levels, as we can see the estimated coefficients are unreliable. In addition, the stability of the log coefficients indicates that logging the trade variables adequately captures the nonlinearity present in the data. Thus, in the main text of the paper we stick to the log specifications. However, it is still important to check that the results in levels are qualitatively robust. Tables B4 through B8 report all of the regression results in the paper using levels rather than logs (they are equivalent to Tables 1-5 in the main text of the paper).<sup>3</sup> It is clear that all the results still hold. In particular, trade on its own is significant, and, more importantly, the interaction of bilateral trade with the I-O coefficient is always strongly significant as well.

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<sup>3</sup>These tables use the sample trimming 2.5% of the observations (5% in the case of Trade/Output, the most unstable coefficient). This is a relatively conservative trim.

**Table B1.** Impact of Trade on Comovement at the Aggregate-Level: Trimming Exercise

<i>I. Trade/GDP</i>					
	(1)	(2)	(3)	(4)	(5)
	Full	1%	2.5%	5%	10%
Trade	9.78**	19.34**	26.01**	31.27**	35.18**
	(1.82)	(2.73)	(4.59)	(5.93)	(8.54)
Observations	1,967	1,949	1,919	1,872	1778
$R^2$	0.387	0.382	0.378	0.367	0.354
<i>II. Log(Trade/GDP)</i>					
	(1)	(2)	(3)	(4)	(5)
	Full	1%	2.5%	5%	10%
Trade	17.56**	18.45**	16.19**	16.81**	15.91**
	(3.59)	(3.53)	(3.58)	(3.69)	(4.14)
Observations	1,967	1,949	1,919	1,872	1778
$R^2$	0.383	0.378	0.373	0.362	0.352
$\mu_{c1} + \mu_{c2}$	yes	yes	yes	yes	yes

Notes: Robust standard errors in parentheses. \*\* significant at 1%; \* significant at 5%; + significant at 10%. The sample period is 1970–99. The dependent variable is the correlation of the growth of real GDP.  $\mu_{c1}$  and  $\mu_{c2}$  denote the country fixed effects All specifications are estimated using OLS.

**Table B2.** Impact of Trade on Comovement at the Sector-Level: Trimming Exercise for Levels

	I. Trade/GDP					II. Trade/Output				
	(1) Full	(2) 1%	(3) 2.5%	(4) 5%	(5) 10%	(1) Full	(2) 1%	(3) 2.5%	(4) 5%	(5) 10%
Trade	4.47** (0.89)	20.24** (2.70)	30.70** (3.62)	30.11** (4.98)	30.87** (7.60)	0.00* (0.00)	-0.05* (0.02)	-0.029 (0.03)	0.14** (0.05)	0.26** (0.07)
Observations	813,784	801,219	793,430	773,088	732,404	809,947	797,477	789,690	769,449	728,951
$R^2$	0.157	0.157	0.155	0.153	0.151	0.157	0.158	0.158	0.158	0.156
	III. Trade/Total Trade					IV. Trade/Sector Total Trade				
	(1) Full	(2) 1%	(3) 2.5%	(4) 5%	(4) 10%	(1) Full	(2) 1%	(3) 2.5%	(4) 5%	(5) 10%
Trade	1.09** (0.24)	2.98** (0.47)	5.60** (0.62)	6.56** (0.84)	6.27** (1.25)	0.31** (0.02)	0.39** (0.03)	0.52** (0.03)	0.74** (0.04)	0.86** (0.05)
Observations	815,233	802,618	794,851	774,461	733,702	815,233	802,618	794,843	774,471	733,703
$R^2$	0.157	0.156	0.154	0.151	0.147	0.157	0.155	0.153	0.151	0.144
$\mu_{c1} \times \mu_i + \mu_{c2} \times \mu_j$	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes

Notes: Robust standard errors in parentheses. \*\* significant at 1%; \* significant at 5%; + significant at 10%. The sample period is 1970–99. The dependent variable is the correlation of the real output growth between sector  $i$  and sector  $j$  of the country pair.  $\mu_{c1}$  and  $\mu_{c2}$  are country 1 and 2 fixed effects, respectively.  $\mu_i$  and  $\mu_j$  are sector  $i$  and  $j$  fixed effects, respectively. Variable definitions and sources are described in detail in the text.

**Table B3.** Impact of Trade on Comovement at the Sector-Level: Trimming Exercise for Logs

	<i>I. Trade/GDP</i>					<i>II. Trade/Output</i>				
	(1) Full	(2) 1%	(3) 2.5%	(4) 5%	(5) 10%	(1) Full	(2) 1%	(3) 2.5%	(4) 5%	(5) 10%
Trade	1.47** (0.09)	1.63** (0.10)	1.74** (0.10)	1.81** (0.10)	1.91** (0.11)	0.91** (0.09)	1.08** (0.09)	1.16** (0.09)	1.26** (0.10)	1.47** (0.10)
Observations	653,588	647,052	637,247	620,908	588,228	650,341	643,837	634,081	617,823	585,305
$R^2$	0.173	0.172	0.170	0.168	0.163	0.173	0.173	0.172	0.171	0.168
	<i>III. Trade/Total Trade</i>					<i>IV. Trade/Sector Total Trade</i>				
	(1) Full	(2) 1%	(3) 2.5%	(4) 5%	(4) 10%	(1) Full	(2) 1%	(3) 2.5%	(4) 5%	(5) 10%
Trade	1.51** (0.09)	1.70** (0.10)	1.81** (0.10)	1.93** (0.10)	1.99** (0.11)	1.29** (0.10)	1.49** (0.11)	1.66** (0.11)	1.86** (0.11)	2.03** (0.12)
Observations	655,011	648,459	638,635	622,259	589,509	655,011	648,459	638,635	622,258	589,509
$R^2$	0.173	0.171	0.169	0.165	0.160	0.173	0.170	0.169	0.165	0.158
$\mu_{c1} \times \mu_i + \mu_{c2} \times \mu_j$	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes

Notes: Robust standard errors in parentheses. \*\* significant at 1%; \* significant at 5%; + significant at 10%. The sample period is 1970–99. The dependent variable is the correlation of the real output growth between sector  $i$  and sector  $j$  of the country pair.  $\mu_{c1}$  and  $\mu_{c2}$  are country 1 and 2 fixed effects, respectively.  $\mu_i$  and  $\mu_j$  are sector  $i$  and  $j$  fixed effects, respectively. Variable definitions and sources are described in detail in the text.

**Table B4.** Impact of Trade on Comovement at the Sector-Level: Pooled Estimates for Levels

	I. Trade/GDP				II. Trade/Output			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Trade	252.37** (3.05)	93.42** (3.25)	106.12** (3.29)	30.70** (3.62)	2.69** (0.04)	0.92** (0.04)	0.86** (0.04)	0.13** (0.05)
Observations	793,430	793,430	793,430	793,430	769,399	769,399	769,399	769,399
$R_o^2$	0.010	0.096	0.222	0.155	0.007	0.098	0.223	0.158
$R_w^2$	–	0.0011	0.0014	0.0001	–	0.0007	0.0006	1.13E-05
	III. Trade/Total Trade				IV. Trade/Sector Total Trade			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Trade	51.75** (0.52)	18.05** (0.55)	21.02** (0.55)	5.60** (0.62)	2.22** (0.02)	0.94** (0.02)	0.88** (0.02)	0.52** (0.03)
Observations	794,851	794,851	794,851	794,851	794,843	794,843	794,843	794,843
$R_o^2$	0.015	0.095	0.219	0.154	0.019	0.095	0.219	0.153
$R_w^2$	–	0.0014	0.0019	0.0001	–	0.0027	0.0026	0.0004
$\mu_{c1} + \mu_{c2} + \mu_i + \mu_j$	no	yes	no	no	no	yes	no	no
$\mu_{c1} \times \mu_i + \mu_{c2} \times \mu_j$	no	no	yes	no	no	no	yes	no
$\mu_{c1} \times \mu_{c2} + \mu_i \times \mu_j$	no	no	no	yes	no	no	no	yes

Notes: Robust standard errors in parentheses. \*\* significant at 1%; \* significant at 5%; + significant at 10%.  $R_o^2$  is the overall  $R^2$  and  $R_w^2$  is the within- $R^2$  associated with the regressor of interest. The sample period is 1970-99. The dependent variable is the correlation of the real output growth between sector  $i$  and sector  $j$  of the country pair.  $\mu_{c1}$  and  $\mu_{c2}$  are country 1 and 2 fixed effects, respectively.  $\mu_i$  and  $\mu_j$  are sector  $i$  and  $j$  fixed effects, respectively. Variable definitions and sources are described in detail in the text.

**Table B5.** Impact of Trade on Comovement at the Sector-Level: Within- and Cross-Sector Estimates for Levels

	I. Trade/GDP				II. Trade/Output			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Trade	248.37** (3.09)	89.94** (3.28)	102.44** (3.31)	26.32** (3.65)	2.65** (0.04)	0.87** (0.04)	0.82** (0.04)	0.09+ (0.05)
Trade×Same Sector	128.79** (18.38)	118.13** (15.92)	127.46** (14.19)	132.42** (15.90)	1.42** (0.23)	1.41** (0.20)	1.51** (0.18)	1.44** (0.20)
Same Sector	0.01** (0.00)	0.01** (0.00)	0.01** (0.00)	–	0.01** (0.00)	0.02** (0.00)	0.01** (0.00)	–
Observations	793,430	793,430	793,430	793,430	769,399	769,399	769,399	769,399
$R_o^2$	0.011	0.096	0.222	0.155	0.008	0.098	0.223	0.158
$R_w^2$	–	0.0015	0.0018	0.0002	–	0.0011	0.0011	0.0001
	III. Trade/Total Trade				IV. Trade/Sector Total Trade			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Trade	50.98** (0.53)	17.33** (0.55)	20.29** (0.56)	4.71** (0.62)	2.18** (0.02)	0.91** (0.02)	0.85** (0.02)	0.49** (0.03)
Trade×Same Sector	23.22** (3.12)	22.32** (2.69)	22.70** (2.35)	25.45** (2.70)	0.98** (0.12)	0.95** (0.10)	0.97** (0.09)	0.95** (0.10)
Same Sector	0.01** (0.00)	0.01** (0.00)	0.01** (0.00)	–	0.01** (0.00)	0.01** (0.00)	0.01** (0.00)	–
Observations	794,851	794,851	794,851	794,851	794,843	794,843	794,843	794,843
$R_o^2$	0.015	0.095	0.219	0.154	0.020	0.096	0.220	0.154
$R_w^2$	–	0.0019	0.0023	0.0002	–	0.0031	0.0031	0.0005
$\mu_{c1} + \mu_{c2} + \mu_i + \mu_j$	no	yes	no	no	no	yes	no	no
$\mu_{c1} \times \mu_i + \mu_{c2} \times \mu_j$	no	no	yes	no	no	no	yes	no
$\mu_{c1} \times \mu_{c2} + \mu_i \times \mu_j$	no	no	no	yes	no	no	no	yes

Notes: Robust standard errors in parentheses. \*\* significant at 1%; \* significant at 5%; + significant at 10%.  $R_o^2$  is the overall  $R^2$  and  $R_w^2$  is the within- $R^2$  associated with the regressors of interest. The sample period is 1970–99. The dependent variable is the correlation of the real output growth between sector  $i$  and sector  $j$  of the country pair.  $\mu_{c1}$  and  $\mu_{c2}$  are country 1 and 2 fixed effects, respectively.  $\mu_i$  and  $\mu_j$  are sector  $i$  and  $j$  fixed effects, respectively. Variable definitions and sources are described in detail in the text.

**Table B6.** Impact of Trade on Comovement at the Sector-Level: Vertical Linkage Estimates for Levels

	<i>I. Trade/GDP</i>				<i>II. Trade/Output</i>			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Trade	235.44** (3.33)	77.65** (3.50)	93.26** (3.50)	11.54** (3.85)	2.48** (0.04)	0.73** (0.04)	0.71** (0.04)	-0.044 (0.05)
Trade×IO	482.11** (52.14)	520.90** (45.40)	429.06** (40.68)	597.05** (44.34)	9.83** (0.77)	8.73** (0.65)	7.63** (0.60)	8.57** (0.64)
Input-Output	0.06** (0.00)	0.03** (0.00)	0.03** (0.00)	- (-)	0.06** (0.00)	0.03** (0.00)	0.03** (0.00)	- (-)
Observations	793,430	793,430	793,430	793,430	769,399	769,399	769,399	769,399
$R_o^2$	0.011	0.096	0.222	0.155	0.009	0.098	0.224	0.158
$R_w^2$	-	0.0017	0.0020	0.0004	-	0.0014	0.0014	0.0003
	<i>III. Trade/Total Trade</i>				<i>IV. Trade/Sector Total Trade</i>			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Trade	48.68** (0.57)	15.14** (0.59)	18.69** (0.59)	2.01** (0.66)	2.08** (0.02)	0.82** (0.02)	0.77** (0.02)	0.41** (0.03)
Trade×IO	88.58** (8.78)	95.57** (7.63)	76.36** (6.69)	112.19** (7.48)	6.94** (0.46)	6.12** (0.39)	5.42** (0.35)	5.94** (0.37)
Input-Output	0.05** (0.00)	0.03** (0.00)	0.03** (0.00)	- (-)	0.06** (0.00)	0.02** (0.00)	0.03** (0.00)	- (-)
Observations	794,851	794,851	794,851	794,851	794,843	794,843	794,843	794,843
$R_o^2$	0.016	0.095	0.220	0.154	0.021	0.096	0.220	0.154
$R_w^2$	-	0.0021	0.0025	0.0005	-	0.0035	0.0034	0.0008
$\mu_{c1} + \mu_{c2} + \mu_i + \mu_j$	no	yes	no	no	no	yes	no	no
$\mu_{c1} \times \mu_i + \mu_{c2} \times \mu_j$	no	no	yes	no	no	no	yes	no
$\mu_{c1} \times \mu_{c2} + \mu_i \times \mu_j$	no	no	no	yes	no	no	no	yes

Notes: Robust standard errors in parentheses. \*\* significant at 1%; \* significant at 5%; + significant at 10%.  $R_o^2$  is the overall  $R^2$  and  $R_w^2$  is the within- $R^2$  associated with the regressors of interest. The sample period is 1970-99. The dependent variable is the correlation of the real output growth between sector  $i$  and sector  $j$  of the country pair.  $\mu_{c1}$  and  $\mu_{c2}$  are country 1 and 2 fixed effects, respectively.  $\mu_i$  and  $\mu_j$  are sector  $i$  and  $j$  fixed effects, respectively. Variable definitions and sources are described in detail in the text.



**Table B7.** Impact of Trade on Comovement at the Sector-Level: Vertical Linkages, Within- and Cross-Sector Estimates for Levels

	<i>I. Trade/GDP</i>				<i>II. Trade/Output</i>			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Trade	48.33** (0.58)	14.68** (0.60)	18.43** (0.60)	1.64* (0.67)	2.45** (0.04)	0.71** (0.04)	0.69** (0.04)	-0.05 (0.05)
Trade×Same Sector	16.10** (5.49)	16.54** (4.77)	19.94** (4.15)	15.80** (4.81)	0.0632 (0.33)	0.202 (0.30)	0.57* (0.27)	0.20 (0.30)
Trade×IO	95.64** (12.36)	113.09** (10.78)	78.68** (9.50)	126.68** (10.65)	12.11** (1.21)	10.13** (1.00)	8.25** (0.91)	9.26** (0.97)
Trade×Same Sector×IO	-64.03** (23.50)	-76.82** (20.31)	-59.44** (17.55)	-72.59** (20.18)	-4.19* (1.85)	-2.75+ (1.59)	-2.50+ (1.44)	-1.81 (1.56)
Same Sector×IO	-0.07** (0.01)	-0.03** (0.01)	-0.04** (0.01)	–	-4.19* (1.85)	-2.75+ (1.59)	-2.50+ (1.44)	–
Same Sector	0.01** (0.00)	0.01** (0.00)	0.01** (0.00)	–	0.01** (0.00)	0.02** (0.00)	0.01** (0.00)	–
Input-Output	0.10** (0.00)	0.04** (0.00)	0.04** (0.00)	–	0.12** (0.00)	0.04** (0.00)	0.04** (0.00)	–
Observations	794,851	794,851	794,851	794,851	769,399	769,399	769,399	769,399
$R_o^2$	0.016	0.095	0.220	0.154	0.009	0.099	0.224	0.158
$R_w^2$	–	0.0019	0.0021	0.0004	–	0.0016	0.0015	0.0003
	<i>III. Trade/Total Trade</i>				<i>IV. Trade/Sector Total Trade</i>			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Trade	48.33** (0.58)	14.68** (0.60)	18.43** (0.60)	1.64* (0.67)	2.04** (0.02)	0.79** (0.02)	0.75** (0.02)	0.39** (0.03)
Trade×Same Sector	16.10** (5.49)	16.54** (4.77)	19.94** (4.15)	15.80** (4.81)	0.428 (0.18)	0.48** (0.15)	0.64** (0.13)	0.46** (0.15)
Trade×IO	95.64** (12.36)	113.09** (10.78)	78.68** (9.50)	126.68** (10.65)	9.36** (0.70)	8.06** (0.58)	6.90** (0.52)	7.47** (0.57)
Trade×Same Sector×IO	-64.03** (23.50)	-76.82** (20.31)	-59.44** (17.55)	-72.59** (20.18)	-5.36** (1.08)	-4.62** (0.92)	-4.38** (0.80)	-3.91** (0.89)
Same Sector×IO	-0.07** (0.01)	-0.03** (0.01)	-0.04** (0.01)	–	-0.07** (0.01)	-0.03** (0.01)	-0.03** (0.01)	–
Same Sector	0.01** (0.00)	0.01** (0.00)	0.01** (0.00)	–	0.001 (0.00)	0.01** (0.00)	0.01** (0.00)	–
Input-Output	0.10** (0.00)	0.04** (0.00)	0.04** (0.00)	–	0.11** (0.00)	0.03** (0.00)	0.03** (0.00)	–
Observations	794,851	794,851	794,851	794,851	794,843	794,843	794,843	794,843
$R_o^2$	0.016	0.095	0.220	0.154	0.022	0.096	0.220	0.154
$R_w^2$	–	0.0022	0.0026	0.0005	–	0.0037	0.0036	0.0009
$\mu_{c1} + \mu_{c2} + \mu_i + \mu_j$	no	yes	no	no	no	yes	no	no
$\mu_{c1} \times \mu_i + \mu_{c2} \times \mu_j$	no	no	yes	no	no	no	yes	no
$\mu_{c1} \times \mu_{c2} + \mu_i \times \mu_j$	no	no	no	yes	no	no	no	yes

Notes: Robust standard errors in parentheses. \*\* significant at 1%; \* significant at 5%; + significant at 10%.  $R_o^2$  is the overall  $R^2$  and  $R_w^2$  is the within- $R^2$  associated with the regressors of interest. The sample period is 1970–99. The dependent variable is the correlation of the real output growth between sector  $i$  and sector  $j$  of the country pair.  $\mu_{c1}$  and  $\mu_{c2}$  are country 1 and 2 fixed effects, respectively.  $\mu_i$  and  $\mu_j$  are sector  $i$  and  $j$  fixed effects, respectively. Variable definitions and sources are described in detail in the text.

**Table B8.** Impact of Trade on Comovement at the Sector-Level: Vertical Linkages and Elasticities of Substitution Estimates for Levels

	<i>I. Trade/GDP</i>		<i>II. Trade/Output</i>	
	(1)	(2)	(1)	(2)
Trade	184.93** (16.63)	56.33** (4.84)	1.14** (0.15)	0.14** (0.04)
Trade×IO	549.35** (45.22)	571.21** (44.52)	3.57** (0.44)	4.58** (0.45)
Trade×(Production Elasticity)	-106.32** (9.51)	–	-0.69** (0.09)	–
Trade×(Consumption Elasticity)	–	-6.46** (0.44)	–	-0.04** (0.00)
Observations	657,062	793,430	657,006	789,690
$R_o^2$	0.176	0.156	0.178	0.158
$R_w^2$	0.0006	0.0002	0.0004	0.0004
	<i>III. Trade/Total Trade</i>		<i>IV. Trade/Sector Total Trade</i>	
	(1)	(2)	(1)	(2)
Trade	31.10** (2.90)	11.87** (0.83)	1.76** (0.12)	0.82** (0.04)
Trade×IO	101.57** (7.56)	107.47** (7.50)	5.01** (0.38)	5.82** (0.37)
Trade×(Production Elasticity)	-17.92** (1.66)	–	-0.81** (0.07)	–
Trade×(Consumption Elasticity)	–	-1.42** (0.08)	–	-0.06** (0.00)
Observations	658,143	794,851	658,384	794,843
$R_o^2$	0.174	0.155	0.174	0.154
$R_w^2$	0.0006	0.0007	0.0010	0.0015
$\mu_{c1} \times \mu_{c2} + \mu_i \times \mu_j$	yes	yes	yes	yes

Notes: Robust standard errors in parentheses. \*\* significant at 1%; \* significant at 5%; + significant at 10%.  $R_o^2$  is the overall  $R^2$  and  $R_w^2$  is the within- $R^2$  associated with the regressors of interest. The sample period is 1970–99. The dependent variable is the correlation of the real output growth between sector  $i$  and sector  $j$  of the country pair.  $\mu_{c1}$  and  $\mu_{c2}$  are country 1 and 2 fixed effects, respectively. Production Elasticity taken from Luong (2008), and Consumption Elasticity taken from Broda and Weinstein (2006).  $\mu_i$  and  $\mu_j$  are sector  $i$  and  $j$  fixed effects, respectively. Variable definitions and sources are described in detail in the text.

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