Financial liberalization and the relationship-specificity of exports *

Fabrice Defever

University of Nottingham
Center of Economic Performance (LSE)
GEP and CESifo

Jens Suedekum [a)]

Mercator School of Management
University of Duisburg-Essen
CESifo and IZA

Forthcoming at *Economics Letters*

Abstract

We investigate the causal impact of equity market liberalizations on sectoral export performance across 91 countries (1980-1997). The increased availability of external finance has boosted trade of industries that intensively use relationship-specific inputs, and lowered exports of industries using standardized inputs.

Keywords: Financial liberalization, credit constraints, relationship-specificity, international trade

JEL-class.: F14, F36, G20

*) We thank Pierre Daniel Sarte (the editor), two anonymous referees, Juan Carluccio, and Michaela Trax for very useful comments and discussions on earlier drafts. All errors and shortcomings are solely our responsibility. Part of this research was completed while Defever was visiting the University of Duisburg-Essen. We thank this institution for its hospitality. We are also grateful to the DAAD for providing the financial support of this research visit.

[a]) corresponding author. Lotharstrasse 65, 47057 Duisburg, Germany. Phone: +49/203/3792357.
Email: jens.suedekum@uni-due.de

1. Introduction

The quality of domestic institutions plays a key role in shaping a country's pattern of comparative advantage. Recent research has, in particular, identified two major institutional characteristics that matter for trade: i) the quality of contract enforcement as it affects the capability to specialize in relationship-specific industries (Nunn, 2007), and ii) the development of the financial system, as credit constraints may prevent firms from investing in R&D or market entry costs, which in turn can negatively affect their export performance (Manova 2008; Antràs and Caballero 2009). Little is known, however, about how trade is affected by the interaction of those aspects.

We investigate the impact of equity market liberalizations in the period 1980-1997 on sectoral export performance across 91 countries. Our focus is on the differential impact of those liberalizations on industries with a varying degree of relationship-specificity. Following the classification by Nunn (2007), we think of a "specific industry" as one where detailed contractual arrangements and unique investments of input suppliers and final goods producers are required, giving rise to hold-up and renegotiation issues.

The recent theoretical literature (Carluccio and Fally, 2012; Antràs, Desai and Foley, 2009), has shown that credit constraints may impede specialization in complex, relationship-specific industries. Possible mechanisms can be that firms are reluctant to source from, or to invest in, financially weak countries as they anticipate opportunistic behavior of their partners who face financial frictions; or because non-standard inputs require higher upfront investments which are more difficult to finance in such countries. The available evidence on the link between financial development and the relationship-specificity of exports is mostly cross-sectional, however, which makes it difficult to establish a causal effect of finance.

Our contribution is to address those issues from a dynamic perspective, by exploiting the drastic *changes* in domestic financial systems that came with the equity market liberalizations. We build on the approach by Manova (2008) who shows that these episodes can be regarded as an exogenous shock to the availability of external capital in the respective country, and do not capture simultaneous trade policy reforms or other institutional changes. While Manova (2008) focuses on the effect of liberalization on the export performance of sectors with different financial dependence, we extend that approach by evaluating the importance of relationship-specificity at the industry level.

We obtain two main findings. First, the financial liberalizations have disproportionally boosted exports of industries with a higher degree of relationship-specificity. Our panel results are thus consistent with previous cross-sectional evidence (Carluccio and Fally 2012), and therefore support the view that financial frictions have a negative causal effect on the probability of specialization in complex industries. Second, even though trade volumes have increased on average after liberalization, our findings suggests that reforms of financial institutions generate winners and losers: Most sectors have higher, but some sectors have lower export volumes after liberalization. The industries' relationship-specificity contributes more than external finance dependence to the understanding of this sectoral variation.

2. Data

The main data set for this study is from Manova (2008).[1] It combines export flows for 27 (3-digit ISIC) industries and 91 countries over the period 1980-1997 with country-level data on financial liberalizations, and sector-level data on financial vulnerability.

The main variable capturing the event of liberalization is a dummy that is zero in all years before, and one in all years after the official equity market opening. 39 countries opened their domestic capital market to foreign equity flows during the observation period, while 16 countries liberalized prior to 1980 and 36 never liberalized.[2] To classify sectoral financial vulnerability, Manova (2008) computes two variables: i) the external finance dependence as measured by the average ratio of capital expenditures minus cash flow to capital expenditures for the median firm in each industry in the US, and ii) asset tangibility, defined as the share of net property, plant and equipment in total book-value assets for the median US firm in that industry.

To this data set, we merge the 3-digit ISIC sector-level information derived from Nunn (2007) which builds on the Rauch (1999) classification and input-output linkages in the US in 1997.[3] There, the relationship-specificity of an industry is measured by the average fraction of inputs which are not bought and sold on an organized exchange

[1] The data are available under http://www.stanford.edu/~manova/EMLdata.dta.

[2] We also use three alternative measures, namely: ii) a similar dummy referring to the "first sign" of an upcoming liberalization, iii) an index that is zero before, and ranges between zero and one in all years after the official liberalization, where the index value captures the reform intensity, and iv) an analogous index for the "first sign" of liberalization. As further control variables we also use her country-level data on GDP and factor endowments. For all details about these data, see Manova (2008).

[3] The data are available under http://scholar.harvard.edu/nunn/pages/data-0. Below we also report several robustness checks related to this measure of relationship-specificity.

market and for which no international reference price exists. This index is available for all 27 sectors included in Manova (2008). Table 1 provides some descriptive statistics and correlations between the sectoral variables used in our study.

Table 1: a) Descriptive statistics of the sectoral variables (N=27)

	Mean	Std. Dev.	Median	10th perc.	90th perc.	Min	Max
Relationship-specificity	0.530	0.211	0.532	0.266	0.838	0.062	0.890
External finance dependence	0.253	0.330	0.219	-0.140	0.767	-0.451	1.140
Asset tangibility	0.304	0.137	0.301	0.132	0.458	0.075	0.671

b) Correlation table between sectoral variables (N=27)

	Relationship specificity	External finance dependence	Asset tangibility
Relationship-specificity	1		
External finance dependence	0.399**	1	
Asset tangibility	-0.665***	-0.041	1

***, **, *, indicate significance at the 1%, 5%, and 10% level.

The data show that machinery or scientific equipment are among the most, and tobacco and non-ferrous metals are among the least specific industries. Furthermore, more specific industries tend to rely more on external finance, although there are also some exceptions (e.g., leather products), and they tend to have lower asset tangibility.

3. Estimation

We investigate the differential impact of financial liberalization on sectoral exports by estimating the following panel specification that is similar as in Manova (2008):

$$X_{cit} = \alpha_0 + \alpha_1 GDP_{ct} + \beta_0 Lib_{ct} + \beta_1 Lib_{ct} \times Spec_i + \beta_2 Lib_{ct} \times FinDep_i + \\ + \beta_3 Lib_{ct} \times AssetTang_i + \gamma_1 Y_{cit} + \eta_c + \eta_i + \eta_t + \varepsilon_{cit} \quad (1)$$

X_{cit} is the (log) export volume of industry i in country c and year t. GDP_{ct} is c's (log) gross domestic product, Y_{cit} are further time-varying control variables, and the η's are country-, industry- and time-fixed effects. Lib_{ct} is the liberalization dummy. $FinDep_i$ is the external finance dependence, $AssetTang_i$ the asset tangibility, and $Spec_i$ the degree of relationship-specificity in sector i. In all regressions we cluster the standard errors at the country level.

Our focus is on the interaction terms. Manova (2008) has only included β_2 and β_3. We introduce β_1, which is identified from the variation of equity market openness across countries over time, and the variation of relationship-specificity across industries. β_1 thus estimates the comparative advantage of financially more open countries in industries with a higher degree of specificity.

The three variables $Spec_i$, $FinDep_i$ and $AssetTang_i$ have been centered around their respective mean, so that β_0 can be interpreted as the predicted increase of exports after liberalization for an industry with mean values of those characteristics. This rescaling has no impact on the estimates (or standard errors) of the interaction terms β_1, β_2 and β_3.[4] Notice further that the direct effects of $Spec_i$, $FinDep_i$ and $AssetTang_i$ on X_{cit} are captured by the industry-fixed effect η_i

4. Main results

Table 2 shows our main results. In the first column, we replicate Manova's (2008) main finding (see column 3 of her Table 2). Conditional on GDP, general time trends, and time-invariant characteristics captured by the country- and industry-fixed effects, she finds a disproportionally large effect of liberalization on the exports of sectors with higher external finance dependence ($\beta_2 > 0$). In the second column we introduce β_1 instead of β_2, in the third column we jointly consider β_1 and β_2, and in the fourth column we also add β_3, i.e., the interaction with respect to asset tangibility. We consistently estimate a strongly positive and highly significant coefficient $\beta_1 > 0$.[5] That is, liberalization has disproportionally boosted exports of more relationship-specific industries.

Furthermore, we find that the interaction term β_2 remains positive and significant (see column 3), although it becomes substantially smaller than in column 1. The interaction term β_3 is not significant, however, once we control for relationship-specificity. These findings are important to set our results into perspective to Manova (2008).

First, we find that financial liberalization seems to generate winning and losing sectors. Our results in column 3 imply that the export volume is predicted to rise after liberalization ($\beta_0 + \beta_1 \cdot Spec_i + \beta_2 \cdot FinDep_i > 0$) in 20 out of 27 industries, with values

[4] Without the centering of the sectoral characteristics, β_0 would have captured the effect of liberalization for a hypothetical industry where $Spec_i$, $FinDep_i$ and $AssetTang_i$ are all equal to zero. As can be seen from Table 1, such a sector does not exist as $Spec_i$, and $AssetTang_i$ are always larger than zero in the data.

[5] We also test for the joint significance of $\beta_0+\beta_1$. The last row reports the Wald Chi-Square test and the respective p-value. As can be seen, the two terms are also jointly significant. An alternative Wald test for the hypothesis $\beta_0=\beta_1=0$ yields very similar results.

ranging up to 123% in the Scientific equipment sector. Exports are negatively affected, however, in 7 cases with changes as large as -51% in the petroleum refineries. The impact of financial development on trade is therefore economically substantial and strongly heterogeneous across sectors. An intuition may be that the general increase in the availability of external capital in the economy induces tougher selection and reallocation of credit, so that some sectors even end up exporting less than before.

Table 2: Estimation results

	Official Liberalization Dummy				First Sign Liberalization Dummy	Official Liberalization Intensity	First Sign Liberalization Intensity
Liberalization (β_0)	0.333***	0.333***	0.332***	0.332***	0.318***	0.742***	0.845***
	(0.089)	(0.089)	(0.089)	(0.089)	(0.088)	(0.206)	(0.213)
Liberalization × relationship-specificity (β_1)		1.892***	1.548***	1.979***	1.993***	2.971***	3.018***
		(0.242)	(0.233)	(0.319)	(0.319)	(0.357)	(0.360)
Liberalization × external finance dependance (β_2)	0.946***		0.557***	0.466***	0.536***	0.482***	0.508***
	(0.132)		(0.120)	(0.121)	(0.127)	(0.166)	(0.173)
Liberalization × asset tangibility (β_3)				0.866	0.735	2.178***	2.182***
				(0.592)	(0.591)	(0.748)	(0.749)
GDP (α_1)	0.872***	0.869***	0.870***	0.870***	0.891***	1.006***	1.002***
	(0.268)	(0.268)	(0.268)	(0.268)	(0.270)	(0.263)	(0.263)
Controls	Exporter, year and sector F. E.						
R-squared	0.795	0.795	0.796	0.796	0.797	0.797	0.797
# observations	39,568	39,568	39,568	39,568	39,568	39,568	39,568
# exporters	91	91	91	91	91	91	91
Joint significance test							
Wald test on $\beta_0 + \beta_1$		71.38	53.36	45.58	45.35	82.04	83.97
Prob > F		0.000	0.000	0.000	0.000	0.000	0.000

The dependent variable is the log of exports to the world by 3-digit ISIC sector, 1980–1997. The official and first sign liberalization dummies and intensities, external finance dependence, and asset tangibility are defined as in Manova (2008). Relationship specificity is defined as in Nunn (2007) as the fraction of inputs neither bought nor sold on an exchange market nor reference priced, using the conservative classification by Rauch (1999). All sectoral variables have been centred around their respective mean. GDP is the log of the exporter's GDP. All regressions include a constant term, exporter, year and sector fixed effects, and cluster errors at the exporter level. Standard-errors reported in parentheses. ***, **, *, indicate significance at the 1%, 5%, and 10% level.

Further comparing our results with Manova (2008), her main conclusion is supported by our analysis insofar, as we also find that the export volume tends to increase more in sectors with higher external finance dependence. However, our results suggest that the differential relationship-specificity across industries is considerably more important when it comes to explaining the sectoral variation in the effect of liberalization on trade.

Table 3: Predicted changes in sectoral export volumes

Relationship-specificity ($Spec_i$)	Financial Dependence ($FinDep_i$)		
	10th percentile (-0.393)	Median (-0.034)	90th percentile (0.514)
10th percentile (-0.264)	-0.296	-0.096	0.210
Median (0.002)	0.116	0.316	0.621
90th percentile (0.308)	0.590	0.789	1.095

Table reports the predicted change in export volume for different values of $FinDep_i$ and $Spec_i$ (values of the centered variables are reported in parentheses), using the estimated coefficients β_0, β_1 and β_2 from Table 1, column 3. Prediction is computed as $\beta_0 + \beta_1 Spec_i + \beta_2 FinDep_i$

To show this more specifically, Table 3 reports the predicted changes in export volumes for different percentiles of $FinDep_i$ and $Spec_i$. Suppose $FinDep_i$ is hypothetically held fixed at its median value (so that the centered variable becomes 0.219-0.253=-0.034), while $Spec_i$ varies from the 10th percentile (-0.264) to the 90th percentile (0.308). The predicted export changes then range from -9.6% to +78.9%, thus spanning around 90 percentage points. By contrast, holding $Spec_i$ fixed at the median (0.002), predicted export changes only vary by about 50 percentage points (from 11.6% to 62.1%) when raising $FinDep_i$ from the 10th to the 90th percentile.

5. Robustness checks

Columns 5-7 of Table 2 show that our baseline results remain robust when using the "first sign of liberalization" dummy or the indicators of reform intensity instead of the official liberalization dummy. This is important, because a causal interpretation of the results requires that the equity market openings provide an exogenous shock to the availability of external capital, and do not capture other institutional changes that have occurred because countries anticipated future financial deregulations. Those concerns about possible anticipation effects are allayed.

TABLE 4 HERE

Table 4 provides three further robustness checks. First, in columns 1-4 we control for traditional sources of comparative advantage, namely the countries' (time-varying)

factor endowments with physical capital K, human capital H, and natural resources N, and interactions of those with (time-invariant) factor intensities across industries. [6] In line with factor proportions theory of international trade, we find that countries tend to export goods that intensively use their abundant factor. Importantly, our main result remains robust: the coefficient $\beta_1 > 0$ is highly significant, regardless of how the liberalizations are conceptualized.

Second, in columns 5-8 we repeat the exercise, but now focus on those countries that actually liberalized their equity markets during the observation period. Thereby our coefficients are now only identified from such countries where export flows can be observed both before and after a financial deregulation. Our main results remain qualitatively unchanged when focusing on this subsample of "switchers", the only exception being in column 6.

Third, in columns 9-12 we follow Manova's (2008) "event study" approach and use a fixed effect η_{ci} for every country × industry pair instead of separate fixed effects η_c and η_i in eq. (1). This setup takes into account that there may have been pair-specific unobserved differences driving export performance parallel to a liberalization event. It is considerably more demanding than the specification in (1), since identification now purely comes from within-country changes in trade over time, thus attributing the key role to the time variation. The results show that, unlike β_2 and β_3 which now turn insignificant, our main coefficient $\beta_1 > 0$ remains robust, column 10 being the only exception. The "event study" thus corroborates our earlier finding that financial liberalizations disproportionally boost exports of more specific industries, although the quantitative magnitudes are now somewhat smaller than before.[7]

Finally, we have also conducted robustness checks with respect to Nunn's (2007) measure of relationship-specificity. In particular, for the share of inputs not sold on an exchange market, Rauch (1999) provides a "conservative" and a "liberal" definition. Furthermore, he also suggests that the information on the reference prices may be omitted when computing the sectoral index of specificity, which is then only computed as the share of inputs not bought or sold on organized exchange market (in a

[6] Factor endowments are not available in all cases. This is why the number of observations drops from 91 to 70 countries in columns 1-4, and why we cannot include all 39 but only 33 "switching" countries in columns 5-8. For the event study setup in columns 9-12, we return to the sample of 70 countries.

[7] We have also reproduced Table 2 using pair-specific fixed effects η_{ci} instead of η_c and η_i. Our main result remains: $\beta_1 > 0$ robustly holds, and using these coefficients to build an analogue to Table 3, our results still suggest that specificity adds more than finance dependence to the understanding how liberalization affects sectoral export volumes.

"conservative" or a "liberal" definition). The results reported so far refer to the "conservative" definition, and use the information on the reference prices. As a robustness check, we have reproduced Table 2 also for the three alternative measures of relationship-specificity. The detailed results are omitted for brevity, but it turns out that our main results are robust throughout. That is, $\beta_1 > 0$ holds in all specifications, with statistical significance at the 1% level in all cases. Results also remain robust (with statistical significance in the vast majority of cases) when reproducing Table 4, that is, when adding factor endowments as controls, when focusing only on the "switchers", or when conducting the "event study" analysis.

6. Conclusions

The longitudinal design of our study identifies the causal effect of financial liberalization on sectoral export performance. Our panel and event study results show that those equity market openings have disproportionally boosted exports of industries with a higher degree of relationship-specificity. Furthermore, our results indicate that exports of relatively standardized sectors are negatively affected by financial liberalizations. The differential relationship-specificity across industries is more important than the differential reliance on external capital when it comes to explaining the sectoral variation in the effect of liberalization on trade.

Literature

Antràs, P. and R. Caballero (2009), "Trade and Capital Flows: A Financial Frictions Perspective", Journal of Political Economy 117, 701-44

Antràs, P., Desai, M. and F. Foley (2009), "Multinational Firms, FDI Flows and Imperfect Capital Markets", Quarterly Journal of Economics 124, 1171-219.

Carluccio, J. and T. Fally (2012), "Global Sourcing under Incomplete Capital Markets", Review of Economics and Statistics 94, 740-763

Manova, K. (2008), "Credit Constraints, Equity Market Liberalizations and International Trade", Journal of International Economics 76, 33-47

Nunn, N. (2007), "Relationship-Specificity, Incomplete Contracts, and the Pattern of Trade", Quarterly Journal of Economics 122, 569-600

Rauch, J. (1999), "Networks versus Markets in International Trade," Journal of International Economics 48, 7–35

Table 4: Robustness checks

	Official liberalization dummy	First sign liberalization dummy	Official liberalization intensity	First sign liberalization intensity	Official liberalization dummy	First sign liberalization dummy	Official liberalization intensity	First sign liberalization intensity	Official liberalization dummy	First sign liberalization dummy	Official liberalization intensity	First sign liberalization intensity
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Controlling for factor endowments - All countries				Switchers only				Event study setup			
Liberalization (β_0)	0.308***	0.309***	0.544**	0.649***	0.042	0.012	0.175	0.162	0.287***	0.291***	0.487**	0.585**
	(0.094)	(0.098)	(0.207)	(0.234)	(0.065)	(0.078)	(0.212)	(0.258)	(0.100)	(0.104)	(0.207)	(0.236)
Liberalization × relationship-specificity (β_1)	2.150***	2.133***	3.273***	3.358***	0.705*	0.612	3.090***	3.053***	0.491*	0.409	1.030**	1.146**
	(0.369)	(0.378)	(0.433)	(0.440)	(0.373)	(0.404)	(0.658)	(0.891)	(0.278)	(0.283)	(0.488)	(0.507)
Liberalization × external finance dependence (β_2)	0.365**	0.400**	0.407**	0.426**	0.294*	0.285*	0.499	0.056	0.135	0.134	0.080	0.062
	(0.148)	(0.155)	(0.190)	(0.197)	(0.145)	(0.140)	(0.451)	(0.336)	(0.112)	(0.118)	(0.219)	(0.250)
Liberalization × asset tangibility (β_3)	-0.049	-0.219	0.505	0.415	-1.255*	-1.484**	-0.694	-0.633	-0.370	-0.478	-0.663	-0.939
	(0.632)	(0.618)	(0.929)	(0.938)	(0.643)	(0.657)	(1.303)	(1.640)	(0.375)	(0.389)	(0.601)	(0.640)
GDP (α_1)	0.405	0.398	0.564	0.551	1.001*	0.953*	1.052*	0.985*	0.460	0.451	0.607*	0.595
	(0.333)	(0.337)	(0.343)	(0.344)	(0.561)	(0.551)	(0.557)	(0.542)	(0.354)	(0.357)	(0.363)	(0.363)
K/L	0.358	0.382	0.311	0.314	-0.289	-0.282	-0.372	-0.331	0.200	0.249	0.224	0.241
	(0.306)	(0.302)	(0.318)	(0.314)	(0.585)	(0.579)	(0.584)	(0.570)	(0.442)	(0.433)	(0.452)	(0.444)
H/L	-0.302	-0.355	-0.233	-0.273	-0.226	-0.111	-0.208	-0.032	1.465	1.408	1.594*	1.538
	(0.534)	(0.543)	(0.557)	(0.562)	(0.879)	(0.885)	(0.881)	(0.873)	(0.883)	(0.916)	(0.922)	(0.944)
N/L	0.230	0.243	0.077	0.096	0.375	0.585	0.268	0.479	-0.275	-0.267	-0.451	-0.433
	(0.519)	(0.514)	(0.522)	(0.513)	(1.431)	(1.434)	(1.457)	(1.460)	(0.592)	(0.587)	(0.597)	(0.589)
K/L × K intensity	2.352**	2.484**	2.782**	2.947***	3.012*	3.641**	3.868**	4.155**	4.373	4.112	3.858	3.811
	(0.945)	(0.947)	(1.064)	(1.091)	(1.519)	(1.579)	(1.645)	(1.749)	(2.638)	(2.603)	(2.631)	(2.586)
H/L × H intensity	0.830**	0.841***	0.812**	0.811**	0.446	0.312	0.392	0.196	-0.953*	-0.939	-1.027*	-1.009*
	(0.315)	(0.313)	(0.318)	(0.318)	(0.680)	(0.675)	(0.674)	(0.656)	(0.561)	(0.572)	(0.573)	(0.581)
N/L × N intensity	0.110*	0.096	0.132**	0.128**	0.128	0.108	0.123	0.128	1.254***	1.262***	1.422***	1.411***
	(0.061)	(0.060)	(0.063)	(0.063)	(0.076)	(0.077)	(0.076)	(0.079)	(0.295)	(0.295)	(0.302)	(0.300)
Controls	Country, industry and year fixed effects								Fixed effects for country*industry pairs, year fixed effect			
R-squared	0.808	0.808	0.809	0.809	0.700	0.685	0.701	0.684	0.938	0.938	0.938	0.938
# observations	31,971	31,971	31,971	31,971	15,800	15,314	15,800	15,314	31,971	31,971	31,971	31,971
# countries	70	70	70	70	33	32	33	32	70	70	70	70
Joint significance test												
Wald test on $\beta_0 + \beta_1$	38.15	35.63	61.66	62.90	3.24	2.01	21.11	11.81	4.378	4.029	3.130	3.783
Prob > F	0.000	0.000	0.000	0.000	0.081	0.167	0.000	0.002	0.016	0.022	0.050	0.027

The dependent variable is the log of exports to the world by 3-digit ISIC sector, 1980–1997. See Manova (2008) and legend to Table 2 for definitions. All sectoral variables have been centred around their respective mean. Regressions 1-8 include a constant term, country, year and industry fixed effects. Regressions 9-12 include a constant term, year fixed effects and fixed effects for country*industry pairs. In regressions 1-4 and 9-12 we include all 70 countries for which factor endowments data is available. In regressions 5-8 we include only those 33 out of 70 countries where the respective liberalization indicator changed from zero to a positive value during the observation period. Standard errors are clustered at the country level and are reported in parentheses. ***, **, *, indicate significance at the 1%, 5%, and 10% level.