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**Working Paper**

# Trade Liberalisation and Import Margins

FIW Working Paper, No. 39

**Provided in Cooperation with:**
FIW - Research Centre International Economics, Vienna

*Suggested Citation:* Frensch, Richard (2009) : Trade Liberalisation and Import Margins, FIW Working Paper, No. 39, FIW - Research Centre International Economics, Vienna

This Version is available at:
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FIW – Working Paper

FIW Working Paper N° 39
December 2009

# Trade Liberalisation and Import Margins*

Richard Frensch

**Abstract**

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**JEL Codes**: F12, F14, O33
**Keywords**: Gravity, Product Variety, Trade Liberalisation

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Thanks to Barbara Dietz, Jarko Fidrmuc, Jürgen Jerger, Achim Schmillen, Volkhart Vincentz as well as seminar participants in Brighton and Prague for comments on earlier versions. I am grateful to two anonymous referees for numerous suggestions for improvement and to Ali Kutan for editorial guidance. The author acknowledges financial assistance from a Bavarian Ministry of Science forost grant.
*Forthcoming in Emerging Markets Finance

# Trade Liberalisation and Import Margins

October 2009

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## Trade Liberalisation and Trade

The impact of trade liberalisation in the form of policies or mutual agreements is usually analysed within a gravity framework by adding a policy variable of interest. In particular, Rose (2000 and 2005) demonstrates substantial pro-trade effects of being a member of the OECD or the euro zone. Baier and Bergstrand (2007) find that a free trade agreement may double bilateral trade after 10 years.

This type of work with gravity equations traditionally concentrates on aggregate trade values but ignores the two margins of trade, i.e., the extent to which economies trade different volumes of each good (along the intensive margin) or wider or narrower sets or varieties of goods (along the extensive margin). It is only quite recently that trade margins have been studied empirically underlining the importance of extensive margin adjustment following the reduction of trade costs. Feenstra and Kee (2007) link U.S. tariff liberalisation to increased export variety from Mexico and China. Their results correspond to Kehoe and Ruhl's (2003) that trade liberalisation implies significant adjustment along the extensive margin. Felbermayr and Kohler (2007) redress Rose's (2005) findings to the extent that becoming a WTO member increases trade not only by intensifying existing trade but also by trading with new partners. Baldwin and di Nino (2006) present evidence that the euro has boosted trade along the extensive as well as the intensive margin. Bernard et al. (2007) and Popko and Tkachuk (2007) explicitly estimate gravity equations not only for trade volumes, but also for extensive and intensive margins.

Using highly disaggregated OECD and European emerging countries' data, I explore the impact of unilateral institutional trade liberalisation on volumes, extensive and intensive margins of their imports from the rest of the world (ROW) within a gravity framework differentiating between broad categories of goods by use (intermediate,

capital and consumer goods). Reaching beyond the sheer volumes impact of trade liberalisation matters in its own right; more consumer goods variety entails welcome static welfare effects (Krugman 1980). More inputs variety, however, can have lasting growth effects: Amiti and Konings (2007) suggest a link from higher import variety of intermediate inputs to productivity gains at the firm level, concluding from the comparatively large productivity gains accruing from lowering input versus output tariffs. More capital goods variety may even change the economy's state of technology when the state of technology is related to the variety of capital goods available for production, as proposed in Romer (1990), with consequent effects on income and growth.

The Romer proposition has recently been successfully tested in Frensch and Gaucaite Wittich (2009) using trade-based measures of variety. Testing whether trade-based measures of available capital goods variety indeed contain information on technology requires distinguishing the technology information from the pure trade information in the data. Any such attempt is deeply entrenched in the interdependence between technology, trade, and income: trade and variety of trade depend on income, and income on variety via a technology channel. However, Frensch and Gaucaite Wittich (2009) formulate a short-cut through this web of endogeneity. At the core of capital-goods-variety-based models of growth is the formulation that the variety of capital goods available for production constitutes a technology parameter. This implies that a trade-based measure of the variety of consumer goods available in a country does not constitute technology but is a pure trade measure, i.e., it depends on income via trade but does not influence income via a technology channel. Accordingly, they define the available variety of capital goods relative to the available variety of consumer goods, as a technology-relevant variety measure. Thus, identifying substantial effects of

European emerging economies' recent institutional trade liberalisation on the extensive import margins of intermediate or capital goods relative to the extensive import margins of consumer goods amounts to identifying an important channel for the well documented but sometimes slightly superficially modeled link between reforms and growth in transition (for a critique, see Rusinova 2007).

In addition, as discussed below, recent models of heterogeneous firms and trade imply rather clear-cut predictions on how margin effects of institutional trade liberalisation should be distributed across categories of goods, so the results of this paper may also be used as evidence for or against these theories.

The rest of this paper is organised as follows. The next section discusses implications of recent heterogeneous firms and trade models on margin effects of institutional trade liberalisation across categories of goods. The following section discusses data issues of margin measurement and institutional trade liberalisation. A gravity framework is then formulated and put to test; especially, I broaden the analysis by substantially expanding the product space, in which countries trade, to reflect product differentiation by country of origin, using a unique data set. I then check the robustness of results. A final section concludes.

## Gravity, Trade Margins and Trade Models

Studying extensive *versus* intensive trade margins presupposes a theoretical model with product differentiation. The most popular one is Krugman's (1980) love of variety approach, where monopolistically competitive firms are all identical and all trade costs are variable. Consequently, all product varieties are traded – which is inconsistent with the empirical evidence – and changes in variable trade costs impact

only the intensive margin of trade. Consumer preferences imply that the higher the elasticity of substitution between product varieties, the less consumers are willing to buy foreign varieties at higher variable trade cost. This type of model accordingly predicts that variable trade costs have a stronger impact on trade flows the higher the elasticity of substitution.

Recent theories (Melitz 2003; Helpman, Melitz and Rubinstein 2008; Chaney 2008) generalise Krugman (1980) by combining firm heterogeneity in productivity with the introduction of fixed costs of exports, allowing to differentiate among exporting and non-exporting firms in terms of the profitability of incurring fixed export costs. The existence of fixed costs of entering a market thus opens up the possibility of an extensive margin adjustment and may explain the positive relationship between a country's export or import variety and total income noted in Hummels and Klenow (2002 and 2005): as country sizes increase, firms of lower productivity find it profitable to incur fixed export costs. Intuitively, the typical unitary elasticities of total trade with respect to both exporter and importer country size in gravity frameworks will now be split up into elasticities along the extensive and the intensive margins, both positive but smaller than one. In particular, Chaney (2008) establishes links between trade adjustment and the elasticity of substitution that overturn Krugman (1980). In his model, which also allows for potentially asymmetric countries in terms of income, the elasticity of substitution between product varieties plays no role for the impact of variable trade costs on trade flows when firm productivities are subject to a Pareto distribution.[1] But a higher elasticity of substitution between product varieties lowers the effect of fixed trade costs on trade flows, resulting in an overall dampening impact of substitutability on the influence of total trade costs on trade flows.

Why does the introduction of fixed costs of exporting change the amplifying effect of

substitutability on trade flows to a dampening effect when firm productivity is heterogeneous? As in the Krugman model, the impact of variable costs on the intensive margin of exports still increases with the elasticity of substitution. There is no fixed cost effect on the intensive margin, as fixed costs do not influence price setting in a monopolistic competition environment. However, in Chaney's (2008) model, the new impact of export costs on the extensive margin of exports decreases with the elasticity of substitution: as – variable or fixed – barriers decrease, low productivity firms enter. When product differentiation is high, i.e., when the elasticity of substitution is low, less productive firms charging higher prices still capture relatively large market shares with a high impact on trade flows. Specifically, as long as the productivity distribution of firms is Pareto, the dampening influence of a higher elasticity of substitution on the impact of variable export costs along the extensive margin exactly offsets the Krugman-style amplifying influence of higher substitutability on the impact of variable export costs along the intensive margin. The strength of the impact of variable trade costs on trade flows depends only the dispersion of firm productivity. What remains, is the negative influence of a higher elasticity of substitution on the impact of fixed trade costs on the extensive margin: with a high elasticity of substitution productivity differences turn into large size differences in monopolistic competition and large firms can easily overcome fixed costs so that aggregate trade flows are less sensitive to trade barriers when goods are more substitutable.

There is some empirical support for these new trade models: using Swedish firm export data, Andersson (2007) finds that along the extensive margin the impact of fixed costs of market entry (proxied by measures of familiarity with markets) is larger for differentiated goods than for homogenous goods when using the classification

developed by Rauch (1999). For a large panel of French firms, Crozet and Koenig (2007) find that the elasticity of substitution does not govern the overall influence of variable, *ad-valorem* trade barriers for the majority of 34 different industries.

In the following section, I argue that my chosen measure of unilateral institutional trade liberalisation reflects fixed trade costs. Then, exploring the effects of a country's institutional trade liberalisation on extensive and intensive margins of imports from ROW is equivalent to analysing the impact of declining fixed export costs on ROW exports. Analysing ROW exports ensures a substantial degree of exporting firms' heterogeneity behind my data. Rather than by export industry, I differentiate broad categories of goods by use (intermediate, capital and consumer goods), which guarantees a reliable categorisation in terms of substitutability: goods used in production are more complementary than consumer goods, in whichever industry they may have been produced.[2] Accordingly, my results may be used as evidence for or against recent models of heterogeneous firms and trade, which predict that extensive import margin effects of a country's institutional trade liberalisation should – *via* lowering the fixed costs for ROW exporters – increase with decreasing substitutability among products, and that further the full import volume effect of institutional trade liberalisation be realised along the extensive margin.

## Data Issues

### *Measuring Import Margins*

Import data are from 36 countries-reporters, among them emerging economies and OECD member countries from Europe and North America, between 1992 and 2004. I derive import margin measures from these data according to the lowest aggregation

level of the SITC, Rev. 3 in the UN COMTRADE database. This covers 3,114 SITC items, while the UN Statistics Division's *Classification by BEC* (*Broad Economic Categories*) allows for SITC items to be grouped into major SNA activities, namely primary goods, intermediate goods, capital goods, and consumer goods.[3]

Margin measurement follows Feenstra and Kee's (2007) exact measurement comparable over time and across countries when products enter consumption or production non-symmetrically: I define a benchmark that does not vary over time and encompasses as many of my sample countries as possible. Given data limitations (only OECD countries report in each year), the benchmark set is $I_{OECD}$, the total set of items imported by the *virtual country of all OECD economies* in my sample from ROW over all years. Then, $imports^{i}_{OECD}$ is the value of imports for SITC item $i$, summed over all OECD economies and averaged across the years 1992–2004. Accordingly, an exact measure of the extensive import margin of country $c$ in period $t$ for purposes of comparisons both over time and countries, is given by an analogue to equation (4) in Feenstra and Kee (2007),

$$EM_{c,t} = \frac{\sum_{i \in I_{c,t}} imports^{i}_{OECD}}{\sum_{i \in I_{OECD}} imports^{i}_{OECD}}, \tag{1}$$

which depends on the set of SITC items imported by country $c$ at time $t$, $I_{c,t}$, but not on the value of its imports. $EM_{c,t}$ can be interpreted as that share of OECD-imported goods during 1992–2004 also imported by country $c$ in $t$. For symmetric import flows, $EM_{c,t}$ simplifies to the number of goods imported by $c$ in $t$ relative to the number imported by OECD countries during 1992–2004. Quite analogously, the intensive import margin of country $c$ in period $t$ is given by,

$$IM_{c,t} = \frac{\sum_{i \in I_{c,t}} imports^{i}_{c,t}}{\sum_{i \in I_{c,t}} imports^{i}_{OECD}}, \tag{2}$$

which equals country *c* imports at time *t* relative to that of the benchmark country (i.e., the virtual aggregate country of all OECD economies) in those items, in which *c* itself imports from ROW at time *t*. Then, the product of the two margins,

$$EM_{c,t} \times IM_{c,t} = \frac{\sum_{i \in I_{c,t}} imports^{i}_{c,t}}{\sum_{i \in I_{OECD}} imports^{i}_{OECD}}, \tag{3}$$

is total imports of country *c* at time *t*, relative to total OECD imports averaged across the years 1992–2004.

***Institutional Trade Liberalisation***

I utilise information on trade and payments liberalisation that applies equally to all goods categories. For this purpose, I use the foreign trade and payments liberalisation index of the European Bank for Reconstruction and Development (EBRD), where progress is measured in steps of one third on a scale between 1 and 4.33. I assume this index to equal 4.33 for OECD economies, in line with its construction (Appendix Table A2). The index being ordered qualitative rather than cardinal, I consider the impact of *full* liberalisation, i.e., I define $TradeLib_{c,t}$ to take the value of 1 if the index equals 4.33, and 0 otherwise. While this looks quite an extreme threshold to consider, trade liberalisation proceeded quickly across European emerging economies during transition. Accordingly, about half of all 1992–2004 $TradeLib_{c,t}$ observations for these countries take the value of one.

Progress on the EBRD scale touches on reducing administrative trade barriers, providing access to foreign exchange, and convertibility. A country's progress along

these lines thus results in lowering the fixed "beachhead" costs for ROW exporters, rather than variable costs as if reducing tariff and non-tariff barriers. The latter, in fact were lowered considerably by most European emerging economies already when entering into Interim Europe Agreements with the EU at the beginning of the nineties, i.e. before my data begin (Spies and Marques 2009). As a result, for the sample of countries used in the regressions below, the simple correlation coefficient between the EBRD measure and the ten-scale IMF trade restrictiveness index,[4] reflecting tariff and non-tariff restrictions between 1997 and 2003, is a mere –0.13.

## A Gravity Framework

Consistent with complete specialisation approaches, such as recent models of firm heterogeneity and trade, which preserve the gravity structure of trade, and following Bernard et al. (2007), Felbermayr and Kohler (2007), and Popko and Tkachuk (2007), I estimate log-linear gravity equations over a panel of 36 countries between 1992 and 2004 for aggregate values of imports from ROW and for each of the two components: the extensive import margin, $EM_{c,t}$ (the variety of products, as defined in equation 1), and the intensive import margin (i.e., the average value of imports per product, $IM_{c,t}$, equation 2). Since my data are for a single exporting country (ROW), exporter income is captured in the regression constant leaving as explanatory variables the log of the importer's GDP, *GDP_Im*, and *TradeLib*. Country heterogeneity, and specifically Anderson and van Wincoop's (2003) multilateral trade resistance effects can, as in Baier and Bergstrand (2007), be taken care of by including time-varying country dummies.[5] However, in my framework of trade with ROW, this requires *NT* dummies, where *N* is the number of countries and *T* is the number of years, i.e., more than the number of observation in my unbalanced panel (Appendix Table A1). I therefore

begin with country and period fixed effects. This controls for plausibly important time-invariant country-specific, as well as country-invariant time-specific omitted variables with the implication that no time-invariant parameters such as on remoteness or other distance related effects can be estimated.

With imports of country $c$ at time $t$ from ROW, $IMPORTS_{c,t} = \sum_{i \in I_{c,t}} imports^{i}_{c,t}$, gravity equations are,

$$\log IMPORTS_{c,t} = \beta_{0,1} + \beta_{1,1} \log GDP_Im_{c,t} + \beta_{2,1}\, TradeLib_{c,t} + \varepsilon_{c,t,1}\,, \tag{4}$$

for total imports,

$$\log EM_{c,t} = \beta_{0,2} + \beta_{1,2} \log GDP_Im_{c,t} + \beta_{2,2}\, TradeLib_{c,t} + \varepsilon_{c,t,2}\,, \tag{5}$$

for extensive import margins, and

$$\log IM_{c,t} = \beta_{0,3} + \beta_{1,3} \log GDP_Im_{c,t} + \beta_{2,3}\, TradeLib_{c,t} + \varepsilon_{c,t,3}\,, \tag{6}$$

for intensive import margins, where (4) – (6) include country and period fixed effects, the latter also to control for each year's data using a different numéraire since GDP and trade values are in current dollars, as recommended in Baldwin and Taglioni (2006). Equations (4) – (6) are each estimated separately for all goods, consumer goods, capital goods, and intermediate goods.[6] All import flows across all goods categories are positive. According to (3),

$$\begin{aligned} \log EM_{c,t} + \log IM_{c,t} &= \log \sum_{i \in I_{c,t}} imports^{i}_{c,t} - \log \sum_{i \in I_{OECD}} imports^{i}_{OECD} \\ &= \log IMPORTS_{c,t} - \log \sum_{i \in I_{OECD}} imports^{i}_{OECD}\,, \end{aligned} \tag{7}$$

where the right-hand term $\log \sum_{i \in I_{OECD}} imports^{i}_{OECD}$ is constant for each country-reporter. As OLS is a linear operator, estimated coefficients – except for the intercept – from equations (5) and (6) will always sum up to the respective estimated

coefficient from equation (4) for each estimated goods category equation.

The seemingly unrelated regression (SUR) method can estimate the parameters of (4), (5), or (6) each as a system across goods categories, accounting for heteroskedasticity and contemporaneous correlation in the errors across categories. This is plausible because unobservables would potentially simultaneously affect both intermediate and capital goods trade, in which case estimating equations as a system should improve efficiency. However, I may as well use OLS by equation because the same regressors show up in each equation, in which case SUR estimates become equivalent to OLS. I perform SUR only in order to obtain the covariances between the estimates from different equations, which I need to properly perform Wald tests.[7]

## Results and Discussion

### *First Results*

The log of total imports is the dependent variable in the first column of Table 1, and estimation results confirm that trade is increasing in destination GDP. Especially, the market size elasticity of total imports is reasonably close to one, a standard gravity result. Institutional trade liberalisation does have a positive effect on import volumes. Coefficients, however, vary across economic categories: by the semi-elasticity nature of the trade liberalisation coefficient, full liberalisation on the EBRD scale increases total imports by ($e^{0.15}$–1), i.e. by a modest 16 per cent. Respective effects are 25 per cent and 13 per cent for import volumes of intermediate and capital goods, but only 5 per cent for consumer goods.

– Table 1 about here –

When estimating bilateral trade flows with fixed pair effects, Rose (2005) finds a total

trade flow coefficient for GATT/WTO membership for both partners of 0.26; for one trading partner in the OECD, the coefficient increases to 0.29, for both in the OECD, it rises to 0.91. My EBRD measure of full trade liberalisation lies between WTO and – but closer to – OECD membership: all countries are WTO members (except for Yugoslavia with membership negotiations under way), while OECD members are by definition fully liberalised. Accordingly, my import flow coefficient of full EBRD liberalisation should reflect something close to the impact of OECD membership contingent on WTO membership on imports from a ROW which is partly OECD, partly not. Arguing with Rose (2005), such a coefficient should then lie between 0.03 (i.e., 0.29–0.26) and 0.65. My coefficient (Table 1, first column) of 0.15 is in this range.

Table 2 reviews the same influences, but now along the extensive *versus* intensive margins of imports. First, margin elasticities with respect to market size and liberalisation are considerably higher for the intensive than for the extensive margin. Second, extensive margin effects of full liberalisation on the EBRD scale are significantly higher for low substitution goods categories (intermediate and capital goods) than for consumer goods, as confirmed by the Wald tests.

– Table 2 about here –

From Hummels and Klenow (2002), we know that the extensive margin accounts for 9 percent of the greater imports of larger economies. My results suggest that the extensive margin accounts for slightly less than 5 per cent of the higher total imports of larger economies (column 1, Table 1, and column 5, Table 2). Part of the substantial difference between my findings and those of Hummels and Klenow (2002) may be due to different levels of aggregation of the underlying trade data: while my 1992–2004 panel data differentiate among some 3,100 items, Hummels and Klenow

use 1995 data on some 5,000 items. In terms of the quantitative effects of trade liberalisation on both margins, there is little to compare in the literature. Popko and Tkachuk (2007) note that both margins converge over time to EU-levels during the transition of emerging European economies but do not assign quantitative effects to liberalisation *per se*.

Two conclusions suggest themselves: first, full liberalisation on the EBRD scale entails predominantly dynamic growth consequences *via* larger effects on intermediate goods variety (Amiti and Konings 2007) and capital goods variety, and thus on the state of technology (Romer 1990; Frensch and Gaucaite Wittich 2009) rather than static welfare effects on consumer goods variety. Second, as liberalisation on the EBRD scale indicates a fixed trade cost reduction, this result can be viewed as supporting models of heterogeneous firms and trade such as Chaney (2008). Table 2 results for intensive margin effects of institutional trade liberalisation, however, are less supportive: while fixed trade cost reduction effects should be insignificant along the intensive margin, this is only true for consumer goods.

The inclusion of country fixed effects means that trade liberalisation effects can be identified solely on the basis of the within variation in the policy variable. It is possible that the regression is having difficulty in distinguishing between the country fixed effects and full trade liberalisation which is little time-variant, so the procedure might introduce collinearity problems. Cross-section fixed effects variation accounts for 58 per cent of the total variation of *TradeLib* in my panel. Exactly therefore, however, Tables 1 and 2 are encouraging with respect to the plausibility of results.

***Product Differentiation by Country of Origin***

While the import data distinguish between 3,114 items, fewer than 500 cover capital goods. Counting over this small product space may not produce suitable margin measures. Furthermore, more data detail than so far may be necessary for drawing conclusions on full specialisation theoretical models of heterogeneous firms and trade, in which the extensive margin is modeled as the number of firms. Data detail can be increased by expanding the product space by differentiating items by country of origin, as my data also cover each of the 36 reporter-countries' disaggregated imports from 54 selected partner countries, making up a set of 75 million data points. The most preferable solution would be defining an exact margin measure over this expanded space. However, as any subset of countries, when chosen as benchmark, introduces a geographic specialisation bias, I follow Frensch and Gaucaite Wittich (2009): the number of imported SITC items times the respective number of source countries corresponds to a simple count measure of the extensive imports margin, $EM_{c,t}(PD)$, in the expanded product space. For this measure, I identify a maximum count of 168,156 since all 54 source countries can each potentially supply all 3,114 basic SITC items to a country-reporter. With $IMPORTS_{c,t}$ of course still denoting import volumes, the intensive import margin is now quite naturally defined as the average value of each imported variety, i.e., as $IM_{c,t}(PD) = IMPORTS_{c,t} / EM_{c,t}(PD)$.

Results of re-estimating (5) and (6) with these new import margin measures allowing for product differentiation by country of origin are presented in Table 3, where results for import volumes of course remain those given in Table 1. The major change, compared to Table 2, is the now much larger effects along the extensive margin, due to much higher data detail. Again, I can compare my findings to Hummels and Klenow (2002), who also estimate country size elasticities of total imports along both margins when allowing for product differentiation by country of origin: in their Table

5, they assess that the 'number of source-items' accounts for 45 per cent of the higher imports of larger countries, based on 1995 UNCTAD data with imports of 59 countries from 110 source countries in 5,017 items. From columns 1 and 13 in my Tables 1 and 3, the respective figure is 42 per cent.

– Table 3 about here –

Table 3 considerably strengthens the support for heterogeneous firms and trade models: the elasticity of extensive import margins of low substitutability goods (intermediate and capital goods) with respect to institutional trade liberalisation is indeed significantly higher than the same elasticity of high substitutability goods (consumer goods), as evidenced by the Wald tests in columns 14 and 15 of Table 3. At the same time, the now much higher data detail confirms that there is no substantial intensive margin effect of institutional trade liberalisation for all goods; when testing for separate goods categories, this is, however, not true for intermediate goods.

## Sensitivity

### *Measurement of Trade Liberalisation*

EBRD indicators are fundamentally based on the judgement of EBRD country specialists. Campos and Horvath (2006) present alternative measures of privatisation, external, and internal liberalisation for transition economies. I use their cardinal Lora-Campos-Horvath measure of external liberalisation, $Lora_ext_{ct}$, defined between 0 and 1.[8] Again, similar to the procedure with the EBRD indicator, I take OECD economies to be fully liberalised.

– Table 4 about here –

Results given in Table 4, where estimated coefficients by margins again add up to the respective estimated coefficient in the imports volumes estimation (not reproduced due to space constraints), are comparable to the benchmark results in Table 3. Trade liberalisation measured by Lora-Campos-Horvath does have stronger effects along the extensive import margins of intermediate and capital goods than for consumer goods. Further evidence on the heterogeneous firms and trade approach is mixed: it is only along the intensive margins of capital and consumer goods that trade liberalisation *à la* Lora-Campos-Horvath does not have any significant impact.

***'Time-span-variant' Country Dummies***

While I cannot fully incorporate Baier and Bergstrand's (2007) time-variant country dummies, I can go some way in this direction by adding 'time-span-variant' country dummies to period fixed effects. Specifically, I experiment with dividing the 1992–2004 period of observation into different sub-periods, with the objective of minimising the variation of the full liberalisation dummy accounted for by time-span-variant country dummies subject to retaining sufficient degrees of freedom for estimation. On this basis, I select time-span-variant country dummies for three sub-periods, 1992–6, 1997–2000, and 2001–4.[9]

– Table 5 about here –

This procedure results in substantially cutting Table 3 point estimates of full trade liberalisation effects (see Table 5 where again estimated coefficients by margins add up to the respective estimated coefficient in the imports volumes estimation, not reproduced due to space constraints): full liberalisation on the EBRD scale now

increases the extensive import margin of all goods by ($e^{0.039}$–1), i.e. by only 4 per cent. Respective effects by goods categories are 5.4 per cent and 4.3 per cent for intermediate and capital goods, respectively, but only an insignificant 1.5 per cent for consumer goods. This is in line with the discussion in Baldwin and Taglioni (2006): the advantage of the time-span-variant country dummies' now taking better account of country heterogeneity comes at the cost of an increased collinearity between the liberalisation dummy and time-span-variant country dummies. However, the qualitative benchmark results still remain intact on the basis of SUR-based Wald tests: institutional trade liberalisation continues to have stronger effects along the extensive import margins of intermediate and capital goods than for consumer goods. Furthermore, it is now only along the intensive margins of capital goods that trade liberalisation does have any significant impact, albeit negative: for all goods, as well as for intermediate and consumer goods categories, as predicted in Chaney (2008), the full effect of institutional trade liberalisation lowering fixed costs for ROW exporters is indeed realised along the extensive margin.

## Conclusions

The paper explores the impact of European emerging economies' recent institutional trade liberalisation on import values as well as on extensive and intensive import margins across broad categories of goods within a gravity framework. I report two main results: first, I find robust evidence in support of stronger extensive import margin effects of unilateral institutional trade liberalisation for intermediate and capital goods compared to consumer goods. Second, when allowing for product differentiation by country of origin, I find evidence that the import volume effect of institutional trade liberalisation is primarily realised along the extensive margin,

where the strength of this second result is sensitive to specification.

According to the first result, full liberalisation on the EBRD scale entails predominantly dynamic growth rather than static welfare effects. This identifies an important channel for the link between reforms and growth in transition. Both results taken together can also be viewed as supporting models of heterogeneous firms and trade such as Chaney (2008): extensive import margin effects of a country's institutional trade liberalization should – *via* lowering the fixed costs for ROW exporters – increase with decreasing substitutability among products, and the full import volume effect of institutional trade liberalisation should be realised along the extensive margin.

The two implications of the main results may in fact be viewed together. The first result fits into a simple stage-of-growth argument:[10] trade liberalisation helps emerging economies to get successfully involved in import-led-growth strategies, which consist of importing intermediate and capital goods while paying for these imports by exporting final goods produced with these imports. Why, however, can this strategy work if we remember that – after all – it is firms that trade, not countries? Even without the need to explicitly target certain sectors, a broad-based institutional liberalisation lowers fixed trade costs of ROW exporters to the liberalising country, and this has a stronger impact both on imports and along the extensive margins of low elasticity (i.e., intermediate and capital) goods than for high elasticity (i.e., consumer) goods by the behaviour of heterogeneous firms in trade, yielding a link between firm trade and growth

**Notes**

1 Del Gatto et al. (2006) in fact show that the Pareto is a fairly good approximation of underlying distributions of firm-level productivities for a number of sectors and European countries.

2 Estimates in Broda and Weinstein (2006) suggest a substitution elasticity of 6 for consumer goods, implying markups around 20 per cent in monopolistic competition models. Jones (2008) works with an elasticity of substitution among intermediate goods of 0.5, i.e. between Leontief and Cobb-Douglas.

3 For a comprehensive data description, see the Appendix.

4 I am very grateful to the IMF for letting me use this data.

5 As demonstrated in Cheng and Wall (2005), unless heterogeneity is taken care of correctly, gravity models can overestimate integration and other policy effects on trade. Anderson and van Wincoop (2003) criticise bilateral gravity specifications that ignore the interaction between bilateral and multilateral trading costs: bilateral trade flows are determined in a general equilibrium framework. Intuitively, the more resistant to trade a country is with all others, the more it is pushed to trade with a given bilateral partner. In my framework of multilateral imports, multilateral trade resistance becomes part of country heterogeneity.

6 Primary goods are excluded. The results of this paper are independent from this.

7 See Kimura et al. (2007) for an equivalent procedure in a related setting.

8 For the construction of the Lora-Campos-Horvath measure, see Appendix Table A2. I use data from Campos and Horvath (2006, Table A3). A drawback is limited data, available only for 1992–2001; there are no data on Yugoslavia.

9 These combined effects now already account for 67 per cent of the total variation in *TradeLib*.

10 I am grateful to an anonymous referee for pointing this out.

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## Text Tables

**Table 1: Gravity regressions for import volumes.** OLS with country and period fixed effects

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | Dependent variable is the log of total import flows of: | | | |
| | All goods | Intermediate goods | Capital goods | Consumer goods |
| Explanatory variables: | | | | |
| log *GDP_Im* | 0.84*** (15.26) | 0.74*** (11.18) | 0.96*** (13.15) | 0.89*** (15.00) |
| *TradeLib* | 0.15*** (5.46) | 0.22*** (6.67) | 0.12*** (3.46) | 0.048* (1.65) |
| Wald test [p-value] | | [0.0000]*** | [0.0211]** | |
| Observations (cross sections; time) | 442 (36; 1992–2004) | | | |
| Adj. *R*-squared | 0.99 | 0.99 | 0.99 | 0.99 |

*General notes* to Tables 1–5: All goods are without fuels and lubricants. The cutoff-value for trade flows is 10,000$. Variables are defined in Appendix Table A2. Fixed effects not reported, *t*-statistics in parentheses. * (**, ***) indicate significance at 10 (5, 1) per cent. The null hypothesis in the SUR-based Wald tests for trade liberalisation effects is that coefficients are identical between a respective goods category equation and the consumer goods equation.

**<u>Table 2:</u> Gravity regressions for import margins.** OLS with country and period fixed effects

| | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
|---|---|---|---|---|---|---|---|---|
| | Dependent variable is the log of the *extensive* import margin of: | | | | Dependent variable is the log of the *intensive* import margin of: | | | |
| | All goods | Intermediate goods | Capital goods | Consumer goods | All goods | Intermediate goods | Capital goods | Consumer goods |
| Explanatory variables: | | | | | | | | |
| log *GDP_Im* | 0.040*** (7.14) | 0.039*** (6.69) | 0.033*** (3.69) | 0.031*** (7.43) | 0.80*** (15.05) | 0.70*** (10.81) | 0.93*** (12.87) | 0.86*** (14.65) |
| *TradeLib* | 0.012*** (4.17) | 0.018*** (6.23) | 0.025*** (5.67) | 0.0052** (2.57) | 0.14*** (5.21) | 0.20*** (6.25) | 0.10*** (2.81) | 0.043 (1.49) |
| Wald test [p-value] | | [0.0000]*** | [0.0000]*** | | | | | |
| Observations (cross sections; time) | 442 (36; 1992–2004) | | | | 442 (36; 1992–2004) | | | |
| Adj. *R*-squared | 0.93 | 0.94 | 0.76 | 0.89 | 0.99 | 0.99 | 0.99 | 0.99 |

**<u>Table 3:</u> Gravity regressions for import margins** (national product differentiation). OLS with country and period fixed effects

| | (13) | (14) | (15) | (16) | | (17) | (18) | (19) | (20) |
|---|---|---|---|---|---|---|---|---|---|
| | Dependent variable is the log of the *extensive* import margin of: | | | | | Dependent variable is the log of the *intensive* import margin of: | | | |
| | All goods | Intermediate goods | Capital goods | Consumer goods | | All goods | Intermediate goods | Capital goods | Consumer goods |
| Explanatory variables: | | | | | | | | | |
| log *GDP_Im* | 0.35*** (11.12) | 0.30*** (10.21) | 0.40*** (10.58) | 0.42*** (11.40) | | 0.49*** (10.92) | 0.44*** (6.88) | 0.56*** (9.36) | 0.47*** (9.29) |
| *TradeLib* | 0.10*** (6.54) | 0.13*** (8.15) | 0.11*** (6.12) | 0.048*** (2.63) | | 0.046** (2.08) | 0.085*** (3.29) | 0.011 (0.36) | 0.00066 (0.03) |
| Wald test [p-value] | | [0.0000]*** | [0.0001]*** | | | | | | |
| Observations (cross sections; time) | 442 (36; 1992–2004) | | | | | 442 (36; 1992–2004) | | | |
| Adj. *R*-squared | 0.98 | 0.98 | 0.98 | 0.98 | | 0.99 | 0.99 | 0.99 | 0.99 |

**<u>Table 4:</u> Gravity regressions for import margins** (national product differentiation). OLS with country and period fixed effects

| | (21) | (22) | (23) | (24) | | (25) | (26) | (27) | (28) |
|---|---|---|---|---|---|---|---|---|---|
| | Dependent variable is the log of the *extensive* import margin of: | | | | | Dependent variable is the log of the *intensive* import margin of: | | | |
| | All goods | Intermediate goods | Capital goods | Consumer goods | | All goods | Intermediate goods | Capital goods | Consumer goods |
| Explanatory variables: | | | | | | | | | |
| log *GDP_Im* | 0.29*** (8.29) | 0.24*** (6.58) | 0.33*** (7.89) | 0.37*** (8.60) | | 0.46*** (8.88) | 0.40*** (6.30) | 0.49*** (6.67) | 0.54*** (9.69) |
| log *Lora_ext* | 0.11*** (4.34) | 0.16*** (5.89) | 0.14*** (4.44) | 0.0065 (0.20) | | 0.16*** (4.33) | 0.19*** (4.03) | 0.022 (0.41) | 0.035 (0.85) |
| Wald test [p-value] | | [0.0000]*** | [0.0000]*** | | | | | | |
| Observations (cross sections; time) | 327 (35; 1992–2001) | | | | | 327 (35; 1992–2001) | | | |
| Adj. *R*-squared | 0.99 | 0.99 | 0.98 | 0.98 | | 0.99 | 0.99 | 0.99 | 0.99 |

*Note*: for strictly positive values of *Lora_ext*.

**<u>Table 5:</u> Gravity regressions for import margins** (national product differentiation). OLS with period and time-varying country effects

| | (29) | (30) | (31) | (32) | (33) | (34) | (35) | (36) |
|---|---|---|---|---|---|---|---|---|
| | Dependent variable is the log of the *extensive* import margin of: | | | | Dependent variable is the log of the *intensive* import margin of: | | | |
| | All goods | Intermediate goods | Capital goods | Consumer goods | All goods | Intermediate goods | Capital goods | Consumer goods |
| Explanatory variables: | | | | | | | | |
| log *GDP_Im* | 0.31*** (9.26) | 0.24*** (7.32) | 0.38*** (9.87) | 0.41*** (9.86) | 0.48*** (11.20) | 0.43*** (8.89) | 0.57*** (9.36) | 0.48*** (9.94) |
| *TradeLib* | 0.039*** (2.84) | 0.053*** (3.92) | 0.042*** (2.65) | 0.015 (0.89) | –0.018 (–1.02) | 0.0044 (0.22) | –0.059** (–2.37) | 0.0032 (0.16) |
| Wald test [p-value] | | [0.0010]*** | [0.0122]** | | | | | |
| Observations (cross sections; time) | 442 (36; 1992–2004) | | | | 442 (36; 1992–2004) | | | |
| Adj. *R*-squared | 0.99 | 0.99 | 0.99 | 0.99 | 0.99 | 0.99 | 0.99 | 0.99 |

*Note*: time-varying country effects are defined for three sub-periods, 1992–6, 1997–2000, and 2001–4.

## Appendix: Commodity classifications, country and period coverage

*Commodity classifications*

SITC

There are 3,121 *headings* in the SITC, Rev.3, 2,824 at the 5-digit level and 297 at 4-digits, that are not disaggregated any further. The 3-digit group 334 (petroleum products), which is divided into eight final headings in SITC, Rev.3, is in fact not subdivided by many reporting countries, so I treat it as a single heading. This leaves 3,114 *items*, as the level of aggregation of the SITC, Rev.3 to work with.

BEC

The United Nations Statistics Division's *Classification by BEC* (*Broad Economic Categories*) allows for headings of the SITC, Rev.3 to be grouped into 19 activities covering primary and processed foods and beverages, industrial supplies, fuels and lubricants, capital goods and transport equipment, and consumer goods according to their durability. The BEC also provides for the rearrangement of these 19 activities (on the basis of SITC items' *main* end-use) to approximate the basic System of National Accounts (SNA) by 272 primary good items, 1,627 SITC intermediate good items, 471 capital good items, and 704 consumer good items.

*Country and period coverage*

Import data were extracted for 36 reporting countries from Europe and North America. Belgium and Luxembourg are treated as one country throughout as reported until 1998. The data cover 1992–2004 but not all countries report in each year (average: 34.1 countries per year).

– Table A1 about here –

Partner countries comprise ROW (for total imports), and 55 individual countries, i.e., the 36 reporter-countries plus: Bosnia and Herzegovina, 12 CIS economies (Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russia, Turkmenistan, Ukraine, Tajikistan, Uzbekistan) and six Asian economies (China, Hong Kong, Japan, South Korea, Taiwan, and Thailand) for imports and thus for the extensive margin count in the expanded product space allowing for product differentiation by country of origin. These partner countries generally account for 80–95 per cent of reported imports.

– Table A2 about here –

## Appendix tables

**Table A1: Reporter-countries and trade data availability**

| | | | | | |
|---|---|---|---|---|---|
| 1 | Albania (1996–2004) | 13 | France (1992–2004) | 25 | Malta (1992–2004) |
| 2 | Austria (1992–2004) | 14 | United Kingdom (1992–2004) | 26 | Netherlands (1992–2004) |
| 3 | Belgium and Luxembourg (1992–2004) | 15 | Germany (1992–2004) | 27 | Norway (1992–2004) |
| 4 | Bulgaria (1996–2004) | 16 | Greece (1992–2004) | 28 | Poland (1992–2004) |
| 5 | Canada (1992–2004) | 17 | Croatia (1992–2004) | 29 | Portugal (1992–2004) |
| 6 | Switzerland (1992–2004) | 18 | Hungary (1992–2004) | 30 | Romania (1994–2004) |
| 7 | Cyprus (1992–2004) | 19 | Ireland (1992–2004) | 31 | Slovakia (1994–2004) |
| 8 | Czech Republic (1993–2004) | 20 | Iceland (1992–2004) | 32 | Slovenia (1992–3, 1995–2004)) |
| 9 | Denmark (1992–2004) | 21 | Italy (1992–2004) | 33 | Sweden (1992–2004) |
| 10 | Spain (1992–2004) | 22 | Lithuania (1994–2004) | 34 | Turkey (1992–2004) |
| 11 | Estonia (1995–2004) | 23 | Latvia (1994–2004) | 35 | United States (1992–2004) |
| 12 | Finland (1992–2004) | 24 | Macedonia (1994–2004) | 36 | Serbia and Montenegro (1996–2002, 2004) |

*Notes*: Belgium and Luxembourg are treated as one country. OECD countries as of 1992 are underlined.

**Table A2: Variables used in regressions (1)–(36) in Tables 1–5**

| Variable | Definition | Source | Notes |
|---|---|---|---|
| | | Dependent variables | |
| *IMPORTS* | Imports of country *c* at time *t* from ROW in current dollars | UN COMTRADE | See Appendix. |
| *EM and IM* | Extensive and intensive margins of imports over the SITC Rev.3 product space | Own computations on the basis of UN COMTRADE | Defined by 3,114 SITC Rev.3 categories; see Text and Appendix. |
| *EM*(*PD*) and *IM*(*PD*) | Extensive and intensive margins of imports over an expanded product space allowing for product differentiation by country of origin | Own computations on the basis of UN COMTRADE | Defined by 168,156 products, i.e., by 3,114 SITC Rev.3 categories times 54 respective source countries; see Text and Appendix. |
| | | Explanatory variables | |
| *GDP_Im* | Import country GDP in current dollars | *World Development Indicators 2007* | |
| *TradeLib* | Full trade liberalisation dummy | European Bank for Reconstruction and Development (EBRD) | Dummy indicating whether or not a country has reached level 4+ on the EBRD foreign trade and payments liberalisation scale. The EBRD measures reform on a scale between 1 and 4+ (=4.33); 1 represents widespread import and/or export controls or very limited legitimate access to foreign exchange; 2, 3, and 4 define progress, while 4+ indicates countries with standards and performance norms of advanced industrial countries, i.e., of OECD countries. |
| *Lora_ext* | Lora-Campos-Horvath measure of trade liberalisation | Campos and Horvath (2006, Table A3) | Campos and Horvath compile 29 variables for external liberalisation, both on capital flows and on trade. Aggregation is as proposed in Lora (1997) with the major advantage that this method does not require to benchmark reform efforts against an ideal well-functioning market economy. Rather, the reference is the maximum reform effort observed in the data. Underlying variables are classified into 'input' and 'outcome' indicators of reform in order to generate input-only measures. This is crucial in terms of addressing endogeneity issues. |