Determinants of export diversification at different margins of export growth in developing and transition countries

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Abstract

Among the development benefits of export diversification identified in the literature are reduced instability of export earnings, higher export revenues, reduced vulnerability to idiosyncratic shocks and macroeconomic instability, improved allocation of resources to their most productive use and, consequently, higher productivity and growth. Yet there are few studies on the determinants of export diversification for developing economies and this is the first to include European transition countries as well. Unlike most studies, which quantify overall diversification, we investigate diversification and policies to promote diversification along both the intensive and extensive margins of export growth. We utilise the decomposition property of the Theil index to distinguish diversification along both of the two margins, construct new data sets at the 6-digit level for a sample of 40 developing and 22 transition countries, and apply system GMM to estimate dynamic panel models, which are specified to include a wide range of determinants of diversification along the two margins. In particular, we analyse the effects of aid for trade. We find that while the fixed costs of business start-up are impediments to diversification at both the intensive margin and, even more so, at the extensive margin, export costs that are part of trade facilitation measures (with elements of fixed and variable costs) impede only diversification at the intensive margin. Conversely, variable costs (such as tariffs) and international trade costs (such as those proxied by distance) do not have a significant impact at either margin. We also find that aid for building productive capacity encourages export diversification by improving productive capacity in trade-oriented industries and trade activities by domestic firms, especially by increasing the variety of exports (i.e. at the extensive margin). Our results contribute to the conduct of future research by revealing somewhat different sets of determinants for diversification at the different export margins, suggesting that aggregate measures of diversification should not be the sole focus. For policy, our findings have two particular implications: first, reducing trade facilitation and business start-up costs may make a more significant contribution to trade diversification than will further tariff reduction; and, secondly, aid for productive capacity is an important development instrument assisting developing and transition countries to integrate into global markets and diversify their exports. More generally, our findings are consistent with "new industrial policy" arguments that trade promotion requires not only liberalization but accompanying supply-side and institutional reform.

Key words – export diversification, aid for trade, transition countries, trade facilitation

Acknowledgement

1. Introduction

Classical and neoclassical economists support the idea of specialisation according to static comparative advantage, assuming it to be growth enhancing. However, change in the constellation of the forces in the global market, such as greater independence of the former colonies in the period after the Second World War, raised questions around the benefits of economic diversification. Arguing that concentration of production and export structure on a few primary products brings economic risks of export earnings instability and political risks of poor governance and internal conflicts, development economists began to favour diversification for economic development and growth.

Accordingly, export diversification should help a country to avoid instability of export earnings, expand export revenues, induce less macroeconomic instability (Breton and Newfarmer, 2007) and reduce vulnerability to idiosyncratic shocks (Acemoglu and Zilibotti, 1997). According to the "new, new trade theory", diversification will allocate resources to the most productive use, improving industry's productivity (Melitz, 2003; Bernard et al. 2007) and boost economic growth (Hausmann and Klinger, 2006).

While the literature establishes the relationship between development and export diversification (Imbs and Wacziarg, 2003; Cadot et al. 2011), the factors that drive export diversification are rarely examined in the literature. Determinants of export diversification are particularly interesting in transition economies, considering that transition reforms aim to make structural changes in the economies, including changes in the structure of export. The literature is mainly in agreement that export diversification is an important issue for developing countries. The transition reforms conducted in the former socialist economies changed the system of resource

allocation and, consequently, the export structure as well. Rapid transformation into market economies causes significant changes in export structure as production specialisation according to comparative advantage comes to be incentivised by markets rather than central government. According to Besedes (2011) this is the main reason why we expect to find significant structural changes of exports in transition economies twenty years after the onset of transition. The current literature shows little interest in transition changes and their impact on export structure and export intensity. Hence, it is surprising that there is no paper investigating the factors which influence export diversification in such economies.

2. Definition of export diversification

The literature does not come up with a consistent definition of export diversification. Conceptually, the definition is derived from the way diversification is measured. We argue that the definition should be consistent with the preferred diversification measure. In our study, and in the majority of the other studies, concentration indices are used as a preferred measure of the extent to which a country's exports are diversified. Diversification measured this way is defined as the change in inequality between export shares. Such change is usually a result of the introduction of new export categories in a country's export mix (diversification at the extensive margin) and/or changes in the product share in the existing export mix (diversification at the intensive margin). Hence, as for export growth, diversification may arise at either the extensive and/or the intensive margin.

Unlike most studies, which only quantify overall diversification (usually measured by one or other of the standard concentration indices, such as the Theil index), we argue that it is important to investigate diversification in a more differentiated manner, focusing also on diversification

at the different margins of export growth. Our approach is based on Cadot et al. (2011) – namely, we rely on the decomposition property of the Theil index into the within and between components to capture changes along the intensive and extensive margins of export growth.

By dividing the country's export lines into the two groups of active (denoted by G_1) and inactive export lines (denoted by G_o), Cadot et al. (2011) show that diversification at the intensive margin is captured by the change in the within component of the Theil index (equation 1) and diversification at the extensive margin is captured by the change in the between component of the Theil index (equation 2):

$$\lim_{x_0 \to 0} \Delta T_W = \frac{1}{n_1} \sum_{k \in G_1} \frac{x_k}{\mu_1} ln \left(\frac{x_k}{\mu_1} \right) = \Delta T_{G_1} \qquad (1)$$

where n_1 is the number of active export lines, x_k is the value of export line k and μ_1 is the average value of active export categories.

$$\lim_{x_0 \to 0} \Delta T_b = - \Delta \ln n_1 \qquad (2)$$

The change in the within component measures changes in inequality among the active export lines only and does not include export of new product categories (i.e. diversification at the intensive margin). On the other hand, changes in the between components measure changes in the number of active exporter categories (primarily arising from introduction of new export categories), which refers to changes at the extensive margin.

In all countries in our sample, the intensive margin is dominant in the structure of overall diversification. On average, 75% of the overall diversification can be explained by the diversification at the intensive margin and only 25% by the extensive margin.

3. Literature review

3.1. Review of the theoretical literature

Although diversification of exports proved to be successful in many Asian economies in the early 1970s, theoretical affirmation of diversification came later, in the "new" trade and endogenous growth theories (Krugman, 1979; Grosman and Helpman, 1991; Romer, 1995; Krugman, 1995). The workhorse model in "new" trade theory is the monopolistic competition trade model developed by Krugman (1979). Each variety is produced by identical firms within each industry and exported to all markets as customers prefer variety without any limit. However, the micro data available in the late 1980s and onward indicates remarkable heterogeneity related to productivity and size of firms both between and within industries. Within an industry, there is a tendency that only more productive and larger firms self-select into becoming exporters, as only the most productive ones are able to overcome the cost of export market entry. While the existing trade theories failed to explain those stylised empirical facts, the heterogeneous firm trade model (the HT models) developed by Melitz (2003) offered the most successful explanation of such selection. This *self-selection* mechanism provides a theoretical prediction regarding the relationship between trade costs and aggregate trade. Falling trade costs tend to decrease the export market productivity threshold, having a twofold effect on firms' export decisions. The first round effect is positive, as falling costs will increase the

profitability of exporters and encourage more domestic firms to start exporting. A greater number of exporting firms increases the diversification of a country's exports. In addition, there are negative induced effects as falling costs eases the exports of foreign firms, which increases import competition on the domestic market. With more competition, the domestic sales of all firms will be reduced. However, under the burden of competition the least productive firms exit the market, increasing aggregate productivity on the home market. More productive exporters will recover losses in the domestic market with increased profit from larger export sales

Change in trade costs is supposed to change the exports per firm, but also the set of exporters, causing changes at both the intensive and the extensive margins of trade. Melitz (2003) discusses the effect that changes in trade costs have on the number of exporters (i.e. the extensive margin); however, the model is not explicit regarding the effect that barriers could have on the intensive margin. Later variants of the Melitz (2003) model pay more attention to this issue. We find studies by Lawless (2010) and Chaney (2008), which are interesting for the purpose of our analysis. These studies provide a theoretical framework within which the effect of fixed and variable trade costs on trade margins can be explained. The extensive margin in these studies is represented, respectively, by the number of firms (Lawless, 2010) and the exports of new exporters in a sector (Chaney, 2008), while the intensive margin is captured by average exports per firm (Lawless, 2010) and change in the exports of existing exporters in a sector (Chaney, 2008).

According to Lawless (2010), change in trade costs could change total exports in two ways, by influencing the export productivity threshold and the sales of existing exporters. Increases in both variable and fixed costs should increase the export productivity threshold. A higher productivity threshold will force low-sales firms to exit the market, lowering the number of

firms in the market (extensive margin). However, in the case of the intensive margin, the predictions are not that obvious. On the one hand when low-sales firms are off the market, the higher-sale exporters remain. Such changes should increase export growth at the intensive margins as existing products become more concentrated. On the other hand, the increase in variable costs tends to decrease the sales of all existing exporters, i.e. reducing export growth at the intensive margin. Hence, ambiguity regarding the effect of variable costs on the intensive margin is present: at one end, there is a possibility that the increase in variable trade costs have a positive effect as low-sales firms exit; while at the other end, there is a possibility for a negative effect from decreasing sales of the existing exporters. The effect of fixed costs on the intensive margin is more straightforward. When rising fixed costs are observed, the exporters need to reach a higher productivity threshold. The short-run effect on the sale of existing exporters is absent, since existing exporters have already paid the fixed costs and subsequent changes of such costs have no further influence. However, once fixed assets have to be replaced then the result may be exit.

The definitions of trade margins used in the theoretical models coincide with our definitions and measures of diversification along the margins. Changes in the in(equality) among active export lines (our definition of the intensive margin) is directly related to the average sales per firm and/or size of exporters (the intensive margin in theoretical models). Assuming that firms produce and export differentiated products, higher average sales and/or size of exporters should result in changed distribution of shares of exported products. Under the same assumption, change in the number of firms and the set of exporters in a sector (the extensive margin in theoretical models) corresponds to change in the number of active export lines (our definition of the extensive margin).

From the perspective of development policies, including export diversification, the effect of trade costs is particularly important. Examples of fixed entry costs are costs that arise from expenditure to set up distributional channels, costs of document preparation, port procedures and other bureaucratic work related to exporting. The majority of such costs arise from institutional inefficiency. Poor institutions could be considered as a fixed production costs and a barrier for firms to operate on the market (Do and Levchenko, 2009). The lack of "appropriate" institutional efficiency increases transaction and production costs, raising information and procurement costs (Milner and McGowan, 2013) and causes low supply-price elasticity of traditional exports (Love, 1984). Better institutional quality/efficiency helps producers to adjust their production structures to the international environment and optimally allocate their resources. Consequently, it enhances diversification of economic activities. This effect is potentially highly important for the developing and transition economies, where inefficiencies are highly present and mainly related to bureaucratic obstacles or corruption. At the same time, the transition economies have undertaken extensive reforms to enhance institutional quality.

While fixed costs are a critical factor in firms' decisions to enter the market, change in variable costs determine the behaviour of all exporters, regardless of whether they are incumbents or newcomers. Melitz (2003) assumes that variable costs are of the per, unit "iceberg" type (tariffs, transport costs). However, from Samuelson (1952) iceberg variable costs are usually modelled as an ad valorem tax equivalent. We will follow the study of Irarrazabal et al (2010), that incorporate both iceberg costs and per unit costs in a heterogeneous trade model.

International transport costs and the "psychic" costs of trading across cultures and languages increase with distance, which decreases the firm's profitability from serving more distant markets. The diversification pattern of a country is determined by the transport costs related to distance, as a better geographical position decreases transport costs and helps a country's export.

A review of the current state of knowledge identifies other potential candidates from which the baseline model could be augmented, such as: country size; level of the exporting country's development; and sources of external financing in developing and transitional economies such as aid-for-trade.

Country size, measured either in population terms or GDP could be important for a country's export diversification. A larger population should give rise to a greater potential for diversification due to productivity benefits from economies of scale and a larger pool of potential innovators (Krugman, 1981, Klinger and Leaderman, 2011).

In spite of the fact that heterogeneous trade models do not refer to the exporting country's level of development, empirical studies show that the heterogeneity of the economic structure evolves with the stage of development. According to empirical findings, increasing income per capita of the exporting country is expected to have a positive impact on export diversification at a lower level of development; however, at a higher level of development, further increase in income will support export concentration. Acemoglu and Zilibotti (1997) argue that there are limited diversification opportunities at lower levels of development, because of the scarcity of capital and indivisibility of investment projects. However, the process of adoption and imitation of easily accessible new technologies developed in advanced economies (Imbs and Wacziarg, 2003) increases the level of diversification along with the level of development. In addition, further distance from the technological frontier in poorer countries eases the introduction of new products (Klinger and Leaderman, 2011), although we would suggest that this is dependent on absorptive capacity. As the level of a country's development increases, the country offers more

11

incentives to producers to increase their production mix. However, as a country becomes closer to the technological frontier, many export lines close as a part of regular churning. Richer economies intend to outsource production of certain products that requires endowments that are not very abundant in their home county. That could explain why more developed countries start to re-concentrate at a higher level of development.

Foreign aid constitutes an increasingly important mechanism for the transfer of resources to developing countries in general and to transition countries in particular. Aid helps with the stabilization of transition economies and supports countries' macroeconomic performance, domestic investment predominantly.

Low supply capacity in developing and transition countries precludes firms from benefits from preferential market access to developed countries. This is considered to be the main reason for low export growth and low levels of export diversification in developing countries. To avoid ineffectiveness of multilateral trade reforms, developed countries implemented the aid-for-trade initiative. As the name indicates, aid-for-trade aims to improve different dimensions of countries' trade, to overcome trade-related obstacles and to improve integration of countries into the global trade system. It should help both entrepreneurs and investors to exploit export opportunities. Considering its aim is to help developing countries to expand their export base and, consequently, export diversification, this type of aid is particularly important in the context of our investigation.

Hallaert and Munro (2009) elaborate that the most common objectives of the aid-for-trade Initiative are greater trade, export diversification, maximization of links with the rest of the economy and improvement of the country's capacity to implement trade reform. Survey responses from 84 recipient countries show that export diversification is the main goal recipients want to achieve through aid-for-trade. Donors, on the other hand, consider long-term goals, such

as poverty and growth, to be more important than export diversification. Considering that export diversification should reduce risks and demand shocks, diversification has become more important for donors during the latest economic crisis (OECD/WTO, 2011).

Aid-for-trade consists of the following types of Official Development Assistance (ODA): aid for trade assistance; aid for infrastructure; and aid for building production capacity. All aid-for-trade categories might influence the diversification of countries' export bases, but not all categories are expected to be equally important for diversification. The most important should be aid for building productive capacity, which targets internal, supply–side barriers by improving production capacity to produce goods and services and to invest in new industries and sectors. This category of aid should directly help countries to diversify their exports.

3.2. Review of the empirical literature

Discussion on export diversification in the literature mainly concentrates either on the effects of export diversification or on policy response regarding the diversification process. As the majority of studies find that export diversification increases economic growth, the expected question is what determines export diversification.

The global tendency of declining tariffs has shifted research interest towards the importance of "non-tariff" barriers. While numerous empirical studies (Roberts and Tybout, 1997; Bernard and Jensen, 2004; Bernard et al., 2007) reach general agreement that fixed costs of exporting are essential for the self-selection of heterogeneous firms, studies that examine the significance of such costs for the process of export diversification appeared only very recently (Dennis and Shepherd, 2011; Persson, 2013). Policies which aim to decrease such costs are known in the

literature as "trade facilitation". The study of Dennis and Shepherd (2011) is an empirical implementation of the heterogeneous model from the export diversification perspective. Their results reveal that market entry costs and international transport costs have strongly significant negative effects on export diversification, particularly in a sub-sample of low-income countries. Interestingly, tariffs in importing and exporting countries seem to have no influence on export diversification. Persson (2013) find that there is a positive effect of trade facilitation on the extensive margin of trade, especially in the case of more elastic differentiated products.

A large number of studies (Rodrik et al. 2004; Dollar and Kraay, 2004; Chang and Hong, 2006, Levchenko, 2007) recognize institutions as a source of comparative advantage and important determinants of country's trade. Examining patterns of bilateral trade, Francois and Manchin (2013) find that institutional quality and well developed institutional infrastructure influence not just export levels, but also the probability that export will take place at all (i.e. the extensive margin of trade growth). Observing the effect of the political regime on sectorial diversification, Cuberes and Jerzmanowski (2009) explain theoretically and determine empirically that non-democracy increases sector concentration, by increasing barriers to entry of new firms. Murphy et al. (1993) explain the effect of rent-seeking, one particular form of corruption. According to them, rent-seeking could affect diversification activities due to political reasons, credit constraints faced by entrepreneurs and long-term maturation of new goods. The entrepreneurs have limited investment options if they are not favoured by government and do not have established lobbies. The lack of credit imposes difficulties to cover additional costs, which could arise due to bribes and other form of illegal payments. They also argue that there is greater possibility of rent-seeking in long-term projects such as innovation. Hence, a higher level of

rent-seeking will impede introduction of new products as entrepreneurs will under invest because they cannot reap all of the profit.

Other studies concern the effect of variable costs, such as those associated with distance. Analysis of firm level data confirms the same direction of relationships at the intensive and extensive margin of exports (Lawless, 2010). Most empirical studies find that distance from the major markets is a significant determinant of export diversification (Parteka and Tamberi, 2013; Amurgo-Pacheco and Pierola, 2008). Nonetheless, the magnitude of such relationships is significantly larger for the extensive margin. Bernard et al. (2007) for a sample of US exporters, find a strong negative link between distance and export growth at the extensive margin. However, the sign of the relationship is the opposite in the case of the intensive margin. In Baldwin and Harrigan (2011), distance likewise has a positive impact on the intensive margin. Distance increases trade costs and so sales price and revenue on more distant markets. In turn, this inflates the share of exports to more distant markets and thus affects measures of diversification at the intensive margin.

There is a well-established empirical literature on the diversification-development nexus. The seminal work of Imbs and Waczirg (2003) finds that countries diversify production and employment along the development path up to a PPP-adjusted GDP per capita level of around $9000 in 1985 constant U.S. dollars, when they start to specialize again. This finding initiated a wave of empirical studies aiming to uncover the behaviour of export diversification along the level of development. The semi-parametric and parametric estimation technique of Cadot et al. (2011) and Klinger and Lederman (2011) show that export data follow the same pattern as production. The turning point of the export diversification pattern is occurring at a higher level of development (at PPP-adjusted GDP per capita levels between $22,500- $25,000 in 2000

constant U.S. dollars), indicating that exporting countries diversify their exports most of the time, while specialization brings benefits only to the advanced economies. Semi-parametric estimates by De Benedictis et al. (2009) and Parteka (2010) uncover a non-linear, but monotonically decreasing trend of diversification. Inclusion of country-specific fixed effects, missing in previous studies, seems to account for the differing results. In addition, Cadot et al. (2011) examine the behaviour of export diversification at different margins of export growth during the process of development. They found that while most export growth appears at the intensive margin of export growth, most of the diversification appears at the extensive margin.

Surprisingly, empirical investigation of the impact of aid-for-trade on trade is rather limited. However, the existing studies on the trade effect are more consensual regarding the influence that aid has on trade. Most empirical studies find that aid supports trade (Helble et al, 2012; Vijil and Wagner, 2012; Cali and te Velde, 2011). Morrissey (2006) relies on empirical and case study evidence and concludes that trade facilitation (improved by financial assistance in the form of aid-for-trade) increases imports and exports, even more than trade policy reforms. Gravity specification in Helble et al. (2012) finds a positive and significant effect of aid on trade volume.

Breton and Uexkull (2009) use data on product specific technical assistance for trade to estimate the effect on export of products subject to assistance. They find that technical assistance is more effective for sectors with a higher level of initial exports compared to sectors with a low level of initial exports. To explain the results, the authors argue that obstacles to exporting are more easily identified within existing exports than within new exports. Consequently, assistance could be more effectively allocated to areas that are known to be problematic.

Although a large group of transition economies are significant recipients of trade assistance in the form of aid-for-trade, no empirical studies have been undertaken to investigate the effects

that aid has on trade in transition economies. Only a few studies analyse whether aid achieves its objectives, other than greater trade, or assess its effectiveness for different sub-categories of aid. Surprisingly, there is no empirical study investigating aid effects on export diversification, either total or at the margins.

4. Methodology, model and data

4.1. Data description

Our sample includes an unbalanced panel of data from 62 developing and transition countries in the period 2005-2011. Except for Montenegro, that has data from 2006, data on exports for other countries are available for the entire period observed. We include 22 transition economies, which are analysed separately.

There is no consensus regarding the measurement of trade in the literature. Mirror data are often used as they cover a larger sample of countries. It is considered that mirror data are more accurate, especially for developing countries, as it is monitored more carefully by customs officials. Also, it is expected that imports are reported in more detail to let Customs apply tariffs. On the other hand, mirror data are not free of reporting errors. According to the WTO International Trade Center (ITC), mirror data should actually be used as a second-best solution to complement direct export data. Among the reasons for preferring export statistics stated in Escaith (2012) are inadequate coverage of non-reporting countries (in particular intra African trade), problems of trans-shipments and inclusion of transportation and insurance costs, which are excluded from export costs (imports are valued Cost, Insurance and Freight – CIF; and direct exports free on board - FOB). Also, in countries with high tariffs and weak customs monitoring capabilities, traders could deliberately underestimate the value of imports or declare the product

under a product heading with a lower tariff to avoid tariffs (Ferratino and Wang, 2008). Export data can be more accurate when trade takes place within a customs union and when exporters have a strong incentive to receive a rebate on taxes or duty paid for imported goods subsequently exported in the same or a different form (Escaith, 2012). Another case when mirror data should be used with caution is related to panel data design. Considering that the number of reporting countries could differ over the years, this requires cautious use of mirror statistics for time comparisons.

For trade costs to be consistent, it is important that trade is valued at FOB and not at CIF prices (Arvis et al, 2013). Since one of the main variables of interest in our analysis is trade costs, we use export diversification measured with direct export data as a benchmark. However, we complement the results by additionally analysing export diversification calculated with mirror data.

Indicators of export diversification are calculated by using the 6-digit level of the Harmonised System (HS) data from COMTRADE, 1996 revision, which recorded data on 5113 export lines. Since COMTRADE does not report inactive export lines, firstly we identify inactive lines in all countries and all years and then we assign them zero values. Hence, we have a harmonized sample size, with 5113 export lines in total. Domestic market entry and export costs are taken from the World Bank *Doing Business* database. Aid data are taken from the Creditor Reporting System (CRS) database, collected by the OECD. Aid commitments are used since disbursements are not systematically reported by international financial institutions to the CRS, which are an important source of financing in developing and transition economies.

Detailed description of each variable, data sources, and descriptive statistics are provided in Table 1 (Appendix 1).

4.2. Model and empirical methodology

Building on the theoretical discussion, the following model is specified to investigate determinants of export diversification at the both extensive and intensive margin:

$$DIV_{it} = \beta_1 + \beta_2 (DIV)_{i,t-1} + \beta_3 (sbcost)_{i,t} + \beta_4 (excost)_{it} + \beta_5 (tariff)_{i,t} + \beta_4 (dist)_i +$$
$$+ \beta_5 (gdppc)_{i,t} + \beta_6 (aidprod)_{i,t} + \beta_7 (othercontrols)_{i,t} + \beta_8 \theta_t + \mathcal{E}_{i,t} \qquad (5.1)$$

The dependent variable (DIV_{it}) is the indicator of export diversification for country *i* (exporting country) and time *t*. The first set of variables included account for the factors identified in heterogeneous trade theory: *sbcost*$_{i,t}$, which correspond to domestic market entry costs; *excost*$_{i,t}$ and *tariff*$_{i,t}$ which refer to international trade costs; *dist*$_i$ to proxy for other international transport costs; and *gdppc*$_{i,t}$[1] to control for technology in the exporting country. As explained earlier, the HT theory predicts that domestic entry and trade costs should have negative effects on diversification at the extensive export margin while the effect of technology is expected to be positive. However, there is no theoretical guidance on the direction of the diversification effects of such variables at the intensive margin, as theory yields no prediction as to how the distribution of export volumes will change when costs or technology changes. *Aidprod*$_{i,t}$ accounts for aid for production capacity.

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[1] Although the literature suggests re-concentration of exports at higher level of development, sample plots show that diversification tends to strictly increase with the level of development. Of course, we tested for the possibility of re-concentration in our sample by including GDP^2 in our models reported below, but find it to be not significant. Moreover, inclusion/exclusion of the squared term does not alter other estimates or their levels of significance.

Another set of variables, (othercontrols)$_{i,t}$ are additional variables identified in the literature as important determinants of the diversification process. These are *population$_{i,t}$* (to account for economic size), inflation (*inflation$_{i,t}$*) and the government budget deficit (*govbalance$_{i,t}$)*. The two latter variables measure macroeconomic stability, which is a particularly important question for developing and countries in transition and are usually included in empirical studies with a focus on these countries.

Based on the review of empirical literature, there is an additional list of issues that it is desirable to deal with in the empirical investigation of the relationship between export diversification and trade facilitation measures for a panel of countries; namely: dynamics of the export diversification process; the potential endogeneity of trade facilitation measures and aid for trade; time invariant and slowly changing variables (distance, entry and export costs); and country heterogeneity.

Since the persistence of trade relationships is well discussed in the literature, starting from Eichengreen and Irwin (1996), it is realistic to expect that history is important in shaping a country's export structure. Another issue, the potential endogeneity of entry and export costs and aid for trade is already discussed in the literature (Dennis and Shepherd, 2011; Cali and te Velde, 2011; Knack and Smets, 2013). Endogeneity of costs could arise from reverse causality between export diversification and costs. The argument for reverse causality comes from political economy: more diversified exporters tend to lobby for a reduction of trade costs. Endogeneity of aid for trade potentially arises from reverse causality that could be explained through the political dimension of aid and/or selectivity in aid allocation. Politics is involved in aid distribution through lobbing groups and rent-seeking activities in donor and recipient countries associated with partners' trading interests. Some studies relate aid to the level of democracy, but findings are inconclusive (Djankov et al., 2008; Heckleman, 2010). Selectivity

arises if aid is allocated to countries with which the donor has developed trade relationships (particularly if the recipients are significant consumers of export goods from the donor country or are the donor's former colonies). The argument is that donors could better recognise the need for trade reforms in trading partner countries than in unknown markets. Conversely, aid could be allocated in order to promote undeveloped trade between recipient and donor countries. In the literature, the endogeneity of aid for trade is usually connected to the problem of tied aid. Selectivity bias could arise as more aid is transferred to the countries where is easier to tie aid (Knack and Smets, 2013). These are all reasons to suspect potential aid endogeneity. Selectivity could appear in the choice of sector, not just countries, when a better performing sector receives more aid for trade than do other sectors. According to Cali and te Velde (2011), aid for productive capacity building is especially subject to selectivity, which will generate an upward bias in the aid coefficient if aid is intentionally directed to better performing sectors.

In order to address these problems we opt for Generalized Method of Moments (GMM) estimation. GMM is desirable since it gives the possibility to exploit internally generated instruments for endogenous variables, since external instruments for transition countries are either lacking or not applicable. Internal instruments enable us to address both the inherent endogeneity of the lagged dependent variable, which captures the history of the process giving rise to current levels of our dependent variable, and the potential endogeneity of the independent variables discussed in the previous paragraph. Two widely used approaches are difference GMM and System GMM developed by Arellano and Bover (1995) and Blundell and Bond (1998), respectively. The former approach is based on first-differencing the model so as to remove any country or sector specific effects. Difference GMM often has a problem with weak instrumentation, because past levels may convey little information about future changes, so that untransformed lags are weak instruments for transformed variables (Roodman, 2009).

Moreover, since some variables in the model are time invariant (e.g. distance) or change slowly over time (entry and export costs), application of difference GMM will not identify these variables (Roodman, 2009). Finally, difference transformation magnifies gaps (Roodman, 2009), which is of some importance given our data set. The potential pitfalls warrant the use of System GMM, which combines in a system the equation in first-differences with an equation in levels. By adding the equation in levels to the system and exploiting the corresponding additional moment conditions, Blundell and Bond (1998) and Blundell et al. (2000) found better finite sample properties compared to difference GMM in terms of bias and root mean squared error   .

In order to check the validity of the instruments in GMM estimation, Arrellano-Bond Serial Correlation tests (m1 and m2) are conducted. Tests for residual correlation, m1 and m2, test the null hypothesis of no first and second order autocorrelation in the error in the first difference equation, respectively. Since the errors in the levels are not correlated, it is expected to find significant first-order serial correlation in the first-differenced error term (tested by m1) and no significant second-order correlation in the first-differenced error term (tested by m2). The expected absence of second-order serial correlation is confirmed in each specification, indicating instrument validity. In addition, we report Hansen/Sargan statistics ,which test the orthogonality condition of each over-identifying instrument. The result of the Hansen test of instrument validity, and of the difference-in-Hansen tests of the exogeneity of the instrument subsets, indicate that the overidentified instruments are valid in the two-step system GMM estimation. Whether the additional subset of instruments in system GMM is valid depends on the "steady state" assumption, which requires that there is no correlation between changes in the instrumenting variables and the fixed effects. The results of the difference-in-Hansen diagnostic indicate that the "GMM instruments for levels", the additional set of instruments for system GMM, are valid and, in addition, there is no undue problem with cross-section dependence in

our data. Therefore, we conclude that our model is well specified and proceed with the interpretation and discussion of our estimates.

5. Main results

Our analysis is comprised of two parts: first, we estimate a model for a full sample of aid recipient developing and transition countries; and then we proceed to analyse transition countries only. Export diversification is preferably measured using direct export data reported by countries (Table 1). However, it is complemented by using mirror import data reconstructed from data reported by their trade partner.[2] For the results to be comparable, we introduce into the respective sample only those countries for which both type of trade data are available. Table 1 presents the results of GMM estimation of model (1) for diversification along the extensive and intensive margins (measured by the between and within components of the Theil index, respectively) together with overall diversification (measured by the total Theil index), firstly for the whole sample and then for the transition countries only.

Table 1 here

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[2] The results of this additional analysis are available on request

The diagnostic tests indicate that the model is correctly specified, endogeneity is treated with valid instruments and, hence, that it is safe to use system GMM estimation. Note that the Theil index measures concentration; hence, positive signs on estimated coefficients indicate negative effects on diversification (e.g. costs); conversely, negative signs indicate positive effects on diversification (e.g. aid).

The results suggest that export diversification is highly persistent, but dynamically stable (with the lagged coefficient below one in each specification. Diversification at the intensive margin in transition economies exhibits stronger persistence than does diversification at the extensive margin (between the respective regressions, the 99% confidence intervals for the estimated coefficients on the lagged dependent variables do not overlap). It is plausible that there is less persistence in opening up new export lines than in existing export lines; yet, we do not find this in the larger sample (in this case, the confidence intervals do overlap).

In both samples, we find that a number of factors are important for diversification at the different export margins. The general conclusion is that costs of domestic market entry (fixed costs – i.e. of setting up the business) and trade facilitation measures (with elements of fixed and variable costs) rather than tariffs and distance are significant for export diversification. More precisely, domestic market entry costs discourage diversification at both margins, while trade facilitation costs appear as diversification impediments only at the intensive margin. In terms of the magnitudes of the estimated coefficients for large sample, the results shows that if starting business costs increase by 1 percentage point, the between and the within component of the Theil index (i.e. extensive and intensive margin) is expected to increase by 0.0013 and 0.0018, respectively. The results for transition sample (the left-hand panel of Table 1) show that increase in starting costs by 1 percentage points tend to increase concentration at the extensive and intensive margin as indicated by respective increase in the between and the within component

24

of Theil index by 0.0018 and 0.003. When evaluated in terms of economic significance the effects is larger for extensive margin.[3]   Increase of export costs by 1\$ tend to increase the within component of the Theil index by 0.00015 in developing and transition sample and by 0.00027 in transition sample only (Table 1). .

Conversely to the intensive margin, which primarily reacts to domestic and foreign market entry costs, the extensive margin might be more related to the degree of product differentiation and quality rather than to costs of markets entry as such. Overall, domestic market entry costs are important for both margins and export costs influence the intensive margin only. The effect of domestic market entry costs on the extensive margin is in accordance with findings in the literature (Helpman et al., 2008; Dennis and Shepherd, 2011). Also, in line with our findings, the previous literature identifies difficulties associated with business start-up to be one of the major reasons for economic difficulties in some transition countries (Sanfey and Zeh, 2012).

The total Theil might reflect the changes on either or both margins. For example, findings on the positive and significant effects of both type of costs in the model with overall diversification indicate the possibility that overall diversification picks up the effects of both margins. This could be expected considering that, by construction, the total Theil (measure of overall diversification) is the aggregate measure of the within and the between Theil (measure of diversification at the margins).

Variable (per unit) costs such as tariffs and international trade costs such as distance have little influence either on the number of products or the distribution of exported quantities. This finding

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[3] As an illustration, the average value for the extensive margin in large sample is 1.218, therefore 0.0012 (β coefficient) is 0.1% of extensive margin mean; the average value for the intensive margin is 3.678, therefore 0.0018 (β coefficient) is 0.05% of the intensive margin mean value.

is in accordance with discussion in the recent literature suggesting that the effect of trade facilitation and removal of non-tariff barriers on trade exceed the effect of lowering tariff barriers (Schiff and Winters, 2003; Baldwin, 2011). Considering the global tendency of declining tariffs (for manufactures in particular), we would expect that measures other than tariffs are becoming more significant impediments for trade.

Another important finding is that one of the categories of aid for trade, aid for production capacity, appears to be important for export diversification. Aid has a positive effect on diversification at the extensive margin across the both the full sample and the transition subsample. Conversely, the effect at the intensive margin is only significant for the full sample. As we expect that the aid has a diminishing effect, we include aid in logarithmic form. For a 10% increase in aid for trade in sample of developing and transition countries, the between and the witihin Theil index will reduce by 0.0036 and 0.0071, respectively. When evaluated in terms of economic significance the effects is larger again for extensive margin. Economic significance of aid is considerably smaller in transition countries in comparison to larger sample, with the between Theil reduced only by 0.00001 for a 10% increase in aid (Table 1).

Aid for productive capacity encourages export diversification by improving production capacity to produce goods and to invest in new industries and sectors. The literature suggests that developing countries are required to increase productive capacity and to expand the range of produced and traded products in order to benefit from integration into global markets. The IMF (2002) argues that consistent trade policies should create market opportunities for developing countries and development policies should allow them to use these opportunities. This is consistent with the situation in transition economies, which have low productive capacity and any improvements could make a significant difference, as our data confirms

Control variables have a pervasive effect on diversification at both margins, being more significant at the extensive margin. The level of development proxied by per capita GDP is only important for changes at the new product margin. Countries in our sample are less developed and accordingly have greater distance from the technological frontier, which eases the introduction of new products along the level of development (Klinger and Leaderman, 2011). Increasing GDP per capita is usually linked with dynamic changes regarding the quality of institutions, human capital and the business environment in general, which all together favour greater heterogeneity of economic structure. Also, the process of adoption and imitation of easily accessible new technologies developed in advanced economies (Imbs and Wacziarg, 2003) increases the level of diversification along with the level of development. Country size, measured in population terms is also important for the new product margin, but only in transition countries.

Macroeconomic stability is more important for diversification in transition countries. Higher inflation results in a more unequal distribution of the exported values, but promotes expansion of the export range. Higher rates of inflation are not necessarily a sign of macroeconomic instability. According to the Balassa-Samuelson effect, rapid productivity growth is associated with catch-up, which is characteristic of successful developing and transition economies, and gives rise to corresponding wage increases in the traded good sector. On the one hand, rapid productivity growth increases the flow of new products that pass the productivity threshold for profitable export and so increase overall export diversification at the extensive margin. The effect of rising productivity on diversification along the intensive margin is ambiguous, because it depends on the incidence of productivity increase on the various existing export lines. On the other hand, on the assumption of a unified labour market, the wage increases accompanying rapid productivity growth are transmitted to the non-traded goods sector, which typically has a substantially lower rate of productivity growth. This results in price rises in the non-traded sector

27

and, hence, in the general price level. However, this correspondingly higher rate of domestic inflation is not a threat to export price competitiveness, because it arises from dynamism of the traded good sector, not macroeconomic instability. A number of empirical studies have found that the Balassa-Samuelson effect holds for transition countries (Mihaljek and Klau, 2008).

We obtain somewhat different estimates when mirror data is used[4]. However, in these estimates tariffs significantly influence diversification, showing that larger tariffs promote concentration.

The importance of tariffs for trade measured by mirror data rather than by export data should not come as a surprise. Tariffs are usually paid by importers and the value of imports is sometimes deliberately underestimated by traders to avoid tariffs or the product is declared under a product heading with a lower tariff (Ferratino and Wang, 2008). So, finding that tariffs show up as significant for imports, but not for the corresponding exports could indicate that the estimated tariff effects are picking up such displacement effects.

Our findings highlight that it is important to distinguish between the sources of concentrated exports at both margins in order to develop correspondingly differentiated policy measures. Considering evidence that domestic market entry and foreign export costs as well as aid for trade determine export diversification in developing and transition countries government should suggests a more active approach to trade facilitation measures and reduction of domestic entry costs to promote diversification. Although it is more challenging for developing than for developed countries to influence trade costs and the cost of domestic entry, this is a highly recommended policy option for countries that aim to expand the range of exported goods and/or to achieve a more equal spread of exported goods. This suggests a quest for complementary

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[4] Results are available on request

policies such as implementation of institutional reforms and trade facilitation measures. Governments in developing and transition countries should be aware that a large bureaucratic apparatus discourages entrepreneurship and is typically associated with exports concentrated on fewer products. The finding that tariffs and transport costs do not significantly influence diversification at either margin suggests reinvestigation of the current position of tariffs in the development and trade literature.

Similarly, findings that one of the categories of aid for trade, aid for production capacity, supports diversification provide an opportunity to revisit the role of aid. Along with internal reform, countries can make more use of aid-for-trade to diversify their exports. In particular, aid for building productive capacity is an important development instrument that can help developing and transition countries to integrate into the global markets through initiatives to build productive capacity in recipient countries.

5.1. Robustness checks

We provide a battery of robustness checks. For the sake of simplicity, we test just one aspect of the estimation at a time. Checks include controls for additional independent variables as well as use of alternative definitions and measurements of diversification, trade costs and aid.

5.1.1. Changing control sets

We carried out additional tests to check whether our findings for developing and transition countries are robust to control for additional variables considered to shape the countries' economic structure.

It is widely established in the literature the export structure could be influenced by the abundance of natural resources. Sachs and Warner (1995) develop the "natural resource curse" hypothesis, which assumes that countries abundant in natural resources concentrate their production in natural resource sectors and are less incentivised to develop manufacturing sectors. Considering that countries in our sample are heterogeneous in terms of natural resource abundance, which range from very resource rich (Azerbaijan, Kazakhstan, Uzbekistan) to very resource poor (Moldavia, Georgia and Monetnegro), we control for this heterogeneity by including a measure of natural resource rent.

We also include different types of institutions as an additional variable in our model. Institutional failures can constrain countries to concentrate on a narrow set of products. This is particularly the case for transition countries that inherit inefficient, large businesses and very poor experience of promoting new business formation.

And, finally, we account for foreign direct investments (FDIs), which are, in addition to aid, another potential determinant of export diversification in these countries. Unlike market-seeking or horizontal investments, which are oriented towards the domestic market primarily, the host country's exports are expected to be primarily influenced by efficiency-seeking or vertical investment as they aim to decrease production costs (Harding and Javorcik, 2010). If efficiency-seeking investments are entering the non-traditional sector and producing goods different than other export firms in the host country, it is expected to diversify the export structure of the host country. In addition, FDIs could support diversification of exports by spillover effects on domestic companies. On the other hand, if investments are directed to the already export-

oriented sector, or aim to exploit natural resources, then the concentration of exports is more likely to rise

Table 2 presents the results of the baseline model with aggregate data for developing and transition countries together and Table 2 in the Appendix for transition countries only, in both cases augmented for natural resources, institutional quality (rule of law and corruption) and foreign direct investment.

Table 2 here

The results are very similar to the baseline results. All variables of interests (costs and aid for trade) retain the same sign and very similar significance and magnitude as in the baseline estimation.

In changing control sets for the transition country sample, the most notable change is that, aid becomes more significant for diversification at the extensive margin when the level of corruption is controlled for. This is expected as, in less corrupted countries, it is more likely that aid is allocated for productive purposes and less to corrupted officials. Furthermore, the results indicate that natural resource abundance is associated with more concentrated exports at the intensive margin.

5.1.2. Different measures of diversification, costs and aid

Another set of robustness checks is obtained by using an alternative measure of the dependent variable, the Hirschman-Herfindahl index (HHI), as well as of the main independent variables. Table 3 presents estimated results for the full sample of developing and transition countries (Appendix Table 3 for transition countries only).

Table 3 here

First, we use the Hirschman-Herfindahl index (HHI) as an alternative export diversification measure. Based on the results from Table 5.13, it is clear that the HHI results are very similar to the results from the baseline estimation with the intensive margin as the dependent variable. The estimated signs are the same and the main variables, export costs and aid, remain statistically significant. The coefficients are smaller, but this is a scaling effect (the Theil ranges from 0 to 8, the HHI from 0 to 1).

Next, we follow a proposition in the literature (Klinger and Lederman, 2006; Dennis and Shepherd, 2011) that the number of official procedures to enter the market may equally or even more accurately capture the full costs of bureaucratic obstacles to market entry than do the corresponding cost data. Hence, instead of cost data, we employ other Doing Business data on the number of documents required to start a business and to export goods. The coefficient on procedures gives the same sign and statistical significance as the coefficients on costs the baseline model. The only difference is the loss of statistical significance of aid in the regression for the intensive margin.

Another approach to checking the robustness of our findings is to redefine aid for trade. First, we use the OECD/WTO (2013) definition and include business and banking services and tourism in the "aid for building productive capacity" category. The results for the extensive margin do not alter much in comparison to the baseline model in Table 1, with the same sign

32

and level of statistical significance for costs and aid. However, aid defined in this way does not exhibit a statistically significant effect on diversification at the intensive margin. This may indicate that improvement of trade regulation and banking services are more important for the number of new export lines and business activities in general than for change in the volume of existing exports.

Thanks to the extensive data set provided in CRS, we are able to analyse aid by different flows (loans and grants). In the baseline model, we use total Official Development aid (ODA), which could be classified as loans or grants. ODA is classified as grant if it does not have any pay-back duties and does not incur any debt. For loans to be classified as ODA, they must have more than a 25 percent grant element. Here we will distinguish between loans and grants to see whether these flows have different effects on diversification. The results show that only grants are significant for the extensive margin, while loans do not have a significant impact on either margin. Observing them individually, these categories are rather small, which could be a reason for their lack of significant effect.

The consistent findings are two-fold: that reducing costs of entry increases export diversification at the extensive margin – i.e. the number of lines exported; and that aid for productivity capacity also helps.

6. Conclusion

Estimating one model for diversification may not be adequate and more information can be obtained if diversification is analysed at both export margins. The previous literature mainly uses aggregate concentration indices as diversification measures and often interprets them as measuring the expansion of the export range (i.e. the extensive margin). As the nature of concentration indices is explored, we demonstrate that overall diversification might hide differentiated developments at the export margins or pick up the effect from just one of the margins. Accordingly, we utilise the decomposition property of the Theil index, which allows us to distinguish diversification along both the intensive and extensive margins. We find evidence consistent with this argument in our empirical analysis. In our sample, the total Theil index predominantly picks up changes at the intensive margin, which confirms previously expressed doubts concerning the interpretation of aggregate indices.

Although we identify a growing body of literature focused on the extensive margin, the literature focused specifically on the intensive margin is still undeveloped. To contribute to closing this gap in the literature, we appeal to an extension of the Melitz (2003) model (Chaney, 2008; Lawless, 2010) that provides insights into factors that influence changes at the intensive export margin. This enables us to augment Melitz's approach to create a theoretical framework to analyse the determinants of both the intensive and the extensive margins.

Our results from 6-digit data for developing and transition countries reveal somewhat different sets of determinants for diversification at different export margins. While the costs of domestic market entry (fixed costs) are impediments to diversification at both the intensive margin and, even more so, at the extensive margin, the export costs that are part of trade facilitation measures (with elements of fixed and variable costs) impede only diversification at the intensive margin. Conversely, variable costs (such as tariffs) and international trade costs (such as distance) do

not have a significant impact on diversification of countries' exports. This finding is in accordance with discussion in the recent literature suggesting that the effect of trade facilitation and removal of non-tariff barriers exceed the effect on trade of lowering tariff barriers (Schiff and Winters, 2003; De, 2006; Baldwin, 2011). Considering the global tendency of declining tariffs (for manufactures in particular), we would expect that trade facilitation indicators (i.e. entry and export costs) rather than tariffs are becoming more significant impediments to trade.

Another important aspect and novelty of our analysis is the investigation of the effectiveness of aid for diversification at both export margins. We use the narrow definition of aid directed to build productive capacity, which consists of the aid categories directed at particular sectors in the economy to enable them to diversify production and exports. Aid is shown to be an effective tool for enhancement of diversification at the extensive margin in both samples; however, when the intensive margin is observed, the significant diversification effect is observed only for the whole sample, but not for the transition subsample. Overall, aid for productive capacity encourages export diversification by improving productive capacity in trade-oriented industries and trade activities by domestic firms, especially by increasing the variety of exports.

More generally, our findings are consistent with "new industrial policy" arguments that trade promotion requires not only liberalization but accompanying supply-side and institutional reform (Rodrik et al. 2004; Do and Levchenko, 2009).

Our results proved to be robust when we include additional independent variables as well as alternative definitions and measurements of diversification, entry and export costs and aid.

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Table 1. System GMM estimates of the model (1)

Dependent variables: The between Theil as a measure of the extensive margin in Columns (1) and (4); the within Theil as a measure of the intensive margin in Columns (2) and (5); the total Theil as a measure of the overall diversification in Columns (3) and (6)

Sample	Developing and transition			Transition		
Diversification	Extensive	Intensive	Overall	Extensive	Intensive	Overall
VARIABLES	(1)	(2)	(3)	(1)	(2)	(3)
L.diversification	0.810***	0.879***	0.894***	0.355**	0.740***	0.759***
	(0.0395)	(0.0580)	(0.0559)	(0.165)	(0.141)	(0.153)
Starting Business	0.0012***	0.0018*	-0.0004	0.0018**	0.003***	0.0035***
Costs	(0.000443)	(0.00102)	(0.00131)	(0.0008)	(0.0012)	(0.00096)
Export Costs	-0.0000200	0.000153**	0.000133**	-0.000053	0.00027***	0.00024**
	(0.000068)	(0.000064)	(0.000054)	(0.000056)	(0.00011)	(0.00009)
Distance	-0.0000052	0.0000044	0.0000017	0.000028	-0.000009	0.0000079
	(0.000006)	(0.000006)	(0.000007)	(0.00002)	(0.000021)	(0.00003)
Tariffs	0.00732	0.00366	0.0199*	0.00464	-0.0193	-0.0136
	(0.00732)	(0.0115)	(0.0108)	(0.0115)	(0.0294)	(0.0385)
Population	-9.12e-11	1.36e-10	-1.29e-10	-6.1e-10***	4.59e-12	-1.86e-10
	(6.61e-11)	(1.17e-10)	(1.27e-10)	(1.90e-10)	(1.39e-10)	(3.03e-10)
Gdppc	-0.00002**	0.000009	0.000006	-0.0001***	-0.00001	-0.00004
	(0.000012)	(0.0000148)	(0.0000184)	(0.000028)	(0.000029)	(0.000047)
Inflation	-0.0000735	0.00213	0.00128	-0.00501**	0.00677**	0.0019
	(0.00131)	(0.00187)	(0.00225)	(0.0024)	(0.0028)	(0.0032)
Government balance	0.00412*	0.00264	0.0126**	0.0118	0.0249**	0.0261**
	(0.00223)	(0.00363)	(0.00495)	(0.0109)	(0.00988)	(0.0134)
Ln(Aid for	-0.0381**	-0.0743**	0.0128	-0.00038**	0.00055	-0.00014
production capacity)	(0.0180)	(0.0386)	(0.0527)	(0.00016)	(0.0006)	(0.0006)
Time dummies	*Included*	*Included*	*Included*	*Included*	*Included*	*Included*
_cons	0.412**	0.422	0.245	0.932***	0.489	0.752

	(0.176)	(0.333)	(0.358)	(0.233)	(0.435)	(0.723)
N	337	337	337	128	128	128
AR(1) *p-value*	0.0054	0.00024	0.000336	0.049	0.045	0.046
AR(2) *p-value*	*0.0919*	*0.960*	*0.987*	0.226	0.280	0.220
Hansen test *p-value*	*0.723*	*0.789*	*0.644*	0.784	0.520	0.506
Number of groups	62	62	62	22	22	22
Number of instruments	38	42	52	21	21	21

Standard errors in parentheses * p ≤0.1, ** p ≤ 0.05, *** p ≤ 0.01

Table 2. Changing control set for full sample of developing and transition countries subsample

Dependent variables: The between Theil as a measure of the extensive margin in Columns (1), (3), (5), (7) and (9) ;
The within Theil as a measure of the intensive margin in Columns (2), (4), (6), (8) and (10)

Controls	Natural resources		Rule of law		Control of corruption		Foreign direct investments	
Export diversification	**Extensive**	**Intensive**	**Extensive**	**Intensive**	**Extensive**	**Intensive**	**Extensive**	**Intensive**
VARIABLES	**(1)**	**(2)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**
L. export	0.885***	0.861***	0.800***	0.895***	0.869***	0.890***	0.816***	0.890***
diversification	(15.01)	(12.77)	(18.10)	(15.78)	(0.0763)	(0.0567)	(18.15)	(16.88)
Starting	0.00088**	0.0017	0.0012**	0.0016*	0.00104**	0.0019*	0.0012***	0.002**
Business Costs	(1.99)	(1.56)	(2.27)	(1.75)	(0.00053)	(0.00102)	(2.96)	(2.39)
Export Costs	-0.000048	0.0002**	-0.00001	0.0002***	-0.00002	0.00016***	-0.00002	0.0001*
	(-0.79)	(2.45)	(-0.14)	(2.98)	(0.000065)	(0.00006)	(-0.38)	(1.94)
Distance	-0.0000005	0.000004	-0.000004	0.000007	-0.0000001	0.000003	-0.000006	0.000006
	(-0.10)	(0.72)	(-0.65)	(1.21)	(0.000004)	(0.00000)	(-1.00)	(0.89)
Tariffs	-0.0016	0.0054	0.0086	-0.0014	0.0009	0.0035	0.0059	-0.0006
	(-0.17)	(0.41)	(0.96)	(-0.11)	(0.0101)	(0.0115)	(0.76)	(-0.07)
Population	-7.39e-13	1.05e-10	-9.42e-11	1.10e-10	-1.10e-11	1.50e-10	-1.06e-10	1.85e-10
	(-0.01)	(0.76)	(-1.28)	(1.19)	(1.10e-10)	(1.16e-10)	(-1.57)	(1.50)
Gdppc	-0.00003***	0.000007	-0.000026	0.0000044	-0.00003*	0.00001	-0.00002*	0.000003
	(-2.61)	(0.44)	(-1.64)	(0.38)	(0.000017)	(0.00001)	(-1.80)	(0.17)
Inflation	0.000275	0.00174	-0.000024	0.00271	-0.000277	0.00202	0.000125	0.00328*
	(0.15)	(0.90)	(-0.02)	(1.47)	(0.00179)	(0.00176)	(0.10)	(1.89)
Government	0.00174	0.00154	0.00423*	0.00353	0.00216	0.00210	0.00454**	0.0015
balance	(0.74)	(0.41)	(1.85)	(0.86)	(0.00341)	(0.00355)	(2.02)	(0.42)
Aid for production	-0.0622**	-0.0686*	-0.0438**	-0.0562*	-0.0581**	-0.0671*	-0.0339**	-0.083***
capacity	(-2.00)	(-1.73)	(-2.46)	(-1.65)	(0.0294)	(0.0379)	(-2.11)	(-2.65)
Time dummies	*Included*	*Included*	*Included*	*Included*	*Included*	*Included*	*Included*	*Included*
Natural	0.00102	0.00202						
resources	(0.80)	(0.59)						
Rule of law			0.0297	0.0917**				
			(0.52)	(2.23)				
Control of corruption					0.0643	0.0313		

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
						(0.0592)	(0.0392)	
FDIs							-0.00041	0.000545
							(-0.68)	(0.75)
_cons	0.460***	0.440	0.449**	0.344	0.467**	0.366	0.423**	0.427
	(2.88)	(1.38)	(2.03)	(1.34)	(0.208)	(0.311)	(2.27)	(1.60)
N	337	337	319	319	337	337	331	331
AR(1) p-values	0.00567	0.000330	0.00580	0.000490	0.00596	0.000239	0.00565	0.000243
AR(2) p-values	0.206	0.955	0.122	0.952	0.239	0.941	0.0742	0.948
Hansen test *p-value*	0.814	0.752	0.643	0.792	0.626	0.821	0.743	0.909
Number of groups	62	62	62	62	62	62	62	62
Number of instruments	39	43	39	39	33	43	39	43

*Standard errors in parentheses * p ≤0.1, ** p ≤ 0.05, *** p ≤ 0.01*

Table 3. Different measures of diversification, costs and aid (developing and transition countries)

Dependent variables: The HHI as a measure of diversification in Column (1); the between Theil as a measure of the extensive margin in Columns (2), (4), (6), and (8) and the within Theil as a measure of the intensive margin in Columns (3), (6), (7) and (9)

		Proxy for costs: number of procedures to start business and documents to export		OECD/WTO definition of aid for production capacity		Aid grants		Aid loans	
Export diversification	HHI index	Extensive	Intensive	Extensive	Intensive	Extensive	Intensive	Extensive	Intensive
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
L. export	0.770***	0.971***	0.860***	0.838***	0.890***	0.829***	0.884***	0.801***	0.898***
diversification	(0.114)	(0.0671)	(0.0422)	(0.0802)	(0.0534)	(0.0392)	(0.0936)	(0.0888)	(0.0565)
Starting Business Costs	0.000103	0.0133**	-0.0259	0.00145**	0.00234*	0.00171***	0.00250*	0.000216**	0.000699
	(0.000239)	(0.0054)	(0.0182)	(0.00069)	(0.00135)	(0.00049)	(0.00138)	(0.000099)	(0.00115)
Export Costs	0.0000236*	-0.0121	0.0606***	0.000012	0.00009*	-0.00004	0.00016**	0.00014**	0.00007*
	(0.0000121)	(0.0160)	(0.0230)	(0.00003)	(0.00005)	(0.00004)	(0.00008)	(0.000057)	(0.00004)
Distance	0.0000014	-0.000003	0.00001	-0.000007	-0.000004	-0.0000027	-0.000003	-0.000012*	0.000003
	(0.000002)	(0.000004)	(0.0000075)	(0.00000515)	(0.00001)	(0.000006)	(0.000007)	(0.000011)	(0.000006)
Tariffs	0.00405*	0.00355	0.00132	0.00269	-0.00179	-0.00111	-0.00437	0.0105	0.0119
	(0.00224)	(0.00725)	(0.00936)	(0.0104)	(0.0175)	(0.00539)	(0.0132)	(0.0101)	(0.00965)
Gdppc	2.08e-11	9.77e-12	-1.06e-10	-3.48e-11	7.22e-11	-7.43e-11	4.23e-11	4.76e-11	2.80e-12
	(2.92e-11)	(5.68e-11)	(1.22e-10)	(8.94e-11)	(8.47e-11)	(5.84e-11)	(1.05e-10)	(1.18e-10)	(7.51e-11)
Population	-0.00000215	-0.0000114	0.000005	-0.000018**	0.000024	-0.00002**	0.000037*	-0.000022	0.0000175
	(0.00000268)	(0.0000158)	(0.000016)	(0.000008)	(0.0000254)	(0.0000116)	(0.000022)	(0.000026)	(0.000012)
Government	0.00044	-0.000997	0.0039**	-0.00047	0.00426**	-0.00032	0.00242	-0.00085	0.005*
balance	(0.000562)	(0.00171)	(0.00179)	(0.00162)	(0.00196)	(0.00157)	(0.00225)	(0.00210)	(0.00257)
Inflation	0.00274*	0.00169	0.00607*	0.00279	0.00431	0.00410*	0.00342	0.00400	0.00781*

	(0.00158)	(0.00241)	(0.00336)	(0.00284)	(0.00359)	(0.00247)	(0.00400)	(0.00362)	(0.00402)
LnAid for production	-0.0163*	-0.0345*	-0.0145	-0.0424*	-0.0298	-0.0692***	-0.00583	-0.00353	-0.0244
	(0.00978)	(0.0183)	(0.0318)	(0.0237)	(0.0482)	(0.0260)	(0.0490)	(0.0272)	(0.0179)
Time dummies	*Included*	*Included*	*Included*	*Included*	*Included*	*Included*	*Included*	*Included*	*Included*
_cons	0.0402	0.194	0.319	0.368**	0.288	0.486***	0.130	-0.0146	0.171
	(0.0435)	(0.205)	(0.283)	(0.148)	(0.295)	(0.156)	(0.391)	(0.181)	(0.188)
N	328	337	337	336	336	337	337	337	337
AR(1) *p-value*	0.0408	0.00567	0.000119	0.0102	0.000275	0.00322	0.000281	0.00325	0.000145
AR(2) *p-value*	0.411	0.211	0.863	0.146	0.619	0.0744	0.773	0.490	0.664
Hansen test *p-value*	0.923	0.673	0.980	0.891	0.572	0.858	0.484	0.591	0.777
Number of groups	62	62	62	62	62	62	62	62	62
Number of instruments	42	52	47	34	42	38	28	34	47

*Standard errors in parentheses * p ≤0.1, ** p ≤ 0.05, *** p ≤ 0.01*

Appendix

Table 1. Variables and Data Sources

Variable	Description	Data Source
Exports	6-digit mirror import data.	UNCTAD COMTRADE
Entry Costs	The official cost needed to register a firm (% of income per capita).	WB Doing Business (section Trading across Borders)
Export Costs	Official fees applied per 20 foot container leaving the exporting countries. Fees covers document preparation costs, administrative fee for custom clearance and technical control, terminal handling charges and inland transport.	WB Doing Business (section Starting a Business)
Tariff	Average tariff applied in importing countries, calculated using data at the HS6 level from the COMTRADE Database, UNCTAD.	UNCTAD-TRAINS
GDP	Gross domestic product in constant 2000 US$.	World Bank World Development Indicators (WDI)
GDP per capita	Gross domestic product per capita in constant 2000 US$.	
Distance	Average of the great circle distance between the main city of exporting countries and Germany (considered as major market), weighted by population share.	CEPII (2006)
Aid for buliding production capacity	Official Development aid directed to the following sectors: agriculture, fishing and forestry, industry, mineral resources and mining and tourism.	OECD Development Aid Committee database (international development statistics)
Inflation	The GDP deflator is derived by dividing current price GDP by constant price GDP and is considered to be an alternate measure of inflation.	Authors' calculation World Development Outlook (WEO)
Government balance	Difference between general government revenue and total expenditure expressed as a percent of GDP. Revenue consists of taxes, social contributions, grants receivable, and other revenue. Revenue increases government's net worth, which is the difference between its assets and liabilities (GFSM 2001, paragraph 4.20). Note: Transactions that merely change the composition of the balance sheet do not change the net worth position, for example, proceeds from sales of nonfinancial and financial assets or incurrence of liabilities. Total expenditure consists of total expense and the net acquisition of nonfinancial assets. Note: Apart from being on an accrual basis, total expenditure differs from the GFSM 1986 definition of total expenditure in the sense that it also takes the disposals of nonfinancial assets into account.	World Development Outlook (WEO)

Table 2. Changing control set for transition countries

Dependent variables: The between Theil as a measure of the extensive margin in Columns (1), (3), (5), (7) and (9) ; The within Theil as a measure of the intensive margin in Columns (2), (4), (6), (8) and (10)

Controls	Natural resources		Rule of law		Corruption		Foreign direct investment	
Export diversification	**Extensive**	**Intensive**	**Extensive**	**Intensive**	**Extensive**	**Intensive**	**Extensive**	**Intensive**
VARIABLES	**(1)**	**(2)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**
L. export	0.416**	0.528***	0.379**	0.754***	0.344*	0.752***	0.429*	0.776***
diversification	(2.39)	(3.49)	(2.30)	(5.92)	(1.90)	(5.36)	(1.90)	(7.05)
Starting	0.0019*	0.0041***	0.0017**	0.0032***	0.0017**	0.0031***	0.0013*	0.0028**
Business Costs	(1.92)	(3.44)	(2.27)	(4.14)	(2.11)	(4.04)	(1.74)	(2.18)
Export Costs	-0.00007	0.0003**	-0.00005	0.0003**	-0.00007	0.0003**	-0.00004	0.0003**
	(-1.13)	(2.28)	(-1.15)	(2.57)	(-1.03)	(2.49)	(-0.54)	(2.57)
Distance	0.00002	-0.00004*	0.00002	-0.000003	0.00002	-0.000004	0.00002	-0.00001
	(1.18)	(-1.95)	(0.73)	(-0.18)	(0.77)	(-0.26)	(0.79)	(-0.79)
Tariffs	0.0008	-0.0267	0.0063	-0.019	0.00605	-0.0172	0.0076	-0.0088
	(0.07)	(-0.97)	(0.55)	(-0.77)	(0.43)	(-0.70)	(0.34)	(-0.37)
Population	-5.41e-10***	-1.18e-10	-5.49e-10***	2.63e-12	-5.94e-10***	-1.32e-11	-5.78e-10**	1.25e-10
	(-2.93)	(-0.62)	(-2.64)	(0.02)	(-2.81)	(-0.13)	(-2.13)	(0.92)
Gdppc	-0.0001***	-0.000042	-0.00008**	-0.000038	-0.00009***	-0.000025	-0.0001*	-0.00001
	(-3.12)	(-1.21)	(-2.06)	(-1.08)	(-3.16)	(-0.83)	(-1.86)	(-0.48)
Inflation	-0.0054**	0.0061**	-0.0055*	0.0082***	-0.0048*	0.0071***	-0.0088***	0.00696**
	(-2.39)	(2.07)	(-1.92)	(2.99)	(-1.87)	(2.64)	(-3.05)	(2.44)
Government	0.00967	0.0305***	0.0113	0.0229**	0.0130	0.0243**	0.0177	0.0266**
balance	(1.34)	(2.72)	(1.04)	(2.36)	(1.13)	(2.55)	(1.14)	(2.18)
Aid for production	-0.00037**	0.000922	-0.00032**	0.00035	-0.0004***	0.0005	-0.0004	0.0005
capacity	(-2.39)	(1.39)	(-2.09)	(0.69)	(-2.73)	(0.86)	(-1.64)	(0.89)
Time dummies	*Included*	*Included*	*Included*	*Included*	*Included*	*Included*	*Included*	*Included*
Natural	0.00228	0.0109***						

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
resources	(0.99)	(3.06)						
Rule of law			-0.121	0.226				
			(-0.53)	(1.39)				
Control of corruption					-0.0423	0.0766		
					(-0.44)	(0.99)		
FDIs							-0.000805	0.00310
							(-0.23)	(1.61)
_cons	0.894***	1.293**	0.830***	0.563	1.135**	0.166	0.934**	0.218
	(3.91)	(2.26)	(3.05)	(1.38)	(2.27)	(0.28)	(2.30)	(0.64)
N	128	128	128	128	128	128	123	123
AR(1) p-value	0.0485	0.0181	0.0520	0.0395	0.0377	0.0435	0.0348	0.0248
AR(2) p-value	0.206	0.450	0.204	0.276	0.184	0.237	0.258	0.275
Hansen test *p-value*	0.766	0.873	0.842	0.698	0.775	0.630	0.416	0.530
Number of groups	22	22	22	22	22	22	22	22
Number of instruments	22	22	22	22	22	22	22	22

*Standard errors in parentheses * p ≤0.1, ** p ≤ 0.05, *** p ≤ 0.01*

Table 3. Different measures of diversification, costs and aid (transition countries)

Dependent variables: The HHI as a measure of diversification in Column (1); the between Theil as a measure of the extensive margin in Columns (2), (4), (6), and (8) and the within Theil as a measure of the intensive margin in Columns (3), (6), (7) and (9)

		Proxy for costs: number of procedures to start business and documents to export		OECD/WTO definition of aid for production capacity		Aid grants		Aid loans	
Export diversification	**HHI index**	**Extensive**	**Intensive**	**Extensive**	**Intensive**	**Extensive**	**Intensive**	**Extensive**	**Intensive**
VARIABLES	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**
L. export	0.502***	0.945***	0.891 ***	0.453**	0.731***	0.453*	0.743***	0.412***	0.696***
diversification	(0.159)	(.138839)	(.065432)	(0.178)	(0.152)	(0.281)	(0.0834)	(0.153)	(0.101)
Starting	0.00084**	0.0071	-0.03732**	0.00157**	0.00262*	0.00144*	0.00244***	0.00170*	0.00266***
Business Costs	(0.000359)	(0.004953)	(0.0179585)	(0.000769)	(0.00140)	(0.00088)	(0.000863)	(0.000910)	(0.000749)
Export Costs	0.00006**	.0137268	0.067257*	-0.0000230	0.000263**	-0.000025	0.000352***	-0.0000625	0.000387***
	(0.000031)	(.022261)	(0.039012)	(0.0000471)	(0.000117)	(0.00006)	(0.000117)	(0.0000607)	(0.000125)
Distance	0.0000019	-5.35e-07	-0.0000207	0.00000974	-0.0000032	0.0000277	-0.0000027	0.0000160	-0.00000672
	(0.000004)	(0.000017)	(0.000022)	(0.0000165)	(0.000025)	(0.00003)	(0.000023)	(0.0000223)	(0.0000260)
Tariffs	-0.0126*	.0040688	-0.024066	0.0159	-0.0214	-0.00259	-0.00926	0.00524	-0.00951
	(0.00750)	(.005451)	(.023366)	(0.0179)	(0.0280)	(0.0135)	(0.0159)	(0.0167)	(0.0230)
Gdppc	2.99e-11	-2.10e-06	-0.0000361	-4.85e-10**	-3.34e-11	-5.12e-10*	5.54e-11	-5.80e-10***	2.38e-11
	(3.10e-11)	(.000022)	(0.00026)	(1.92e-10)	(1.59e-10)	(2.92e-10)	(1.42e-10)	(2.12e-10)	(1.18e-10)
Population	0.0000017	-5.17e-11	1.34e-10	-0.00009***	-0.000011	-0.00009*	0.00000321	-0.0001***	0.00000168
	(0.000005)	(1.3e-10)	(8.53e-11)	(0.00003)	(0.00003)	(0.000054)	(0.0000344)	(0.0000322)	(0.0000291)
Government balance	0.00135	.0012725	0.0185 ***	-0.00810**	0.00625*	-0.0062**	0.00466	-0.00458	0.00351
	(0.00167)	(.002154)	(0.00715)	(0.00408)	(0.00323)	(0.00303)	(0.00530)	(0.00290)	(0.00343)
Inflation	0.0108*	-.0029374	0.0002624*	0.0136	0.0247**	0.00143	0.0239	0.00291	0.0207**
	(0.00633)	(.0027887)	(.0041249)	(0.0152)	(0.0107)	(0.0108)	(0.0161)	(0.0107)	(0.0103)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Aid for production	0.000143	-.0002614	-.0000342	-0.000357**	0.000425	-0.000337	0.000132	0.0000929	0.000779
	(0.000154)	(.000397)	(0.00078)	(0.00017)	(0.00045)	(0.00049)	(0.00139)	(0.000321)	(0.000519)
Time dummies	*Included*	*Included*	*Included*	*Included*	*Included*	*Included*	*Included*	*Included*	*Included*
_cons	-0.0558	0.194	.4157453	0.850***	0.546	0.744**	0.366	0.921***	0.426
	(0.0492)	(0.205)	(0.354036)	(0.263)	(0.477)	(0.327)	(0.397)	(0.188)	(0.323)
N	121	128	128	128	128	128	128	128	128
AR(1) *p-value*	0.034	0.00567	0.036	0.0154	0.0451	0.0631	0.0359	0.0670	0.0384
AR(2) *p-value*	0.136	0.211	0.287	0.244	0.281	0.167	0.241	0.186	0.261
Hansen test *p-value*	0.788	0.673	0.581	0.924	0.576	0.658	0.725	0.846	0.802
Number of groups	20	22	22	22	21	22	22	22	22
Number of instruments	20	22	22	22	21	22	22	22	22

*Standard errors in parentheses * p ≤0.1, ** p ≤ 0.05, *** p ≤ 0.01*