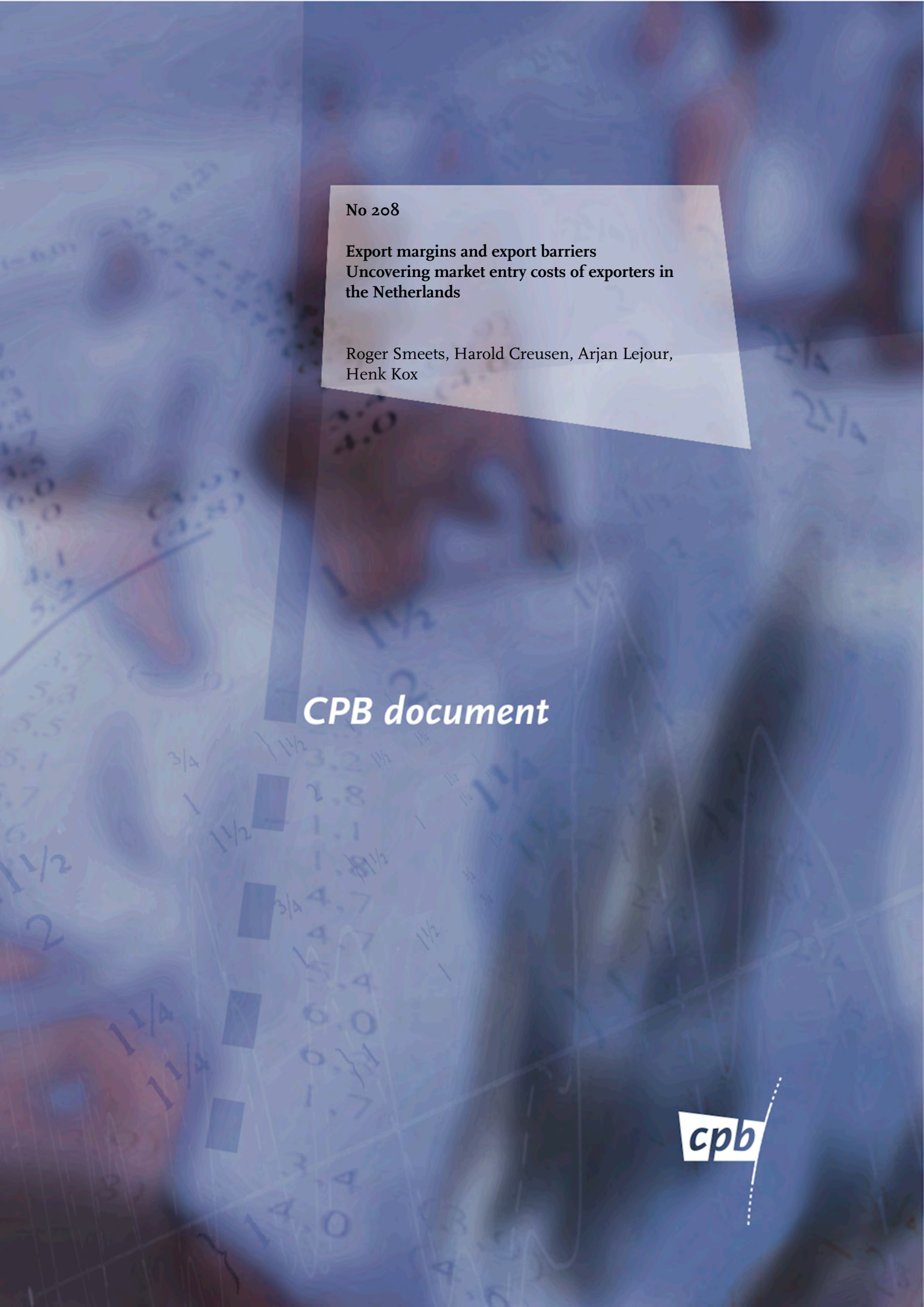

No 208

Export margins and export barriers
Uncovering market entry costs of exporters in the Netherlands

Roger Smeets, Harold Creusen, Arjan Lejour, Henk Kox

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Abstract in English

Even though the Netherlands was the world's sixth largest exporter in 2009, the majority of Dutch firms does not engage in international trade at all, possibly because they are unable to cover the costs to enter specific foreign markets. What are these costs that limited the internationalisation of Dutch firms? Using detailed and unique transaction-level data on export patterns of about 1,200 large Dutch firms in the years 2006-2007, this research opens the black box of market entry costs. First, we find that more productive firms are both more likely to engage in exports (extensive margin) and to export larger volumes abroad (intensive margin). Second, next to the common determinants of export volumes, such as market size, transport and trade costs, we find that poorly developed foreign institutions and regulations form important impediments to firms' export decisions, but not to their subsequent export volume decisions. We also find some evidence that such effects on the export decision are relatively large in small markets, whereas export volumes react more to changes in trade and transport costs in large markets.

Key words: heterogeneous firms, export destinations, market entry costs, gravity equations
JEL code: F14

Abstract in Dutch

Nederlandse bedrijven exporteren naar vrijwel alle landen ter wereld. Echter, de meerderheid van de Nederlandse bedrijven exporteert helemaal niet, wellicht omdat zij niet in staat zijn de kosten voor toetreding tot buitenlandse markten te dekken. Dit onderzoek analyseert de exportbeslissingen van bedrijven en de bestemmingskenmerken door gebruik te maken van gedetailleerde en unieke handelsstatistieken van de 1200 grootste bedrijven in Nederland in 2006 en 2007. Eerst laten we zien dat productievere bedrijven vaker (extensieve marge) en ook meer exporteren (intensieve marge). Daarnaast blijkt dat naast de gebruikelijke handelsbevorderende factoren, zoals marktomvang, transportkosten en tarieven, ook institutionele en procedurele belemmeringen bepalend zijn voor de exportbeslissing, maar niet voor de exportvolumebeslissing. Tot slot lijken dergelijke effecten op de exportbeslissing voornamelijk van belang voor kleine markten, terwijl het effect van handelsbarrières in grote landen vooral een effect heeft op exportvolumes.

Steekwoorden: heterogene bedrijven exportbestemmingen, markttoetredingskosten, graviteitsvergelijking

Contents

Preface

In 2009, the Netherlands ranked 6th on the list of exporting countries. Indeed, Dutch firms seem to export to nearly every country in the world. However, not all firms export and certainly not to every country. Using detailed transaction data from Statistics Netherlands (CBS), this CPB Document shows that most large firms export to only a limited number of destinations. Based on the recent literature on heterogeneous firms in international economics, the authors explore various explanations for this irregular exporting pattern. Distance and market size are important explanations for the export pattern but also market entry costs play a prominent role. This research digs further into these market entry costs and concludes that low levels of institutional and regulatory quality, corruption and cultural dissimilarity are important barriers for entering export markets. In particular, the results show that these barriers are especially influential regarding firms' export decision, and not so much regarding the subsequent decision on export volumes.

This research is part of the CPB programme Globalisation. The document is written by Roger Smeets, Harold Creusen, Arjan Lejour and Henk Kox. It lays down the most important theoretical insights from the modern trade literature and documents the most important empirical results for the Netherlands. This research is accompanied by a discussion paper in which a more technical exercise reveals that the patterns in the data are robust to a number of alternative explanations (see Smeets and Creusen, 2010).

The delivery of the international trade statistics of Statistics Netherlands was an essential element of this project. The authors thank Statistics Netherlands for their cooperation. The CPB programme Globalisation is co-financed by the Dutch Ministries of Economic Affairs, Finance, and Social Affairs and Employment. The authors are grateful for comments and constructive remarks from policymakers from these ministries, as well as from seminar participants at the University of Groningen and Maastricht University. Several CPB colleagues have contributed to this project with fruitful comments, in particular Stefan Boeters, Stefan Groot, Hugo Rojas-Romagosa, Bas Straathof and Bas ter Weel. Discussions with Maarten Bosker, Harry Garretsen, Michael Koetter, Bart Los and Marcel Timmer helped to further improve the paper.

Coen Teulings
Director CPB

Summary

For a small economy, such as the Netherlands, exporting is extremely important for generating income. In 2007 exports of goods and services increased to 93% of GDP in the Netherlands. The determinants of the size of bilateral trade relations have often been investigated. It is by now well known that distance, limited market size and import tariffs hamper trade. However, what affects the decision of firms to export in the first place is less well understood. The determinants of this decision could be different, and hence so could be implications for trade policy. Generally speaking, firms decide both which export markets to serve and how much to export to each of them. Yet detailed trade statistics show that the majority of Dutch firms does not engage in international trade at all, and those that do only export to a limited number of countries. Recent theories in international trade suggest that this might be due to a combination of relatively low levels of firm productivity, combined with relatively high costs of foreign market entry. Especially for firms that are active in a small and open economy such as the Netherlands, establishing new trade relationships could have a significantly larger impact on aggregate trade than intensifying existing ones.

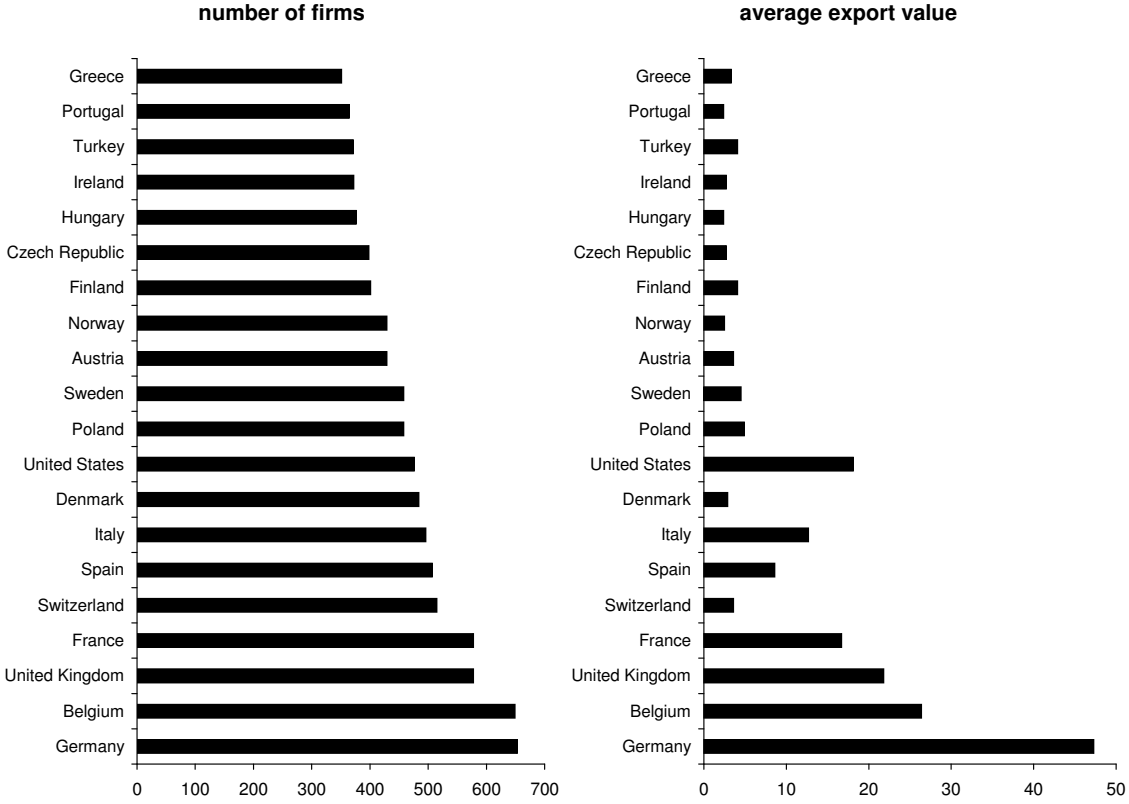
In this study, we ask whether market entry costs indeed function as an impediment to exports, and whether productivity indeed stimulates exports. Answering these questions is important because it sheds light on the determinants of trade relationships. The analysis uncovers several determinants of market entry costs, an issue that has not yet received much attention in the empirical literature. Specifically, using detailed transaction-level data on the export behaviour of Dutch firms, we are able to track the destinations of the exports of approximately 1,200 large firms during the years 2006 and 2007. This enables us to investigate patterns in both the export decision and export volumes of these firms, and to relate these to firm productivity, as well as heterogeneity across destination markets in e.g. country size, transport costs, and institutional quality.

Descriptive results

There is substantial variation in the number of export markets served by a firm. The average number of markets for the firms in our sample is 30 countries. Only a few firms serve more than 100 export destinations and some 9 percent of the firms export to one destination only. These latter firms only account for 0.2 percent of the total exports in our sample. The quarter of firms exporting to 50 destinations or more are responsible for 60 percent of the export value. The most popular export destinations are Germany, Belgium, the United Kingdom, France and Switzerland. The top 20 consists of only European countries and the United States. The data discriminate between the number of firms serving an export market and the average export volume. This shows that Switzerland is important because it is served by many Dutch firms, but the United States is a much more important destination in terms of the average export value. In

a similar vain: although about the same number of firms (about 650) exports to Belgium and Germany, the latter country is a much more important export destination because the average size of exports is nearly twice as high. One of the goals of this document is to understand the differences in the number of (large) Dutch firms serving an export market and the average size of exports, and to investigate the role of trade policy.

The extensive and intensive export margin to top 10 Dutch export destinations



Methodology

We first discuss the theoretical framework on which our analysis is based. This framework predicts that both firms' export decisions and their export volume decisions are positively affected by the market size of an export destination and its remoteness from the rest of the world. Variable trade costs, such as transport costs and tariffs, negatively affect these decisions. Additionally, the export decision is expected to depend negatively on the existence and extent of market entry costs. We present some descriptive evidence, which is consistent with the notion that Dutch firms face market entry costs when entering foreign markets. We proceed by explaining both the export decision and export volume decision by firm productivity, country size, a country's physical distance from the Netherlands, trade tariffs and various proxies for market entry costs. Our methodology accounts for the fact that the export volume decision is conditional on a positive export decision. At the same time, it allows us to refrain from making

explicit assumptions *a priori* about the exact nature and measurement of market entry costs, but instead let the data tell us which factors are most likely to function as such.

Productivity and market entry costs

Firm productivity is an important determinant of both the export decision and the export volume decision. Our estimates suggest that a doubling of productivity would increase the export probability to a specific country by 3.4 percentage points, whereas it would increase export volumes by 67 percent. This might suggest that productivity increases have a large impact on the trade volume and less so on the export decision. However, the average export probability is less than 20 percent in our sample. This implies that a 3.4 percentage point increase is still substantial. At the country level, market size (measured by GDP) and distance also have a significant impact on both export and export volume decisions. A 10 percent increase in size (distance) will increase (decrease) the export probability by 1.1 (1.7) percentage points, and export volumes by 17 (25) percent.

Productivity and market size are hardly affected by Dutch or European Union trade policy. Distance is a proxy for transportation costs and could be affected by better transport facilities and a better infrastructure. In the context of our study, trade policy is more relevant for reducing market entry costs. We find evidence of the existence of market entry costs and pinpoint some of its determinants. Our estimates indicate that the extent of a government's accountability, the quality of its regulation, the degree of corruption, and its cultural proximity to the Netherlands all significantly affect the export decision of Dutch firms. However, they do not have any discernable impact on the export volume decision, which is in line with the (theoretical) interpretation of fixed market entry costs. The effects are economically significant. For instance, we find that if Bangladesh (the most corrupt country in our sample) would be able to lower its level of corruption to that in Finland (the least corrupt country in our sample), Dutch firms would be 8 percentage points more likely to start exporting to Bangladesh, *ceteris paribus*.

Import tariffs only affect the volume of exports. The export decision is not affected but the volume of exports increases by about 11 percent if tariffs are lowered by 3 percent. Within the EU and for most other industrial export destinations, existing import tariffs are lower than 3 percent, but for upcoming large economies such as the BRIC (Brazil, Russia, India and China) countries this is a feasible policy instrument. The number of days it takes to import a container of goods also affects the export and export volume decision. In Rwanda this takes 95 days and in Denmark only 5. If Rwanda would be able to reduce the time by 90 days, the probability that a Dutch firm exports to Rwanda increase by 9 percentage points (which is more than a doubling of active Dutch exporters in Rwanda) and the volume of exports by 81 percent.

Differences between large and small markets

Finally, we find an interesting difference regarding the impact of export barriers between large and small countries. Specifically, it appears that a change in export barriers in large countries has a stronger effect on the export volume decision relative to the export decision of Dutch firms. In small countries this is the other way around. The theoretical model suggests this might be due to differences in competition: if competition is stronger in large markets, adjustments in exports following a change in export barriers will largely occur in export volumes. The reason is that it is relatively unattractive for new exporters to enter the market given the already high degree of competition. In small countries, where competition is arguably lower, the opposite holds. Our results are consistent with such an explanation.

Policy implications

Our analysis enables us to derive policy implications for both export margins: the country-specific export decision (the so-called extensive margin) and the country-specific export volume decision (intensive margin). First, policy makers should recognize that "promoting exports" is as such an ambivalent policy goal. Differences between export decisions and export volume decisions require different strategies: is the goal of export promotion to stimulate firms to engage in exports or to stimulate current exporters to increase their export volumes? If the latter is the aim, should already existing trade relationships be intensified, or should new ones be established?

Second, once the goals have been made explicit, it should be recognized that the appropriateness of policy instruments will depend on the nature of these goals. Decreasing trade and transport costs are particularly effective to intensify existing trade relationships. However, in order to stimulate firms to engage in exports or exporters to expand to uncharted export destinations, it is more appropriate to lower market entry costs, as they are more important impediments to the export decision than trade and transport costs.

This touches upon a third implication: traditional trade policies aimed at lowering tariffs and non-tariff barriers are less effective in helping new trade relationship to develop. Instead, other instruments such as trade missions, bilateral negotiations and economic diplomacy may have a larger impact in unlocking new export markets. This is not only a matter of establishing business networks and infrastructure for doing business; it also entails pressing for institutional and regulatory reforms that make it less risky for Dutch firms to start doing business in foreign countries that now provide business opportunities that are too uncertain. The binding rules of the internal market in the European Union are the prime example of a mechanism lowering these kinds of risks and hence creating and maintaining new export relations.

Finally, picking winners and targeting export promotion policies to specific firms or specific countries are not likely to be viable policy strategies. We show that being sufficiently productive is a prerequisite to survive in foreign markets. Winners need not be picked, they will select themselves. Targeted policies might temporarily soften the budget constraints of firms that are otherwise incapable of exporting. However, to the extent that such policies cannot be sustained long enough to allow firms to reach sufficient scale and productivity, they are not likely to generate long term gains. A similar argument extends to promoting exports to specific (developing) countries: as long as the proper institutional and regulatory conditions for doing business are absent, any temporary export promotion policies targeting specific countries is not likely to lead to sustained export increases.

1 Introduction

In 1962, 50 percent of all Dutch goods exports went to Germany, Belgium, United Kingdom and France, in that order. After nearly fifty years of economic integration, these four countries still form the top four export destinations with an export share of 53 percent.[1] Despite the economic boom in Asia over the last decades, the export shares to these countries hardly increased. Ongoing efforts to reduce worldwide trade barriers and technological progress have led to a steady increase in trade volumes over the last decades, but apparently did not change the export destination mix of the Netherlands. This is not only typically Dutch. In a sample of 158 countries Helpman et al. (2008) document that out of all possible 25 thousand trading pairs, 55 percent did not exist in 1970. By 1997, this percentage has decreased by a mere 6 percentage points to 49 percent. Indeed, the absence of (bilateral) trade is both an important and persistent stylized fact of international trade patterns.

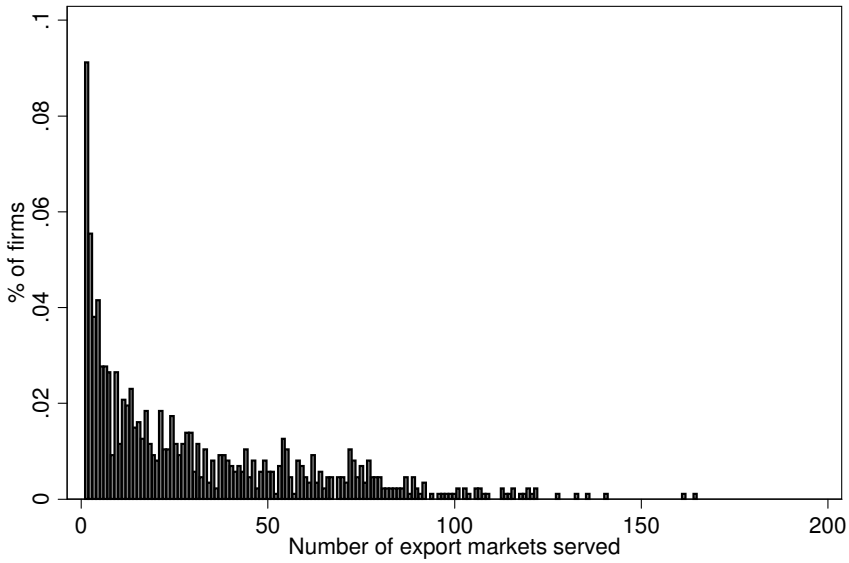
This suggests that lower trade barriers and improved technology have helped to intensify existing trade relations between countries, but have hardly created new ones. Lower trade barriers do not seem to be the proper policy instrument to create new trade. If this is indeed the case, which policy instruments *could* be effective for creating new trade relations?

This study focuses on the determinants of trade relations by distinguishing export decisions to foreign markets and the export volume. The distinction is important because the determinants of these decisions differ. The export volume depends on distance, market size, import tariffs and non-tariff barriers. Distance and market size are also determining variables in the export decision, but this decision also depends on market entry costs. The recent heterogeneous firms models of international trade argue that engaging in trade imposes a fixed cost on firms, so that only the most productive ones can serve foreign markets.[2] If these fixed costs or market entry costs further vary across destinations, some countries will be more easily accessible for exporters than others. Firm-level productivity and country-level variations in market entry costs together determine the pattern of international trade. As an example of this trade pattern, Figure 1.1 shows that nine percent of the large Dutch firms serve one export market and only a few firms serve more than 100 export markets.

[1] Data from Statistics Netherlands.

[2] See e.g., Melitz (2003), Bernard et al. (2003) and Chaney (2008).

Figure 1.1 Relative distribution of firms by market coverage (2007)



In this study, we investigate the determinants of this trade pattern. Specifically, we ask whether market entry costs are an impediment to exports, and whether productivity indeed stimulates exports.

We use detailed data on the export patterns of 1,200 large Dutch firms in 2006 and 2007. These data do not only reveal the number of export destinations for Dutch firms but also the number of firms serving a particular market and the size of their exports. For instance, we find that the United States is ranked fifth in export value but only ninth in terms of the number of exporting firms. The reason is that the average firm-level export value is about 18 million, exceeding the average export value to France (16.7 million). Why is the number of firms that exports to the United States relatively low and the average value of exports relatively high? By disentangling the export market entry decision and export volume decision, we are able to answer such questions.

First, combining firm-level and country-level determinants of trade patterns and trade volumes, we are able to account for the impact of productivity and trade costs simultaneously. Second, using a range of different candidates for market entry costs, our econometric methodology lets the data decide which of them actually function as such and which do not.

Our main results first indicate that the “usual suspects” in determining the magnitude of trade flows - country size and distance - are also prominent determinants of the export decision. Distance explains why the United States is served by less Dutch firms than neighbouring European countries are. However, market size explains why the United States is the only non-European country in the top twenty of Dutch export destination. It also explains that Asian destinations are not very attractive, although rapid economic growth should make Asia more popular in the (near) future.

Second, we find that various cultural, institutional and procedural factors - such as cultural proximity, the extent of corruption, and the quality of regulation - function only as market entry costs, as they affect a firm's export decision, but not its subsequent export volume decision. These factors add to the low number of firms exporting to Asia. Not only distance matters, but also the costs of entering the market. China is a typical example of an export destination with market access difficulties. China's growth performance and WTO membership in 2001, accompanied by substantial decrease in import tariffs, did not lead to an impressive increase in Dutch exports. Exports did increase, but differences in culture and institutions hinder new trade relations. This not only holds for Asian export destinations. For example, Dutch firms would be 9.7 percentage points more likely to export to Iran if that county would have the same quality of institutions as Denmark.

Third, we document an interesting difference of the impact of trade costs on exports between large and small countries: Whereas changes in trade costs more strongly affect the export volume decision to large export destinations, they affect the export decision somewhat stronger for small export destinations. Finally, productivity also functions as a determinant of these two export flow components.

These findings have several implications for Dutch export promotion policies. First, composing effective export promotion policies requires an explicit statement of its goals. That is, if the aim is to stimulate non-exporters to engage in exports, reducing foreign market entry costs will be more effective than stimulating export volumes of existing exporters. However, this also crucially depends on the source of the increased export volumes. Should existing exporters export more to their established trade partners, or should they add new markets to their export portfolio? In the latter case, decreasing market entry costs in destination countries might again be more appropriate than lowering bilateral trade tariffs, whereas the opposite holds in the former case. Furthermore, another implication is that trade missions, bilateral negotiations and economic diplomacy may have a larger impact than lowering tariffs and non tariff barriers, by decreasing information costs and unlocking export markets that are so far largely isolated for Dutch firms. Finally, our results also suggest that export promotion policies targeted at specific firms or countries are unwarranted. More productive firms will more easily engage in exports, and export large volumes when they do. That is, winners need not be picked by the government as they will select themselves. Similarly, stimulating exports to a particular (isolated) country will not generate sustained trade relationships unless proper institutional and regulatory conditions are in place.

Traditional trade policies, like import tariff and non tariff policies, are delegated to the European Union. WTO negotiations and bilateral free trade agreements between the EU and countries like Canada and Korea mainly focus on lowering and eliminating import tariffs and will thus create trade by intensifying trade of existing exporting firms. Trade missions and economic diplomacy could be instruments to unlock potential export markets and could be used by the EU and the individual Member States.

EU enlargement is a typical example of creating new trade relations and intensifying existing ones. Except for the elimination of import tariffs, the intensified cooperation with these countries and acceptance of EU rules lower market entry costs. It is not surprising that Poland is in the top ten of Dutch export destinations and that the Czech Republic and Hungary are in the top twenty. Moreover, European Neighbourhood policy is also a way of lowering market entry costs with the countries east and south of the European Union.

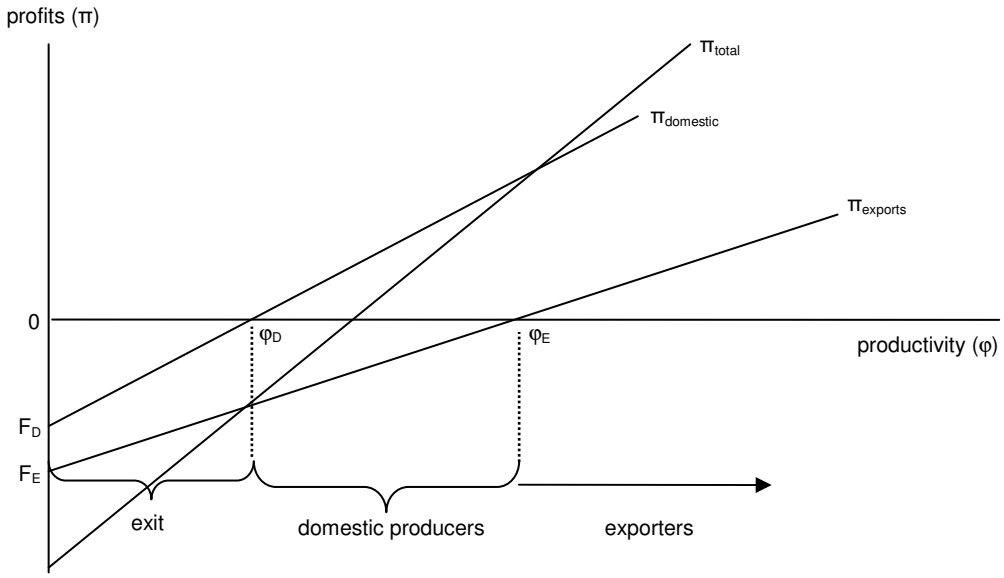
This study fits into the recent empirical literature on the relationship between market entry costs and trade patterns. Eaton *et al.* (2004; 2008) analyse the export patterns of French firms and find that the number of French firms exporting to a specific market varies positively with the size of that market, and that variation in export market destinations is much larger along the extensive margin (the number of firms selling there) than the intensive margin (the amount of exports per firm). Chevassus-Lozza and Latouche (2009) find that market-specific fixed costs matter mostly for the export decision (the extensive margin) but not so much for the amount of sales following this decision (the intensive margin). They also show that the market entry costs for French agrofood exporters vary significantly across export destinations in Europe, but they do not open the black box of the determinants of these market entry costs. Blanes-Cristóbal *et al.* (2008) analyse a representative sample of Spanish firms with three export destinations: the EU, the OECD (minus EU) and the rest of the world (RoW). They find a productivity premium for the EU destinations but not for the OECD and RoW, which they take as evidence of market entry costs in the EU. Finally, for a sample of Irish exporters Lawless (2009) documents a positive relationship between firm productivity and the number of export markets served, suggesting that fixed entry costs differ per export market. In sum, this body of literature provides indirect and implicit evidence on the role of foreign market entry costs. Our goal is to provide a more explicit analysis of these costs, by investigating some of their potential determinants and their impact on the firm-level country-specific export decision.

The rest of this paper is structured as follows: Section 2 presents the main theoretical arguments of the firm heterogeneity model including the export-market heterogeneity in terms of fixed export costs. The accompanying model of Chaney (2008) is presented in appendix A. Section 3 describes the firm level data and investigates whether some of the model's implications can be observed by simply looking at the stylized facts in the data. Moreover, it also presents data at the country level related to market entry costs. Section 4 presents the empirical model, the econometric methodology and the estimation results (a formal derivation of the model is relegated Appendix B). Finally, Section 5 concludes with policy implications, recommendations, and some suggestions for future research.

2 Heterogeneous firms and fixed export costs

In a seminal paper, Melitz (2003) introduces heterogeneous firms that differ from each other in terms of productivity into a model of international trade. Next to a fixed cost of domestic production, he also introduces a fixed cost of exporting. Together these novelties yield an equilibrium in which some firms export, and others do not. Figure 2.1 illustrates the results of the underlying mechanism.

Figure 2.1 Firm heterogeneity and fixed export costs



The horizontal axis in the figure denotes firm productivity (φ) and the vertical axis denotes firm profits (π). The three curves labelled π depict profits for firms that only serve the domestic market ($\pi_{domestic}$), *additional* profits for firms that also export ($\pi_{exports}$), and *total* profits i.e. the sum of domestic and export profits (π_{total}). These profits are positively related to productivity, because increases in productivity (and hence lower marginal costs) allow the firm to set lower prices and capture a bigger share of the market *ceteris paribus*. Two things stand out: First, the intercept of the $\pi_{domestic}$-curve is smaller in absolute value than that of the $\pi_{exports}$-curve. This is due to the assumption that the fixed costs of exports (F_E) are higher than those of domestic production (F_D). Second, the slope of the $\pi_{domestic}$-curve is steeper than that of the $\pi_{exports}$-curve. The reason is that exporters incur a variable trade cost on every unit they export, thus lowering the marginal increase in profits following a productivity increase, relative to domestic production. Together, these elements introduce two threshold productivity levels, φ_D and φ_E, for which it holds that $\varphi_E > \varphi_D$. The productivity thresholds represent the minimum level of productivity that is needed to engage in either domestic production (φ_D) or exports (φ_E). Consequently, firms with productivity levels below φ_D exit the market, as their total profits are

negative. Firms with productivity levels in between φ_D and φ_E produce for the domestic market only, as domestic profits exceed those that could be earned by also engaging in exports. Finally, firms with productivity levels above φ_E produce both for the domestic market and engage in exports, as this entails the highest total profits. This yields an equilibrium in which there are both exporters and non-exporters and exporters are more productive than non-exporters.[3]

The latter implication of the model has been taken to the data by many studies. These try to establish whether the productivity of a firm is indeed an important determinant of its export decision. Table 2.1 below is (partly) taken from Greenaway and Kneller (2007) and presents the results of a number of different studies. The general picture that emerges is that indeed a (ex-ante) exporter productivity premium exists - both in terms of labour productivity (LP) and total factor productivity (TFP) - but that its magnitude varies across countries.[4]

Table 2.1 Exporter productivity premia: empirical evidence

Study	Sample	Productivity premium (*ex ante*)
Bernard and Jensen (1999)	United States: 1984-1992	6% TFP, 8% LP
Isgut (2001)	Colombia: 1981-1991	20% LP, 4% ΔLP
Wagner (2002)	Germany: 1978-1989	0% LP
Baldwin and Gu (2003)	Canada: 1974-1996	3% ΔLP, 0% ΔTFP
Hahn (2004)	Korea: 1990-1998	4% TFP
Blalock and Gertler (2004)	Indonesia: 1990-1996	3% TFP
Kox and Rojas-Romagosa (2010)	The Netherlands: 1999-2005	6.2% LP

TFP = Total Factor Productivity
LP = Labour Productivity
Δ = change
Source: Greenaway and Kneller (2007), part of Table 3.

Other studies have extended or adapted the original model of Melitz (2003) theoretically.[5] In this paper, we follow a particular extension by Chaney (2008). Chaney (2008) extends Melitz (2003) by allowing for asymmetric countries that are separated by asymmetric trade barriers. In particular, Melitz (2003) assumes that both fixed and variable trade costs are similar across foreign destinations implying that all exporters ship their goods to all possible destinations. This implication is at odds with the observation that many countries are still largely isolated from world markets (Helpman et al., 2008). It also contradicts some stylized facts of previous firm-level studies[6] as well as our own results below. By allowing for differences in fixed and variable trade costs, as well as country asymmetries in terms of size, Chaney (2008) effectively

[3] Additionally, this model uncovers another (macro-level) benefit of international trade, which is the increase in average industry-level productivity due to the entry of more productive foreign firms in the market and the simultaneous exit of less productive firms.

[4] See e.g., Wagner (2007) and Mayer and Ottaviano (2007) for other overviews of the literature.

[5] See e.g., Melitz and Ottaviano (2008); Chaney (2008); and Akerman and Forslid (2009).

[6] See e.g., Bernard et al. (2007); Mayer and Ottaviano (2007); Eaton et al. (2008); and Lawless (2009).

allows the intercept and slope of the $\pi_{exports}$-curve in Figure 2.1 to vary across export destinations. As a result, the export productivity threshold φ_E will also differ across countries, so that even among exporters, some will serve more markets than others.

We present a formal derivation of Chaney's model in Appendix 1. Here we will explain the main mechanisms in the model on which we build our empirical specifications in Section 4. A firm's export decision is determined both by its own productivity and the country-specific threshold. If we are able to decompose the productivity threshold in observable country-level determinants, we can estimate the export decision as a function of firm productivity and these country-level determinants. Chaney's (2008) model reveals that the productivity threshold is a positive function of variable and fixed trade costs, and a negative function of the trade partners' market size and its "remoteness" from the rest of the world.[7]

First, consider the role of variable and fixed trade costs. Intuitively, if such costs increase, it becomes more difficult for a firm to profitably export its products to a foreign country. In terms of Figure 2.1, an increase in fixed costs shifts the intercept of the $\pi_{exports}$-curve down; whereas an increase in variable costs flattens its slope (i.e. flattens the $\pi_{exports}$-curve). This implies that the productivity threshold φ_E to serve a foreign country increases with (variable and fixed) trade costs.

Second, the market size of the destination country has an opposite effect on the threshold: if market size - and hence foreign demand - increases, this puts an upward pressure on prices. Consequently, more productive firms can benefit from higher margins and make large profits *ceteris paribus*. In terms of Figure 2.1, the slope of the $\pi_{exports}$-curve increases, hence lowering the productivity threshold φ_E. Finally, the "remoteness" of a trade partner also matters: the more remote a trade partner is from the rest of the world, the easier it is for firms from one specific home country to serve this trade partner *ceteris paribus*, since competition from other exporters is reduced. Again, this leads to an upward shift of the $\pi_{exports}$-curve and a decrease in φ_E.

If the firm has the productivity level to export to a specific market, it then has to decide how much to export. As long as productivity is below φ_E, exports are 0. Once productivity reaches φ_E, the level of exports jumps up and becomes positive. As we show more formally in Appendix 1, the determinants of the export volume decision are very similar to those of the export-or-not decision. Specifically, the only difference is that fixed export costs are no longer of any importance. Intuitively this makes sense: Once the fixed costs of exports are incurred by deciding to serve a particular market, they should not influence the decision on how much to export, as they are fixed. On the other hand, firm productivity, variable trade costs, market size and remoteness are all determinants of the export volume decision. Specifically, an increase in productivity increases exports by making a firm more competitive so that it captures are large market share. An increase in market size increases effective demand, and an increase in

[7] A country's remoteness captures the extent to which it is separated from other (potential) trade partners through the existence of trade barriers, while also taking into account the economic importance of these (potential) trade partners in terms of their market size. See equation (A.9) in Appendix 1 for a formal definition of remoteness.

remoteness decreases competition from other exporters that are based in other countries. In contrast, an increase in variable trade costs tends to reduce export volumes as it raises the price of exports.

In sum, both the export-or-not decision (the so-called extensive margin decision), and the export volume decision (the so-called intensive margin decision) are positively related to the firm's own productivity, as well as both the size and remoteness of a (potential) export destination. They are negatively related to variable trade costs that are incurred when exporting to a (potential) export destination. Moreover, the extensive margin decision is also negatively influenced by the fixed costs of exports, whereas the intensive margin is insensitive to these types of costs. We will investigate these relationships in our empirical setup, discussed in more detail in Section 4 and Appendix 2.

3 Data and descriptive analysis

In order to empirically investigate some of the predictions of Chaney's (2008) model for the Netherlands, we need three types of data: data on the export patterns of Dutch firms (notably regarding their export destinations), data on firm characteristics (notably on firm productivity), and data on export market characteristics. Below we provide some details on the specific data and variables that we use, and end with some preliminary descriptive analyses.

3.1 Export patterns

Our export data are obtained from Statistics Netherlands (CBS) and cover the years 2006 and 2007. These data stem from customs data and include export transactions of firms, classified by product and export destination. Linking them to individual firms thus allows us to observe to which countries these firms do and do not export (the extensive margin decision), as well as how much they export (the intensive margin decision).

The dataset covers all commodities, but no services, and export flows are recorded on the VAT numbers of firms. The total value of all transactions is similar to the size of commodity exports and imports in the national accounts. Statistics Netherlands (2009) links these transaction data to individual firms using the general business register (GBR). About 24% of the exports in 2007 cannot be linked to firms according to Statistics Netherlands (2009). An important reason for this is that a significant part of recorded trade is carried out by foreign controlled enterprises without establishments in the Netherlands. These firms are not registered in the GBR. Large firms (with more than 250 employees) are responsible for 34% of the exports, i.e. 118 billion euro in 2007. The exports of SMEs thus form the major part of total exports (42%) but only 8% of the SMEs exports commodities (Statistics Netherlands, 2009).

In this study, we link these export data to the (approximately) 1,200 largest Dutch firms (i.e. firms that are active in the Netherlands, hence not necessarily Dutch owned). We have several reasons to consider these large firms only. First, we prefer to have a sample of firms that serve multiple and different export markets in order to establish a relationship between the export decision and fixed export costs across different export destinations. Most firms - and certainly most small firms - only serve one export market (cf. Mayer and Ottaviano, 2007; Bernard *et al.*, 2007) whereas firms servicing multiple export markets are often large.

Second, the transaction-level trade data are identified by means of VAT numbers. A problem with the VAT identifier is that fiscal laws allow firms within an enterprise group to use the same VAT identity. It means that matching the customs-based export data with firm-level statistics can be problematic for firms belonging to one fiscal enterprise group. It causes non-unique matches, because more than one firm may use the same VAT number, so that linking export patterns to firm-level characteristics is not straightforward anymore. Since the extent of these non-unique matches is limited in the case of large firms (enterprise groups), we prefer to

use export transaction data of large firms instead of small firms as the loss of information is minimized.

Finally, many small firm establishments eventually are part of large firms. Since we assume that strategic decision-making for the international expansion strategy of firms takes place at a high hierarchical level, we expect that the concept of a large firm will better reflect the level at which export decisions are taken.

3.2 Firm characteristics

We use firm-level data for the (approximately) 1,200 largest Dutch firms during the years 2006 and 2007. Dutch firms in this case means firms active in the Netherlands, so they can also be (partly or fully) foreign owned. The data are a census and stem from the "Statistiek Financiën Grote Ondernemingen" (SFGO), which provides balance-sheet data and profit-and-loss accounts of non-financial firms with a balance sheet total of more than 23 million euros. The minimum firm size in terms of employment is about 50 employees, but most of the firms in this dataset have more than 200 employees. In 2007, some 30% of them had less than 250 employees and are therefore to be considered as SMEs according to the definition of Statistics Netherlands.

Table 3.1 Data coverage matched dataset (total values)

	2006			2007		
	Total	Matched	%	Total	Matched	%
Number of firms	1,236	986	79.8	1,210	1,029	85.0
Employment[1]	1,298	824	63.5	1,281	1030	80.4
Value Added[2]	126	96	76.1	129	111	86.0
Capital Stock[2]	184	150	81.5	222	188	84.7
Exports[2,3]	319	98.9	31.0	348	138	39.6

1 In thousands of full-time equivalents.
2 In billion Euros
3 Original data is the customs-based export data set. The total value of exports in these data equals the value of commodity exports in the national accounts.
Source: SFGO and IH data of Statistic Netherlands

We have matched the export data described in Section 3.1 to the firms in the SFGO. Table 3.1 presents some figures regarding the coverage of our matched sample. In general, the coverage for 2007 is better than for 2006. In terms of the number of firms and capital stock, the coverage of the matched database is about 80%. For employment and value added, at least in 2006 the coverage is substantially lower. Finally, note that the coverage in terms of export value is relative to the total in the transaction-level trade dataset. Most exports (between 60%-70%) are lost after the match because a part of the transaction-level trade data can not be matched and another share is conducted by SMEs (cf. Section 3.1 above).

We also note that all estimates reported in Section 4 are based on the sample of manufacturing, wholesale and retail firms. The reason is that this gives us a more homogeneous set of firms trading commodities, as other service sector firms trade services which are not included in our trade data. This selection of firms account for the majority of matched trade volumes (81%). We include wholesale and retail firms in this sample because these are responsible for approximately 25% of total Dutch exports. Excluding them from the analyses would thus seriously reduce the export coverage in our sample (cf. Bernard et al., 2010).

The model discussion in Section 2 suggests that we need data on *inter alia* firm productivity. We derive a measure of labour productivity from the firm-level data, measured as (the log of) value added of employment in full-time equivalents.

3.3 Country characteristics

Next to a measure of firm-level productivity, we also need data on various country characteristics: market size, variable trade costs, fixed trade costs and remoteness. Even though the firms in our sample are active in approximately 165 countries, due to data constraints regarding some of the variables discussed below, we eventually end up with a sample of 106 countries (see Appendix 3 for a list of these).

For market size, we use (the log of) total GDP from the World Bank Development Indicators; the data are converted from US dollars (in constant prices from the year 2000) into Euros using an average annual exchange rate. Variable trade costs can be (crudely) decomposed into transport costs and trade costs. We follow the gravity-model literature and use the geographical distance between Amsterdam and each of the trading partners' most populated cities as a proxy for transport costs. These data are taken from CEPII. For trade costs, we use a measure of average country-level import tariffs which is taken from the Fraser Institute (Gwartney and Lawson, 2008). Following the theoretical model by Chaney (2008), we construct a measure of remoteness for each export country k in the total set of M export destinations (i.e. 106), as the inverse of the distance weighted sum of the market sizes of all $M-1$ trading partners of k.[8]

Finally, we need a measure of fixed trade costs or market entry costs. Recall from Section 2 that these costs have an impact on the extensive margin decision, but not on the intensive margin decision. This is somewhat problematic, as it is not *a priori* clear which factor or factors satisfy this requirement.

Kneller and Pisu (2007) shed some light on this issue using new survey data for the UK. They have firm-level information on the perceived importance of each barrier to trade. Table 3.2 reproduces the percentage of firms considering a certain issue as a barrier to export. The barriers are grouped in network and marketing barriers, procedural and exchange rate issues and cultural barriers. This list shows that cultural differences, regulation and tax systems and

[8] See equation (A.9) in Appendix 1 for a formal definition of remoteness that corresponds to this empirical proxy.

information and search costs are serious impediments to trade. The actual numbers are striking but could be biased upwards because the authors state themselves that the firms are selected from a sample of firms participating in UK export promotion programmes.

Table 3.2 Barriers to exporting for firms in the UK

	% of firms identifying this as a barrier
Group 1: Networks and marketing	
Obtaining basic information about an export market	29.8
Identifying who to make contact with in the first instance	53.7
Building relationships with key influencers or decision-makers	43.5
Establishing an initial dialogue with prospective customers or business partners	42.8
The marketing costs associated with doing business in an overseas market	51.3
Group 2: Procedural en exchange rates	
Dealing with legal, financial and tax regulations and standards overseas	42.2
Logistical problems	35.0
Exchange rates an foreign currency	41.7
Group 3: Cultural	
Language barriers	36.5
Cultural differences (not language)	32.4
Not having an office or site in an export market	37.2
Bias or preference on the part of overseas customers for doing business with firms established in their own country	45.2

Source: Kneller and Pisu (2007).

In line with these findings, in recent years scholars have become more aware of the relevance of the institutional environment for international trade (Linders, 2006). For instance, Kaufmann and Wei (1999) and Musila and Sigué (2010) have shown that corruption negatively affects the intensity of international trade relations. Anderson and Marcoulier (2002) and WTO (2004), among others, have shown that better quality of institutions increases openness and trade. De Groot *et al.* (2004) use the Worldwide Governance indicators of the World Bank to show that higher quality of institutions in the origin and destination country have a positive effect on trade. Also, trust has been shown to be a fundamental driver of economic transactions. In particular, trust between nations is heavily affected by cultural similarities and cultural similarities in turn tend to lower trade costs (Guiso *et al.,* 2009).

Taken together, this literature provides a range of indicators affecting trade and market entry. As many of these are often highly correlated, we consider a selection of them in this study. We aim to include variables capturing the quality of institutions, the regulatory environment, and cultural similarities.

To capture the quality of institutions we use four different variables. First, we use a governance indicator measuring voice and accountability in a foreign country (Kaufman et al.,

2009). The Worldwide Governance indicators are developed by the World Bank for 212 countries. They cover six dimensions of governance, one of which is voice and accountability. This indicator can be considered to measure the quality of a country's democracy: It captures perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association and, freedom of media. The index ranges between -2.5 (low quality of democracy) and +2.5 (high quality of democracy). Second, we use an index of the overall quality of institutions related to doing business from the Heritage Foundation. The index comprises a number of sub indicators capturing *inter alia* freedom for doing business, trade, fiscal affairs, monetary matters, investment, and finance. It is measured on a scale from 1 (low institutional quality) to 100 (high institutional quality). Third, we use a measure regarding the control of corruption, also based on the Heritage Foundation, but derived primarily from the Transparency International's Corruption Perceptions Index. This index also ranges from 1 (high degree of corruption) to 100 (low degree of corruption). Finally, we employ measures to capture the extent of intellectual property rights protection, taken from the updated Ginarte and Park (1997) dataset. This measure ranges from 0 (low IPP) to 5 (high IPP).

Table 3.3 Market entry cost proxies

	Average	Minimum		Maximum	
		Level	Country	Level	Country
Voice & accountability[1]	0.22	– 1.77	Syria	1.53	Norway
Overall institutional quality[2]	62	45	Iran	82	Ireland
Corruption[2]	44	17	Bangladesh	97	Finland
Intellectual Property Rights[3]	3.34	1.87	Bangladesh	4.88	United States
Quality of regulation[1]	0.26	– 1.61	Iran	1.93	Denmark
Number of documents to import[4]	8.2	3	Denmark	20	Rwanda
Number of days to import[4]	30	5	Denmark/US	95	Rwanda
Cultural proximity[5]	55	1	Bangladesh	88	Austria/Ireland

1 Source: Kaufman et. al (2009).
2 Source: Heritage Foundation (2009).
3 Source: Ginarte and Park (1997).
4 Source: Doing business indicators of the World Bank (2009).
5 Source: KOF institute (2009). Cultural proximity indicators as part of the overall globalisation index.

To capture the regulatory environment in a foreign country, we use three different indicators. First, we use the World Bank Governance index on the quality of regulation. This captures perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development. As before, it ranges from -2.5 (low regulatory quality) to +2.5 (high regulatory quality). Second, we use two measures from the World Bank Doing Business Indicators that more specifically concentrate on bureaucracies

surrounding trade (Djankov et al., 2010). These indicators measure time in days needed to import a container of standard goods into a country, as well as the number of documents needed for this. Although there is no natural range for these variables, in our data they range between 5 and 95 (time) and 3 and 20 (documents).

Finally, to measure cultural similarity we use an indicator from the KOF institute (KOF Institute, 2009).[9] It consists of three items. The first is the trade value of books (both imports and exports) relative to GDP. This aims to proxy the extent to which beliefs and values move across national borders. A second item is the number of McDonald's restaurants *per capita* located in a country. The number of Ikea establishments *per capita* is the third item. It ranges between 1 (culturally very distant) and 100 (culturally very proximate). Table 3.3 summarizes these indicators and shows their average, minimum and maximum values in our sample.

Table 3.4 presents pair wise correlation coefficients for all the fixed cost indicators. It is clear that many of them correlate quite heavily with each other, so that including them simultaneously in our empirical model will be problematic. Note that the two Doing Business Indicators correlate negatively with all the other proxies, as might be expected.

Table 3.4 Pairwise correlations market entry costs

	1	2	3	4	5	6	7	8
1. Voice	1.00							
2. Regulatory quality	0.86	1.00						
3. Institutional quality	0.78	0.89	1.00					
4. Corruption	0.77	0.88	0.82	1.00				
5. IPR	0.69	0.76	0.65	0.68	1.00			
6. Docs to import	– 0.61	– 0.63	– 0.58	– 0.61	– 0.53	1.00		
7. Days to import	– 0.62	– 0.27	– 0.64	– 0.66	– 0.62	0.76	1.00	
8. Cultural proximity	0.67	0.71	0.63	0.60	0.59	– 0.50	– 0.62	1.00

3.4 Descriptive results

The theory described in Section 2 has a number of implications that, as a first pass, might be investigated by considering some descriptive features in the data. This subsection will consider two of them. First, we will investigate if there is an indication of the existence of fixed export costs by investigating the distribution of firms across the number of export destinations. Specifically, we will consider the relationship between the share of exporters, and the number

[9] We do not use more standard measures such as the Hofstede dimensions or the GLOBE index because these are available only for a limited number of countries. As we derive most of the variation in our data from cross-country differences, it is important that we retain as many countries as possible.

of countries that they export to. If fixed export costs exist and if they are country-specific, we expect to see a negative relationship between these two. Second, if fixed costs are export-market specific it could imply a hierarchy in export market destinations. That is, export markets that exhibit lower fixed export costs would also require a lower productivity threshold, and hence *ceteris paribus* should be served by more firms. We will consider if we can establish such a hierarchy in our data.

3.4.1 The importance of fixed export costs

The combination of heterogeneity in firm-level productivity and foreign market entry costs implies that different firms will serve a different number of markets. Specifically, ranking exports markets $j,...,M$ in such a way that $\varphi_j < ... < \varphi_M$ (where φ denotes the productivity threshold) implies that for two firms 1 and 2, with firm 1 significantly more productive than firm 2, it must hold that if firm 1 can profitably serve markets $j,...,l$, firm 2 can only serve markets $j,...,k$ with $k < l$. In other words, firm 2 is unlikely to serve the markets with the highest productivity threshold.

Error! Reference source not found. shows the distribution of firms in our sample with respect to the number of markets that they served in 2007 (the data for 2006 give a similar pattern). It is clear that there indeed is substantial variation in the number of markets served. Specifically, the figure demonstrates a negative (though far from monotonic) relationship between the share of exporters on the one hand, and the number of markets that they export to on the other hand. This provides credibility to the existence of heterogeneous firms and country-specific export costs.

Only one firm exports to all 165 countries in our sample. With a median of 20 and an average of 30 export destinations, the export country-portfolios of the firms in our sample are large, e.g. in comparison with the results obtained by Lawless (2009) for Ireland (specifically, see her Figure 1, p. 248). The distribution of the number of export countries also differs strongly from what has been reported for France and the USA (Eaton et al 2008; Bernard *et al.*, 2007). As mentioned, this is due to the fact that we only have large Dutch firms in our sample and large firms serve on average much more export destinations. Though our sample is not representative of all exporting firms we have the advantage that we can potentially exploit a lot of variation on the export-country dimension in our analysis.

Table 3.5 partly presents the information contained in **Error! Reference source not found.** in a different way. It shows the share of exporters that serve a particular number of markets, as well as the share of exports and employment that these account for.

Table 3.5	Distribution of firms, exports and employment (%), 2006-2007				
	Number of export destination countries				
Share of	1	2	3	4	5-20
... exporting firms	8.62	5.47	4.16	3.75	28.8
... export value	0.19	0.39	0.19	0.45	17.8
... employment	6.11	6.58	6.01	3.45	24.9
Share of		20-30	30-40	40-50	50+
... exporting firms		11.7	7.68	6.61	23.3
... export value		5.74	6.69	8.18	60.3
... employment		9.05	3.16	7.82	34.1

As can be seen in the table, about 50% of the exporting firms serves 20 markets or more. A quarter of them even exports to more than 50 countries. For the export value, these figures are substantially more skewed. Firms exporting to only one country account for less than 0.2% of total exports, whereas those exporting to 50 or more countries account for 60% of exports. Combined, these figures show that even in this sample of large firms, exports are distributed quite unevenly, with a relatively limited number of large exporters (in terms of countries served) accounting for the majority of exports.

3.4.2 Export market hierarchy

Another implication of the theory is that, provided that fixed export costs are country-specific, a hierarchy should exist in terms of the attractiveness of different export markets. The countries with the lower market entry costs are the most popular ones for the exporters. Table 3.6 ranks the 20 most popular export markets in this respect as they appear in our sample.

Unsurprisingly, the two neighbours of the Netherlands - Germany and Belgium - are also the most popular export markets, both in terms of the number of active firms and the total export value. The top 20 is populated only by other EU and European countries, with the United States and Turkey as the only exceptions. Interestingly, the ranking in terms of the number of active firms (the extensive margin) differs from the ranking in terms of total export value, or average exports per firm (the intensive margin). For instance, the United States ranks no. 9 on the extensive margin, but no. 5 on the intensive margin. Apparently, it is *relatively* more difficult for firms to expand their exports to the United States than it is to expand their exports within the United States once they are active there. Such differences hint at the existence of fixed costs of exports.

Table 3.6 Export market ranking (2007)

Country	Number of firms	Total export value (billions)	Average exports per firm (millions)
Germany	653	30.9	47.3
Belgium	649	17.1	26.4
United Kingdom	578	12.6	21.8
France	578	9.9	16.7
Switzerland	515	1.8	3.6
Spain	507	4.4	8.6
Italy	496	6.3	12.7
Denmark	484	1.4	2.9
United States	476	8.6	18.1
Poland	458	2.2	4.9
Sweden	458	2.1	4.5
Austria	429	1.5	3.6
Norway	429	1.1	2.5
Finland	401	1.7	4.1
Czech Republic	398	1.1	2.7
Hungary	376	0.9	2.4
Ireland	372	1.1	2.7
Turkey	371	1.5	4.1
Portugal	364	0.9	2.4
Greece	351	1.1	3.3

The implication of the theory is not only that a hierarchy of export markets should exist, but also that heterogeneous firms should obey this hierarchy when expanding their exports to different countries. Eaton *et al.* (2008) test this implication for French firms, but find that only a small share of their sample obeys an export market hierarchy in a strict sense. A similar result is obtained by Lawless (2009) for Irish firms.

Following Eaton *et al.* (2008) we also test the extent to which firms in our sample obey the export market hierarchy as implied by the top 7 countries from Table 3.6. Markets are ordered in decreasing popularity, i.e. from 1 (i.e., Germany) to 7 (i.e., Italy). We employ three different definitions of hierarchy, each one stricter than the previous one. Results are reported in Table 3.7.

First consider the first column (definition 1). Each row in this column shows the number of firms serving a particular country of rank k, conditional on them also serving the country that is one step higher up in the ranking (k-1). For example, of the 662 firms exporting to Germany in 2007, 605 also exported to Belgium, of which 543 also exported to the UK, etc. A total number of 358 firms in our sample sticks to this definition of export market-hierarchy for the top-7 countries.

Table 3.7 Number of firms following export market hierarchy (2007)

Country	Definition 1[1]	Definition 2[2]	Definition 3[3]
Germany	662	25	15
Belgium	605	23	6
United Kingdom	543	5	1
France	517	17	3
Switzerland	404	13	0
Spain	373	15	1
Italy	358	358	0

1 Each row k presents the set of firms that also serve k - 1
2 Each row k presents the set of firm that also serve k - 1, but no market >k in the top 7
3 Each row k presents the set of firm that also serve k - 1, but no market >k in the entire sample

However, this definition of export market hierarchy is not particularly strict as it does not restrict firms to serve *only* these *k* markets and none other (as the model in Section 2.1 would imply). The hierarchy definition applied in the second column goes one step further and presents the number of firms serving a particular country of rank *k*, conditional on them also serving country of rank *k*-1 but not country of rank >*k* of the top-7 countries. Clearly, applying this stricter definition of export market hierarchy shows that a much smaller amount of firms sticks to this hierarchy.[10]

Finally, we could be even stricter and extend this second definition of export market hierarchy to the entire sample of export markets, instead of just the top-7 countries. The third column in Table 3.7 presents the number of firms serving a particular country *k*, conditional on them also serving country *k*-1 but not *any* other country of rank >*k* in our sample of export destinations. Virtually no firms in our sample stick to this strict definition of hierarchy in their export behaviour.[11] This is not surprising. The firms in our sample are active in different industries, export different sets of products, and are possibly exposed to different degrees of idiosyncrasies. Due to data limitations we are not able to present hierarchy rankings per industry or by product, but it could be the case that these orderings would follow a more strict hierarchy.

Taken together, these descriptive analyses are at least partially consistent with the notion that firms experience entry market costs or hurdles in their export decision. However, at the same time the strong implications on export market hierarchies that follow from the theory in Section 2 are not borne out by the data at this level of aggregation. In the next section, we will turn to a more formal and explicit test of the importance of market entry costs.

[10] The truncation of firms in the final row of column 2 is due to our definition and our choice to restrict our attention to top-7 export destinations.

[11] Extending the analysis regarding definition 3 beyond the top 7 does not yield any positive numbers for markets further down the ranking.

4 Empirical strategy and results

4.1 Empirical strategy

The theoretical model by Chaney (2008) that we discussed in Section 2 (and that is derived formally in Appendix 1) yields a number of testable predictions. Specifically, the model predicts that both the extensive margin of trade (the decision to export or not) and the intensive margin of trade (the export volume decision) are positively related to a firm's own productivity, and to a trade partner's market size and remoteness, and negatively related to variable trade costs. Furthermore, the extensive margin of trade is negatively related to fixed trade costs as well.

The distinction between the extensive and intensive trade margins implies that we have to estimate two equations: one to explain the decision to export or not, and one to explain the decision on export volumes. It is important to realize that the latter decision is conditional on the former; only if a firm has decided to engage in exports can it make a subsequent export volume decision. Consequently, the second decision is made only by a subset of the firms in our sample (i.e. the actual exporters) and we have to account for the implied sample selection in our econometric methodology.

A common way of doing so is to estimate a two-stage Heckman selection model (Heckman, 1979). In the first-stage, we estimate the extensive margin decision as a function of productivity, country size, remoteness, variable trade costs, and fixed trade costs. In the second stage, we then use the subset of exporting firms and estimate the intensive margin decision as a function of the same determinants minus fixed trade costs. Additionally, in this second stage estimation we correct for the fact that we are looking at a specific subset of firms by including a variable derived from the first stage equation, which captures the correlation between the two decisions.[12] In order to enhance the identification of the coefficient estimates in the second stage, it is desirable to include one or more variables in the first stage equation that are not included in the second stage. Fortunately, our theoretical model suggests a natural candidate to serve as such a variable: fixed trade costs. However, as we indicated above, finding an appropriate empirical candidate is not trivial. We use our measure on cultural proximity as a baseline proxy for fixed costs. Getting to know a foreign culture and getting acquainted with its particular customs and practices is typically regarded as a barrier to trade (Linders, 2006; Guiso et al., 2009). However, once sufficient investments have been made in this regard, the returns are invariable to the extent of exchange. That is, cultural barriers are a natural measure of fixed trade costs. We will further investigate the sensitiveness of the results to this proxy, as well as the validity of potential other candidates below.

[12] This variable is equal to the inverse Mill's ratio from the first stage selection model, also known as Heckman's lambda. It captures the correlation between the two error terms of the first and second stage equations. A significant coefficient on this variable indicates that the two decisions are indeed correlated and that the correction should indeed be applied.

In Appendix 2 we show explicitly that the theoretical model by Chaney (2008) conveniently reduces to a binary choice model regarding the extensive margin decision, which we use as the first stage selection equation. As mentioned before, the model establishes a relation between the country-by-country export decision (*Exp*) of firms, a firm's productivity (φ), market size (y), remoteness (θ), variable trade costs (τ), and fixed trade costs (F). This yields the following binary choice model:

$$Exp_{ikt} = \Phi\left(\alpha_0 + \alpha_\varphi \varphi_{ikt} + \alpha_y y_{kt} + \alpha_\tau \tau_{kt} + \alpha_\theta \theta_{kt} + \alpha_F F_k + \eta_i + \phi_k + \nu_t\right) \tag{4.1}$$

where i, k, and t index firm, country, and time (year) respectively. *Exp* is a binary 0-1 variable which indicates whether firm i exports to country k at time t (1) or not (0). The α's are the coefficients that we aim to estimate, and they measure the impact that a change in each of the variables has on the export decision. The function $\Phi(.)$ is the cumulative normal distribution function, a transformation that assures that the outcome of the RHS in equation (4.1) lies between 0 and 1 (as is the case for the dependent variable). It is based on our assumption that the idiosyncratic error term in the model is (standard) normally distributed.[13]

The final three terms in (4.1) capture unobserved heterogeneity at the level of the firm (η), country (ϕ) and time (ν). Not accounting for these unobserved effects might bias the coefficient estimates. Usually, they are dealt with by including firm, country and time-fixed effects. However, because of the nonlinearity in our model[14] it is invalid to include firm-fixed effects because of the so-called "incidental parameters problem", which tends to severely bias the coefficient estimates. A similar problem might arise when including country-fixed effects, since we have many different export markets in our sample, implying that we would have to estimate many additional parameters. On top of this, the fact that we only have two years of observations also seriously limits our possibilities, as including country fixed effects would leave almost no variation in the country-level variables to identify the coefficients. For these reasons, we estimate equation (4.1) using a pooled probit model, while correcting our standard errors for clustering at the country level. In Section 4.4 we will investigate the robustness of this choice to estimating a Random Effects probit model. As we have only two years of data, we can safely omit the unobserved time effect (ν).

The second stage equation models the export volume decision, conditional on a positive first-stage decision (i.e. $Exp_{ikt} = 1$ in equation (4.1)):

$$Exports_{ikt} = \beta_0 + \beta_\varphi \varphi_{ikt} + \beta_y y_{kt} + \beta_\tau \tau_{kt} + \beta_\theta \theta_{kt} + \beta_\lambda \lambda_{ikt} + \zeta_{ikt} \tag{4.2}$$

[13] Another possibility is to use the logistic transformation. However, in this case it is not possible to compute the inverse Mill's ratio, which is based on the (standard) normal distribution.

[14] The nonlinearity is induced by the transformation $\Phi(.)$. See Appendix 2 for more details.

where *Exports* is the (log of) total exports by firm *i* to country *k* at time *t*, the RHS variables are defined as in (4.1), ζ is an idiosyncratic error term that we assume to be normally distributed, and the β's are the coefficients that we aim to estimate.[15] The variable λ in (4.2) is computed after estimating the model in (4.1) and corrects for the fact that the two decisions (on the extensive and intensive margin) might be correlated (also see Appendix 2). Specifically, a significant coefficient β_λ indicates that they are. Again we cluster our standard errors at the country-level to correct for possible dependence of observations within specific export markets.

4.2 Baseline estimates

Table 4.1 below presents the baseline estimates of models (4.1) and (4.2) in columns 1 and 2 respectively. First, consider the export decision model in column 1. All variables enter the model with the expected signs, but both *remoteness* and *tariffs* are not statistically different from zero. The coefficient estimate for *productivity* implies that the likelihood of a positive export decision increases by 0.4 percentage points after a 10% increase in firm productivity.[16] For *GDP* and *distance*, these effects are 1.1 and -1.7 percentage points respectively. Regarding cultural proximity, the results suggest that if e.g. Bangladesh were to (extremely) westernise its culture, the probability of a firm in our sample to export to Bangladesh would increase by 10 percentage points. Even though these effects may seem small at first sight, the average (unconditional) export probability in our sample is approximately 21% and its standard deviation is 40.6%.

Second, consider the intensive margin decision in column 2.[17] All variables except *remoteness* display the expected signs. *Remoteness* is negative but statistically insignificant, as in column 1. The coefficient estimate on *productivity* suggests that a 10% increase in firm productivity increases the export volume with approximately 6.7%. For *GDP*, *distance* and *tariffs*, these figures are 17%, -25% and -38% respectively.[18] These effects are substantial, especially compared to the extensive margin effects. However, the average of log exports in our sample is 12.2 with a standard deviation of 2.91 (i.e. approximately 291%). Moreover, the coefficient estimate on Heckman's lambda in column 2 is significant, which indicates that the extensive and intensive export margin decisions are indeed correlated. The positive sign indicates that there are unobserved firm-specific factors or idiosyncracies which simultaneously raise the export probability as well as the export volume decision. One could think of

[15] Again, we omit firm, country and year effects due to the limited time variation in our data.

[16] Since productivity is measured in logs, a 10% increase in productivity is approximately equal to a 0.1 change in log productivity. This corresponds to a 0.0035 (= 0.1 x 0.035) increase in de dependent variable. Since the dependent variable ranges between 0 (0%) and 1 (100%), this in turn corresponds to an approximate increase of 0.4 percentage points. Effects for other variables can be computed in a similar fashion.

[17] Note that since the dependent variable (export volume) is measured in logs, the coefficients estimates of productivity, GDP, distance and remoteness can be interpreted as elasticities.

[18] Note that *tariffs* is not measured in logs and hence its coefficient estimate should not be interpreted as an elasticity. In fact, a 10% increase in tariffs is rather substantial, given the overall standard deviation of 3%. An increase in tariffs of 3% corresponds with a decrease in export volume of approximately 11.4% according to column 2 in Table 4.1.

managerial capabilities or a regional economic boom as such unobserved factors that might positively influence these decisions simultaneously.

Table 4.1 Extensive and intensive margins of trade: baseline estimates

	Extensive margin	Intensive margin
Productivity	0.035***	0.668***
	(.002)	(.060)
GDP	0.114***	1.70***
	(.006)	(.225)
Distance	– 0.171***	– 2.53***
	(.014)	(.323)
Remoteness	0.175	– 1.91
	(.185)	(1.99)
Tariffs	– 0.001	– 0.038***
	(.001)	(.014)
Cultural proximity	0.001***	
	(.000)	
Lambda		1.99***
		(.581)
(Pseudo) R^2	0.18	0.21
P_actual	21%	-
P_predict	16%	-
No. observations	156,708	32,515

Source: own estimations based on Statistics Netherlands data. Cluster-robust standard errors within parentheses. ***, ** and * denotes 1%, 5% and 10% statistical significance. Coefficient estimates in column 1 are marginal effects, evaluated at the mean.

It is hard to compare these estimates to earlier research, as not many studies have analyzed detailed firm-level trade data in this way. Crozet et al. (2008) come relatively close in a study of French firms. For the extensive margin, they report an elasticity of the export decision with respect to Total Factor Productivity of 0.15. This is substantially larger than our labour productivity estimate of 0.035, but the productivity measures are not comparable.[19] For the intensive margin, they do no consider actual firm exports, but rather average firm exports. Doing so, they estimate elasticities of 0.96 and -0.67 for GDP and distance respectively. These are lower than ours, but the dependent variables and the level of analysis (firms in our case, countries in theirs) are not really comparable. Helpman et al. (2008) also provide estimates for the intensive margin measured as average bilateral firm exports for a sample of approximately 160 countries. The elasticity of distance in their baseline estimation is -1.17, which is a bit

[19] The impacts of the other extensive margin determinants are difficult to compare because Crozet et al. (2008) do not report marginal effects.

closer to our estimate.[20] However, due to differences in dependent variables and levels of analyses, these coefficients are difficult to compare to ours.

4.3 Market entry costs

In order to investigate the impact of the various market entry costs that we introduced and explained in Section 3.3, we add them to the baseline model of Table 4.1 one by one. The reason for not adding them simultaneously is that many of these variables are heavily correlated (Table 3.4), which could lead to biased estimates. Table 4.2 presents the results. For reasons of space, we only report the extensive and intensive margin coefficient estimates of each of the market entry costs, while noting that the coefficient estimates of the baseline variables do not change notably.

Table 4.2 Market entry costs

	Extensive margin	Intensive margin
Voice & accountability	0.014*	– 0.053
	(.008)	(.095)
Quality of regulation	0.027***	0.078
	(.007)	(.128)
Overall institutional quality	0.001**	0.001
	(.000)	(.003)
Control of corruption	0.001**	0.000
	(.000)	(.003)
Intellectual property rights	0.033***	0.252
	(.011)	(.188)
No. of documents to import	– 0.002	– 0.015
	(.001)	(.012)
No. of days to import	– 0.001**	– 0.009**
	(.000)	(.004)

Source: own estimations based on Statistics Netherlands data. Cluster-robust standard errors within parentheses. ***, ** and * denotes 1%, 5% and 10% statistical significance. Coefficient estimates in column 1 are marginal effects, evaluated at the mean.

The results in Table 4.2 are consistent for most market entry costs across the two export margins: An increase in their values tends to increase the extensive margin decision, i.e. it stimulates the firms in our sample to engage in exports. However, once this decision has been made, almost none of the market entry costs affect the intensive margin decision. That is, the export volume decision is insensitive to changes in these factors. There are two exceptions to this story: First, and somewhat surprisingly, the number of documents required to import goods into a country does not have any effect on either of the two export margins. Second, the time it takes to import goods into a country has a negative effect on both export margins. This is not

[20] In their estimation, country size is subsumed in exporter and importer fixed effects so there are no explicit estimates.

surprising. Firms' exports to a particular destination normally consist of several deliveries. The number of days it takes to import and the number of needed documents are therefore presumably largely variable trade costs.

Because most of these variables are indexes, it is hard to attach an economic interpretation to a one unit change in their values. Instead, it is more informative to consider the extremes of the distribution. Take for example *voice & accountability*. The coefficient estimates suggest that if Syria (with a value of -1.77) could improve its institutions in this regard to the level of Norway (with a value of 1.53), Dutch firms would be 4.6 percentage points more likely to export to Syria. Similarly, if Iran could improve the quality of its regulations to the level of Denmark, the probability of Dutch firms exporting to Iran would increase by 9.7 percentage points. A decrease in the extent of corruption in Bangladesh to the level of that in Finland would increase the export probability with 8 percentage points. Improving intellectual property rights protection in Guyana to the level of that in the United States would make exports to the former 10.2 percentage points more likely. Finally, if the number of days it takes to import goods into Rwanda would fall to the level of Denmark, this would increase the probability of Dutch firms exporting to Rwanda by 9 percentage points, whereas it would increase the export volume to Rwanda by 81%.[21]

The findings regarding the first five market entry costs in Table 4.2 are consistent with the notion that they are indeed largely fixed costs that firms have to overcome when entering a market. Once they have done so, these costs are unimportant for subsequent export volume decisions, as Chaney's (2008) model predicts. It also implies that these costs might function as proper exclusion restrictions in the Heckman selection model that we employ.

In order to test this conjecture, as well as to investigate the robustness of our results with respect to changing the component of the exclusion restriction, we rerun the regressions of Table 4.2 seven times, each time using a different market entry cost proxy as the exclusion restriction. Table 4.3 presents the results of this exercise: the rows in the table denote the impact of the different variables on the intensive and extensive margin of trade, whereas the columns depict the specific market entry cost proxy that is used as the exclusion restriction. A + denotes a significant positive effect, a - a significant negative effect, and a 0 an effect which is not statistically different from 0. Hence, the final column of Table 4.3 replicates the results of Table 4.2, where cultural proximity was used as the exclusion restriction.

The results in Table 4.3 suggest voice & accountability, the quality of regulation, the control of corruption, and cultural proximity as the best proxies of fixed export costs. They demonstrate the most consistent pattern of a significant effect on the extensive margin of trade, and no effect on the intensive margin of trade. Yet the results also reveal that some of the baseline estimates in Table 4.2 are relatively sensitive to the choice of the exclusion restriction. For example, the

[21] Recall that, as before, even though this latter effect is huge both by itself as well as compared to the extensive margin effect, the cross-country variation in the intensive margin is also substantially larger than that in the extensive margin. Specifically, these effects translate into a 0.22 standard deviation impact at the extensive margin, and a 0.28 standard deviation impact at the intensive margin.

results on overall institutional quality fluctuate quite heavily between negative, positive and insignificant effects. On the other hand, the effect of intellectual property rights protection (IPR) appears to be consistently positive on both trade margins. In Table 4.2 the coefficient in the intensive margin equation was not significant. Weak patent regimes are significant barriers to manufacturing trade, particularly in goods that are sensitive to IPRs. Nevertheless, this phenomenon occurs mainly within industrialising economies that pose credible imitation threats. Smith (1999) estimated that US exports to middle income countries with high imitation capabilities could increase substantially if global IPR standards are imposed. The results in Table 4.3 suggest that higher IPR not only induces new exporters to enter a market but that also existing trade relations intensify. Finally, the number of days to import goods appears to be a consistent determinant of both trade margins, as it shows up with a negative sign throughout almost all regressions.

Table 4.3 Fixed costs analyses

		VA	QR	IQ	CC	IPR	Docs	Days	CP
		1	2	3	4	5	6	7	8
1. Voice &	Ext		0	+	+	0	+	+	+
accountability	Int		0	0	0	0	0	0	0
2. Quality of	Ext	+		+	+	+	+	+	+
regulation	Int	+		0	0	0	0	0	0
3. Institutional	Ext	0	–		0	0	+	0	+
quality	Int	0	–		0	–	0	0	0
4. Control of	Ext	+	0	+		+	+	+	+
corruption	Int	0	0	0		0	0	0	0
5. Intellectual	Ext	+	+	+	+		+	+	+
property rights	Int	+	+	+	+		+	0	0
6. Number of	Ext	0	0	–	0	0		0	0
documents	Int	–	0	–	–	0		0	0
7. Number of	Ext	–	0	–	–	–	–		–
days	Int	–	–	–	–	–	–		–
8. Cultural	Ext	+	+	+	+	+	+	+	
proximity	Int	+	0	+	+	0	0	0	

Notes: Rows depict the entry costs variables as entered to the baseline model. Columns depict the exclusion restriction chosen to estimate the Heckman selection model. A + indicates a significant positive effect, 0 an insignificant effect, and - a significant negative effect.

4.4 Robustness analysis

We perform a number of robustness checks to test the sensitivity of the baseline results as reported in Table 4.1 First, we include industry dummies in the two regressions models (4.1) and (4.2) to rule out that our results are driven by unobserved industry-level heterogeneity. Second, some concern might arise regarding our inclusion of wholesalers and retailers in the

analysis, as they do not correspond well with the theoretical notion of a 'producer' in Chaney's model (2008). Therefore, we rerun the analyses excluding these firms. Third, so far we have assumed that unobserved firm-level heterogeneity is not an issue, by estimating the extensive margin decision in (4.1) using pooled probit. This might be too restrictive: we repeat our analyses, now employing a Random Effects (RE) probit estimator. Finally, even though we have tried to follow the theoretical model as closely as possible, it might be the case that productivity is actually measuring some other firm characteristic. Therefore, we add to the analyses the firm size-class (ranging from 0-9), and a variable indicating whether a firm is a multinational (1) or not (0). Table 4.4 presents the results.

Table 4.4 Robustness analyses

	Industry dummies		Excl. wholesale/retail		RE probit model		Additional firm controls	
	Extensive	Intensive	Extensive	Intensive	Extensive	Intensive	Extensive	Intensive
Productivity	0.010***	0.460***	0.017***	0.551***	0.092***	0.579***	0.045***	0.882***
	(.002)	(0.030)	(.003)	(.037)	(.006)	(.046)	(.002)	(.065)
GDP	0.112***	1.73***	0.152***	1.88***	0.429***	1.68***	0.112***	1.88***
	(.006)	(.175)	(.008)	(.220)	(.007)	(.176)	(.006)	(.183)
Distance	– 0.108***	– 2.62***	– 0.203***	– 2.43***	– 0.640***	– 2.42***	– 0.169***	– 2.85***
	(.013)	(.246)	(.017)	(.271)	(.011)	(.252)	(.013)	(.269)
Remoteness	0.136	– 1.90	0.206	– 2.48	– 0.517***	– 4.14***	0.153	– 1.62
	(0182)	(1.98)	(.231)	(1.97)	(.016)	(1.95)	(.182)	(2.04)
Tariffs	– 0.001	– 0.043***	– 0.000	– 0.037***	– 0.009***	– 0.046***	– 0.001	– 0.048***
	(.001)	(.013)	(.001)	(.012)	(.001)	(.014)	(.001)	(.014)
Cultural proximity	0.001***		0.002***		0.004***		0.001***	
	(.000)		(.000)		(.000)		(.000)	
Size class							0.048***	0.708***
							(.002)	(.070)
MNE							0.129***	1.71***
							(.004)	(.249)
Lambda		1.92***		1.96***		0.506***		2.37***
		(.462)		(.490)		(.118)		(.454)
(Pseudo) R^2	0.25	0.25	0.20	0.23	-	0.21	0.23	0.24
P_actual	0.21	-	0.26	-	0.21	-	0.21	-
P_predict	0.14	-	0.21	-	0.11	-	0.15	-
No. observations	156,708	32,515	90,720	23,194	156,708	32,515	156,708	32,515
Log Likelihood					– 52,167			
ρ					0.93			
σ_u					3.52			

Source: own estimations based on Statistics Netherlands data. Cluster-robust standard errors within parentheses. Standard errors in RE probit model are not corrected for clustering. ***, ** and * denotes 1%, 5% and 10% statistical significance. Coefficient estimates in column 1 are marginal effects, evaluated at the mean.

First consider the first two columns where industry dummies are included in the analysis (the coefficient estimates of these dummies are not reported for reasons of space). The most notable difference with respect to the baseline estimates is that the coefficient on productivity drops for the extensive and intensive margin. This indicates that a part of the impact of productivity on the margins of exports should in fact be attributed to unobserved sectoral heterogeneity. That is, some industries are more likely to export than others: if there are also inter-industry differences in average firm-productivity, this industry effect is mistakenly interpreted as a productivity effect.

The next two columns in Table 4.4 present the estimates excluding wholesalers and retailers from the analysis. The most notable difference compared to the baseline estimates is the effect of productivity which drops again, although not as much as before. This drop is especially salient in the extensive margin regression. Productivity appears to be a particular prominent determinant of the extensive margin export decision for trade specialists.[22] Further note that the coefficient on *distance* in the extensive margin regression slightly increases in absolute value. This implies that on average, distance is a stronger impediment to engage in exports for non-trade specialists. Cultural proximity is also a more important determinant of establishing trade relations for purely manufacturing firms. The coefficient is higher than in the sample with wholesale and retail firms suggesting, that cultural differences are a minor barrier for firms specialized in trading.

The results on the extensive margin (in column (5)) change quite substantially when the extensive margin regression is estimated assuming random firm effects. In particular, the impact of all determinants on the extensive margin decision increases. Additionally, the impact of *remoteness* takes an unexpected negative and significant sign in both regressions. These results might be taken to suggest that ignoring firm-heterogeneity in the pooled model is unwarranted, and that taking account of this heterogeneity in the RE model leads to much larger impacts of the trade determinants. On the other hand, the results on *remoteness* are surprising and not consistent with the theory. However, because of our inability to correct for clustering of firms at the country-level when using the RE probit model, the estimated t-statistics are extremely high in all cases. This could imply that the significance of *remoteness* is spurious, but a similar argument holds for the other variables as well.

Finally, adding additional firm-level control variables leaves the baseline results essentially intact, although in this case, the estimated productivity effects increase somewhat. The results on *size class* and *MNE* show that larger firms and firms that are (part of) a multinational are more likely to engage in trade, and on average display larger trade volumes. These results accord with Kox and Rojas-Romagosa (2010), who only consider the overall export-decision of a different panel of Dutch firms.

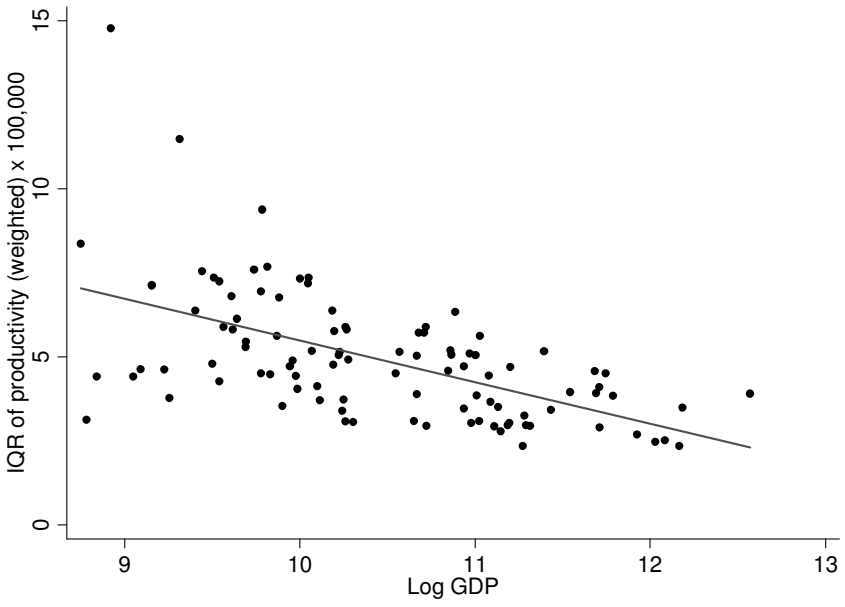
[22] However, also note that our measure of labour productivity is not likely to be a very suitable productivity proxy for wholesale and retail firms.

4.5 Market size matters

The impact of variable and fixed trade costs on the extensive and intensive margins of trade might differ, depending on the ease with which consumers switch between the suppliers of goods (varieties) in their consumption basket. Specifically, if the elasticity of substitution is low (i.e. consumers do not easily switch between suppliers of goods) the model predicts that trade costs will have a large impact on the decision to export or not, and a small impact on the export volume decision. Conversely, if the elasticity of substitution is high (i.e. consumers easily switch between suppliers of goods) trade costs have a small impact on the extensive margin of exports, and a large impact on the intensive margin.

The intuition is as follows: if the elasticity of substitution is low, relatively large price (and hence cost and productivity) differences between firms can be sustained, since consumers do not switch easily between producers. A reduction of trade costs, and hence a reduction in the export productivity threshold φ_E in Figure 2.1 will then induce a relatively large influx of new exporters. The fact that these new entrants are substantially less productive than the average exporter is of little consequence, due to the low elasticity of substitution. At the same time, the export volumes of exporters can only increase marginally, as the market has to be shared with a substantially larger amount of firms.

Figure 4.1 Productivity dispersion and market size



If the elasticity of substitution is high, this situation is turned around. In this case, large price (and hence productivity) differences between firms cannot be sustained, because consumers easily switch from high-cost to low-cost producers. Therefore, a reduction in trade costs will not induce many firms to enter the market because many of them are insufficiently productive to compete with the incumbent high-productivity exporters. At the same time, the reduction in (variable) trade costs allows the incumbent producers to charge lower prices, hence inducing a relatively large increase in the export volumes of individual producers.[23]

Even though we have no explicit measure of the elasticity of substitution in the different export markets, we do have information on the dispersion of exporters' productivity around the mean for each export destination. Syverson (2004) suggests that if the elasticity of substitution is high, the dispersion of productivity is expected to decrease. Figure 4.1 displays the relationship between the dispersion of exporter productivity (weighted by Value Added) and total GDP for 106 export destinations in our sample. Dispersion is measured by the Interquartile Range (IQR) rather than the standard deviation to minimize the influence of outliers in the productivity distribution (cf. Syverson, 2004).

Table 4.5 Large versus small countries

	Large countries		Small countries	
	Extensive	Intensive	Extensive	Intensive
Productivity	0.117***	0.278***	0.050***	0.166***
	(.004)	(.043)	(.007)	(.031)
GDP	0.268***	0.602***	0.250***	0.228**
	(.026)	(.102)	(.029)	(.110)
Distance	– 0.462***	– 1.01***	– 0.404***	– 0.375**
	(.047)	(.179)	(.043)	(.164)
Remoteness	0.460	– 0.609	– 0.911*	– 0.747
	(.615)	(0730)	(.475)	(.698)
Tariffs	– 0.009***	– 0.025***	0.011***	0.005
	(.004)	(.009)	(.004)	(.006)
Cultural proximity	0.002***		0.004***	
	(.000)		(.000)	
Lambda		3.06***		– 0.179
		(1.18)		(.487)
(Pseudo) R^2	0.10	0.17	0.11	0.05
P_actual	0.33	-	0.08	-
P_predict	0.32	-	0.06	-
No. observations	78,384	25,894	78,324	6,621

Source: own estimations based on Statistics Netherlands data. Large countries are those with above median total GDP, small countries are those with below median total GDP. Cluster-robust standard errors within parentheses. ***, ** and * denotes 1%, 5% and 10% statistical significance. All reported coefficients are computed as the ratio of the estimated elasticity over the standard deviation of the dependent variable.

[23] Recall from the discussion in Section 2 that only variable trade costs have an impact on the intensive margin.

The figure shows that exporter productivity dispersion decreases with the size of the market. This is consistent with the notion that larger markets are more competitive (Melitz and Ottaviano, 2008) and that the elasticity of substitution increases with market size (Krugman, 1979). We consequently should expect trade costs to have a larger impact on the intensive margin in large countries, and on the extensive margin in small countries. Table 4.5 below tests this result by splitting our sample into two groups, one for large countries and one for small countries, where large countries are those with total GDP above the sample median. The coefficient estimates are expressed as the ratio of the estimated elasticity over the standard deviation of the dependent variable, to enhance comparison between the extensive and intensive export margins.

First, consider the first two columns regarding export margins for large export destinations. The estimates show that each of the variables has a consistently larger impact on the intensive margin than on the extensive margin. This holds in particular for the intensive margin effects of *distance* and *tariffs*, which exceed those on the extensive margin by a factor 2 and 3 respectively. For the small country sample, the results for *distance* are indeed reversed, although less strong: Here the impact of *distance* is somewhat stronger on the extensive margin than on the intensive margin. Moreover, surprisingly *tariffs* enter the extensive margin regression with a positive sign, as result which we find difficult to explain. Taken together, these results are consistent with the notion that large markets are more competitive, and that as a result trade barriers affect the intensive margin of trade more than the extensive margin.

5 Conclusions

This paper investigates to what extent the current export pattern of large Dutch firms can be explained by current patterns of firm-level productivity and cross country differences in size, trade and transport costs, and several proxies of market entry costs. Specifically, we have investigated to what extent these factors affect both the export decision (the extensive margin of exports) and the export volume decision (the intensive margin of exports).

Our results demonstrate economically sizeable effects of these factors on both export margins. Specifically, we find that a 10% increase in productivity, country size and distance (as a proxy for transport costs) increase the probability that Dutch firms export to a particular country by 0.4, 1.1 and -1.7 percentage points respectively. For already established exporters, similar increases in these variables induce a 6.7%, 17% and –25% increase in export volumes. Furthermore, there is an additional effect of trade tariffs on export volumes: Decreasing tariffs by 1% increases the export volume by 3.8%.

Our empirical methodology has allowed us to uncover some explicit aspects of market entry costs, i.e. trade barriers or costs that only affect the export decision but not the subsequent export volume decision. Specifically, we find that in particular the level of democracy, the quality of regulations and the extent of corruption in foreign countries are important impediments to trade for Dutch firms. For example, if Syria improves its institutions governing the quality of its democracy to the level of Norway, it would increase the export probability of Dutch firms with 4.6 percentage points. Similarly, if Iran would get the quality of its regulation on par with that in Denmark, Dutch firms would be 9.7 percentage points more likely to export to Iran. Finally, if Bangladesh would be able to reduce corruption to similar levels as in Finland, Dutch firms would be 8 percentage points more probable to export there. Both by themselves and compared to the impact of country size, transport and trade costs, these effects are large.

Finally, we provide some tentative evidence that the responsiveness of export and export volume decisions to changes in trade barriers differs between large and small export destinations. In particular, it appears that for large countries, export volume decisions are two to three times as responsive to transport and trade costs than export decisions. On the contrary, in small countries export decisions respond to somewhat more to such changes than export volume decision.

These results have a number of policy implications. First, “promoting exports” by itself is an ambivalent policy goal. In order to design more effective policy instruments, the aims of such instruments should be made more much explicit. That is, is the goal of export promotion to stimulate firms to engage in exports, or to stimulate existing exporters to increase their export volumes? If the latter is the goal, it should then be made explicit whether export volumes should be increased by intensifying already existing trade relationships, or by establishing new ones in so far uncharted territory.

Second, once the goals have been made explicit, it then should be recognized that the appropriateness of policy instruments will depend on the nature of these goals. Our results indicate that decreasing trade and transport costs are particularly effective to intensify existing trade relationships. However, in order to stimulate firms to engage in exports or exporters to expand their export destination portfolio, it is more appropriate to lower market entry costs, as they are more important impediments to the export decision than trade and transport costs.

The question then arises how market entry costs can be lowered? This touches upon a third implication, which is that especially for Dutch firms which already perform relatively well on international markets, traditional trade policies aimed at lowering tariffs and non-tariff barriers are less effective in helping trade potential to materialize. Instead, other policies, such as trade missions, policies to lower information costs about foreign markets, bilateral negotiations and political diplomacy, may have a larger impact by unlocking export markets that are so far largely isolated for Dutch firms. This is not only a matter of establishing business networks and infrastructure for doing business; it also entails pressing for institutional and regulatory reforms that make it less risky for Dutch firms to start doing business in foreign countries that now provide business opportunities that are too uncertain.

Finally, our results suggest that being sufficiently productive is a prerequisite to survive in foreign markets. Winners need not be picked, they will select themselves. Targeted policies might temporarily soften the budget constraints of firms that are otherwise incapable of exporting. However, to the extent that such policies cannot be sustained long enough to allow firms to reach sufficient scale and productivity, they are not likely to generate long term large gains. A similar argument extends to promoting exports to specific (developing) countries: As long as the proper institutional and regulatory conditions for doing business are absent, any temporary export promotion policies targeting specific countries is not likely to lead to sustained welfare gains. In short, if targeted export promotion policies are to be successful, they will have to be maintained long enough either for firms to become productive enough to sustain themselves abroad, or for a foreign country to develop an institutional framework that will establish its position as an attractive place for doing business.

We close by pointing out some limitations in this study. First and foremost, we have focused on large firms only. Since these firms can be expected to experience lower trade barriers than small firms, our estimates are possibly conservative, i.e. they provide a lower bound regarding the impact of trade barriers on the export decision. More research in a similar vein as ours that also (or mainly) includes small firms would be helpful in finding a proper range of these impacts. Second, our sample only covers two years of data, which implies that we derive essentially all our variation from the cross-section dimension. Having a longer time-frame would allow investigating the impact of specific events that likely affect export decisions, such as the EU enlargement in 2004 or the global crisis in 2008. These types of events could have a significant effect on trade costs which could work out differently for the extensive and intensive margin.

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Appendix 1: Theoretical model

Consider a world with *M* potentially asymmetric countries, where firms produce goods using labour *L* as the sole production factor. Consumers in each country maximize utility. There is one homogenous goods sector (good 0) and a sector *h* with a continuous set Ω_h of differentiated varieties. Utility is modelled in a two-tier utility function: the first Cobb-Douglas tier models the substitution of consumption (*q*) between both sectors with substitution parameter μ, and the second CES tier models the substitution between the different varieties ω in the differentiated goods sectors with substitution parameter σ, as follows:

$$U = q_0^{\mu_0} \prod_{h=1}^{H} \left(\int_{\Omega_h} q_h(\omega)^{(\sigma_h - 1)/\sigma_h} d\omega \right)^{[\sigma_h/(\sigma_h - 1)]\mu_h} \tag{A.1}$$

where $\mu_0 + \mu_h = 1$. Consumers in country *j* earn income Y_j of which a part μ_h is spent on (varieties of) good *h*. The perfect price index for good *h* in country *j* is given by:

$$P_j^h = \left(\sum_{r=1}^{M} n_r p_{rj}^{1-\sigma_h} \right)^{1/(1-\sigma_h)} \tag{A.2}$$

where *r* denotes country, *n* is the number of firms, and *p* is the price. Total expenditure on good *h* in country *j* is thus given by $\mu_h Y_j P_j^h$. Applying Shephard's lemma to the price index in (A.2) yields individual demand for a variety of good *h*, supplied by firms from country *r* to consumers in country *j*: $q_{rj}^h = \mu_h p_{jr}^{-\sigma_h} Y_j P_j^{h^{\sigma_h - 1}}$.

The homogenous good functions as the numeraire: it is freely traded and produced under constant returns to scale using one unit of labour, thus producing w_m units of good 0 where w_m is country *m*'s wage rate. Trading the differentiated goods is costly in two ways: first, producers incur a variable "iceberg" trade cost τ_{jk}^h when shipping good *h* from country *j* to country *k*. These costs entail all variable trade costs, such as tariffs and transport costs. Second, producers incur a fixed export cost F_{jk}^h. These fixed export costs are of key interest in this study.

Producers or firms are heterogeneous in terms of labour productivity. Each firm *i* draws a random unit of labour productivity φ_i, which has a cumulative distribution function of $G(\varphi)$. Hence, firm *i* based in country *j* and supplying to consumers in country *k* maximizes the following profit function with respect to prices:

$$\pi_{ijk} = p_{ijk}^h q_{kj}^h - \frac{w_j \tau_{jk}^h}{\varphi_i^h} q_{kj}^h - F_{jk}^h \tag{A.3}$$

Substituting demand into (A.3) and optimizing yields the optimal price as a constant mark-up over marginal costs, which is reminiscent of the familiar Dixit-Stiglitz price, with the difference that more productive firms (higher φ_i) can charge lower prices:

$$p_{ijk}^{h} = \frac{\sigma_h}{\sigma_h - 1} \frac{w_j \tau_{jk}^{h}}{\varphi_i^{h}} \tag{A.4}$$

Substituting (A.4) into (A.2) yields the following price index:

$$P_j^{h} = \left(\sum_{r=1}^{M} n_r \int_{\bar{\varphi}_{rj}^{h}}^{\infty} \left(\frac{\sigma_h}{\sigma_h - 1} \frac{w_j \tau_{rj}^{h}}{\varphi_i} \right)^{1-\sigma_h} dG_h(\varphi) \right)^{1/(1-\sigma_h)} \tag{A.5}$$

where $\bar{\varphi}_{rj}^{h}$ denotes the minimum productivity level necessary for firms from country *r* to be able to profitable export to country *j*. Its value is derived explicitly below.

In order to analytically solve the model, it is assumed that productivity shocks are Pareto distributed with shape parameter γ_h, over [1, ∞):

$$P(\tilde{\varphi}^{h} < \varphi) = G_h(\varphi) = 1 - \varphi^{-\gamma_h} \tag{A.6}$$

where $\gamma_h > \sigma_h - 1$. γ is a measure of sector heterogeneity: the smaller is γ, the more heterogeneous is a sector. Using the optimal price from (A.4) in the demand function, and plugging this back into the profit function in (A.5) yields equilibrium firm profits:

$$\pi_{jk}(\varphi) = \frac{\mu_h}{\sigma_h} Y_k \left[\frac{\sigma_h}{\sigma_h - 1} \frac{w_j \tau_{jk}^{h}}{\varphi P_k} \right]^{(1-\sigma_h)} - F_{jk}^{h} \tag{A.7}$$

Putting these profits to 0 and rearranging the equation yields the productivity threshold above which firms from country *j* find it profitable to export to country *k*:

$$\bar{\varphi}_{jk}^{h} = \lambda_1 \left(\frac{F_{jk}^{h}}{Y_k} \right)^{1/(\sigma_h - 1)} \frac{w_j \tau_{jk}^{h}}{P_k} \tag{A.8}$$

where λ_1 is a constant.[24] Using this formulation for the cut-off level of productivity, together with the assumption Pareto distributed productivity draws in (A.6) allows us to write the perfect price index *P* as a follows:

[24] $\lambda_1 = (\sigma_h / \mu_h)^{1/(\sigma_h - 1)} (\sigma_h / (\sigma_h - 1))$

$$P_k = \lambda_2 \, Y_k^{1/\gamma - 1/(\sigma-1)} \, \theta_k \qquad \theta_k = \sum_{r=1}^{N} (Y_r / Y)^{-1/\gamma} \, (w_r \tau_{rk}) \, F_{rk}^{1/(\sigma-1)-1/\gamma} \tag{A.9}$$

where λ_2 is again a constant[25], and θ_k is similar to Anderson and Van Wincoop's (2003) multilateral resistance index. Essentially, it captures the remoteness of a country with respect to all its trading partners (including itself). In contrast to earlier specifications, this index also weights multilateral resistance by fixed export costs. Note that we have ignored the different varieties of goods and effectively assumed one variety in deriving equation (A.9) by skipping the index *h*. The reason is that we do not distinguish different industries in our empirical analysis. We will drop the index *h* from this point forward.

Finally, substituting (A.9) back into the productivity threshold of (A.8) gives the equilibrium productivity threshold for firms serving country *k* from country *j*:

$$\bar{\varphi}_{jk} = \frac{w_j \tau_{jk}}{\theta_k} \left[\frac{Y}{Y_k} \right]^{1/\gamma} \left[\frac{F_{jk}}{\lambda_4} \right]^{1/(\sigma-1)} \tag{A.10}$$

where λ_4 is a constant. (A.10) will serve as the basis for estimating the extensive export margin decision. Conditional on a positive export decision, exports from firm *i* based in country *j* to country *k* are derived by substituting the price index (A.9) and the equilibrium price (A.4) into the equation for export values:

$$x_{ik} = p_{ij} q_{ij} = \lambda_3 \varphi_i^{\sigma-1} \left[\frac{Y_k}{Y} \right]^{(\sigma-1)/\gamma} \left[\frac{\theta_k}{w_j \tau_{jk}} \right]^{(\sigma-1)} \quad \text{if} \quad \varphi_i \geq \bar{\varphi}_{jk} \tag{A.11}$$

$$0 \text{ if } \varphi_i < \bar{\varphi}_{jk}$$

Equation (A.11) is the basis for estimating the intensive export margin.

[25] See Chaney (2008) p. 1713 for the exact definition of this and subsequently introduced constant terms.

Appendix 2: Econometric model

The theoretical model briefly discussed in Section 2 and presented in Appendix 1 establishes the productivity threshold (A.10) facing firms from home country *j* that wish to export to country *k*, as well as the amount of exports (A.11) once this threshold has been taken. These two equations form the underpinning of our estimations. In this Appendix we will demonstrate that they naturally lead to the derivation of a Heckman selection model (Heckman, 1979).

Note that if a firm's productivity is at least as high as the threshold in (A.10), it will serve market *k*. Otherwise, it will not export its products to this market. In other words, firm *i* from country *j* will export to country *k* if the following condition holds:

$$\varphi_{ij} \geq \overline{\varphi}_{jk} \Leftrightarrow \varphi_{ij} \geq \frac{w_j \tau_{jk}}{\theta_k} \left[\frac{Y}{Y_k} \right]^{1/\gamma} \left[\frac{F_{jk}}{\lambda_3} \right]^{1/(\sigma-1)} \tag{B.1}$$

We can now construct a latent variable Exp^*_{ijk} which is the difference between the (log-linearized) left hand side and right hand side of (B.1):

$$Exp^*_{ijk} = \ln \varphi_{ij} - \ln\, w_j \tau_{jk} + \ln \theta_k - \frac{1}{\gamma}(\ln Y - \ln Y_k) - \frac{1}{(\sigma-1)}(\ln F_{jk} - \ln \lambda_3) + \varepsilon_{ijk} \tag{B.2}$$

From above it follows that firm *i* will export to country *k* if $Exp^*_{ijk} \geq 0$. Hence, if we construct a binary variable $Exp_{ijk} \in [0,1]$ where a value of 0 indicates no exports by firm *i* from country *j* to country *k* and a value of 1 indicates positive exports, we can establish the following relationship between this binary variable and our latent variable:

$$\begin{aligned} Exp_{ijk} &= 1 \text{ if } Exp^*_{ijk} > 0 \\ Exp_{ijk} &= 0 \text{ if } Exp^*_{ijk} \leq 0 \end{aligned} \tag{B.3}$$

Since we have only one home country *j* in our sample (the Netherlands) and two years of observations, we drop subscript *j* and add a subscript *t*. We further assume that the error term ε in (B.2) is a linear composite of unobserved firm (η), country (ϕ) and time (ν) heterogeneity, as well as an idiosyncratic component (υ), *i.e.*:

$$\varepsilon_{ikt} = \eta_i + \phi_k + \nu_t + \upsilon_{ikt} \tag{B.4}$$

where we assume that υ follows a standard normal distribution and that it is independent of all the other variables on the right hand side of (B.2), as well as the other terms in (B.4). Then the probability of a positive export decision is given by:

$$\Pr(\upsilon_{ikt} > -(\ln\varphi_{it} - \ln\overline{\varphi}_{kt}) \mid \varphi_{it}, \overline{\varphi}_{kt}) = 1 - \Phi(-[\ln\varphi_{it} - \ln\overline{\varphi}_{kt}]) = \Phi(\ln\varphi_{it} - \ln\overline{\varphi}_{kt})$$
$$= \Phi\left(\ln\varphi_{it} - \ln w_t\tau_{kt} + \ln\theta_{kt} - \frac{1}{\gamma}(\ln Y_t - \ln Y_{kt}) - \frac{1}{(\sigma-1)}(\ln F_k - \ln\lambda_3) + \eta_i + \phi_k + \nu_t \right) \quad \text{(B.5)}$$

where Φ denotes the cumulative standard normal distribution and where the second equality on the first line of (B.5) follows from the symmetry of this distribution around its mean. This is a Probit binary choice model that can be estimated empirically from our dataset:

$$Exp_{ikt} = \Phi\left(\alpha_0 + \alpha_\varphi\varphi_{it} + \alpha_y y_{kt} + \alpha_Y y_t + \alpha_w w_t + \alpha_\tau\tau_{kt} + \alpha_\theta\theta_{kt} + \alpha_F F_k + \eta_i + \phi_k + \nu_t \right) \quad \text{(B.6)}$$

We have replaced the structural coefficients in (B.5) with α's as we do not intend to structurally estimate the model (cf. Crozet and Koenig, 2010). Also note that the constant term λ_3 has been replaced by β_0 and that we have omitted the *ln* transformation for ease of notation. As further explained in Section 4.1, this model is estimated by means of a pooled estimator, without country specific effects. In the robustness test (see Section 4.4) we also review the case in which η_i is randomly distributed (the Random Effects estimator).

Conditional on a positive export decision (i.e. Exp^*_{ijk}=1), firms then decide how much to export to country *k* at time *t*. Using (A.11) and log-linearizing both sides (again omitting the *ln* transformation on the RHS) yields:[26]

$$\begin{aligned} E(\ln x_{ikt} \mid Exp^*_{ikt} = 1) &= \beta_0 + \beta_\varphi\varphi_{it} + \beta_y y_{kt} + \beta_Y y_t + \beta_w w_t \\ &\quad + \beta_\tau\tau_{kt} + \beta_\theta\theta_{kt} + E(\xi_{ikt} \mid Exp^*_{ikt} = 1) \end{aligned} \quad \text{(B.7)}$$

which, using (B.5) can be rewritten to read:

$$\begin{aligned} E(\ln x_{ikt} \mid Exp^*_{ikt} = 1) &= \beta_0 + \beta_\varphi\varphi_{it} + \beta_y y_{kt} + \beta_Y y_t + \beta_w w_t \\ &\quad + \beta_\tau\tau_{kt} + \beta_\theta\theta_{kt} + E(\xi_{ikt} \mid \upsilon_{ikt} > -(\ln\varphi_{it} - \ln\overline{\varphi}_{kt})) \\ &= \beta_0 + \beta_\varphi\varphi_{it} + \beta_y y_{kt} + \beta_Y y_t + \beta_w w_t \\ &\quad + \beta_\tau\tau_{kt} + \beta_\theta\theta_{kt} + \frac{\sigma_{\upsilon\xi}}{\sigma^2_\xi} E(\upsilon_{ikt} \mid \upsilon_{ikt} > -(\ln\varphi_{it} - \ln\overline{\varphi}_{kt})) \\ &= \beta_0 + \beta_\varphi\varphi_{it} + \beta_y y_{kt} + \beta_Y y_t + \beta_w w_t \\ &\quad + \beta_\tau\tau_{kt} + \beta_\theta\theta_{kt} + \sigma_{\upsilon\xi}\frac{\phi(X'_{ikt}\beta)}{\Phi(X'_{ikt}\beta)} \end{aligned} \quad \text{(B.8)}$$

[26] As before, we have replaced the structural coefficients with β's to stress we do not aim to structurally estimate the model.

where we have used ($X'\beta$) to substitute for the RHS of (B.2), ϕ denotes the normal marginal distribution, and as before Φ denotes the cumulative normal distribution.

The expression following the second equality in (B.8) follows from a common assumption on the joint distribution of the error terms in (B.2) and (B.7), which is a bivariate normal one with zero expectation, variances σ_{υ}^2 and σ_{ξ}^2 respectively, and covariance $\sigma_{\upsilon\xi}$. For two normal random variables, it holds that $E(\xi \mid \upsilon) = (\sigma_{\upsilon\xi} / \sigma_{\xi}^2)\upsilon$. The expression following the third equality follows both from a normalization of σ_{ξ}^2 to 1 as well as the expression for a truncated standard normal distribution.

The final element in the final expression on the RHS in (B.8) demonstrates that the intensive margin decision is indeed affected by the extensive margin decision. This element - the ratio of the marginal normal distribution over the cumulative normal distribution - is also known as the inverse Mill's ratio, or alternatively, as Heckman's lambda (Heckman, 1979). Specifically, it shows that if the two error terms of the extensive and intensive margin decisions are correlated, we should expect to find a significant coefficient estimate for Heckman's lambda (i.e. a significant estimate of $\sigma_{\upsilon\xi}$). The reason is that there might be unobserved heterogeneity or idiosyncratic shocks that simultaneously affect the decision to export and the export volume decision. It also means that in order to properly estimate the intensive margin decision's coefficients, we should include an estimate of Heckman's lambda - derived from the extensive margin decision - in the estimation. This leads to the following estimating equation:

$$\begin{aligned} \ln x_{ikt} &= \beta_0 + \beta_{\varphi}\varphi_{it} + \beta_y y_{kt} + \beta_Y y_t + \beta_w w_t + \beta_{\tau}\tau_{kt} + \beta_{\theta}\theta_{kt} + \beta_{\lambda}\lambda_{ikt} + \zeta_{ikt} \\ &\text{s.t. } \zeta_{ikt} = \xi_{ikt} - E(\xi_{ikt} \mid X'_{ikt}, Exp^*_{ikt} = 1) \end{aligned} \tag{B.9}$$

where λ is Heckman's lambda and its coefficient captures the covariance between the extensive and intensive margin decision.

To enhance identification of the β's, it is often recommended to specify an exclusion restriction i.e. to include a variable in (B.6) which is not included in (B.9). This is especially convenient if the explanatory variables in the two models largely overlap (as they do in this case) and if Heckman's lambda is close to being linear. As can be seen by comparing (A.10) and (A.11) or (B.6) and (B.9), our model suggests a natural candidate for such an exclusion restriction: fixed export costs. It is this aspect of the model and its econometric implication that we exploit in the main analysis.

Appendix 3: Country table

Table A.1 Country sample

Albania	Ecuador	Kenya	**Portugal**
Algeria	**Egypt**	Kyrgyzstan	**Russia**
Argentina	El Salvador	Latvia	Rwanda
Australia	Estonia	Lithuania	Senegal
Austria	Fiji	Luxembourg	**Slovak Republic**
Azerbaijan	**Finland**	Madagascar	Slovenia
Bangladesh	**France**	Malawi	**South Africa**
Belgium	Gabon	**Malaysia**	**South Korea**
Belize	Georgia	Mali	**Spain**
Benin	**Germany**	Malta	Sri Lanka
Bolivia	Ghana	Mauritius	**Sweden**
Botswana	**Greece**	**Mexico**	**Switzerland**
Brazil	Guatamala	**Mexico**	Syria
Bulgaria	Guyana	**Morocco**	**Thailand**
Burundi	Honduras	Namibia	Togo
Cameroon	**Hungary**	Nepal	Trinidad and Tobago
Canada	Iceland	**New Zealand**	**Tunesia**
Central African Republic	**India**	Nicaragua	**Turkey**
Chile	**Indonesia**	Niger	Uganda
China	**Iran**	**Nigeria**	**Ukraine**
Colombia	**Ireland**	**Norway**	**United Kingdom**
Costa Rica	**Israel**	**Pakistan**	**United States**
Croatia	**Italy**	Panama	Uruguay
Cyprus	Ivory Coast	Paraguay	**Venezuela**
Czech Republic	Jamica	**Peru**	Zambia
Denmark	**Japan**	**Philippines**	
Dominican Republic	Jordan	**Poland**	

Notes: Countries in bold are part of the large country sample