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Firm-Level Consequences of Export Demand Shocks

SWEDISH AND FINNISH EXPORTERS

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Abstract

This paper analyzes how firms with different financial strength levels respond to demand shocks in their export markets. We utilize unique administrative datasets of Swedish and Finnish firms matched with national customs data from 1999 to 2014, which allows us to analyze the effects of several macroeconomic shocks affecting the export product demand and performance of exporting firms. We find that financially stronger export firms are better positioned during both positive and negative demand shocks—suffering less from the negative shocks, benefiting more from the positive shocks.

While our results suggest that Swedish and Finnish firms tend to respond similarly to different export demand shocks, there are some salient differences in their survival strategies. While the financially stronger Swedish firms expanded their product lines and market areas, the Finnish firms did not make such adjustments during the 2007–2014 period of negative export demand shocks. By analyzing the firm-level survival strategies on export markets, we provide new insights into the divergent export growth trends of the two countries.

Tiivistelmä

Viennin kysyntäsokkien vaikutukset ruotsalaisten ja suomalaisten yritysten menestymiseen

Finanssikriisin jälkeen Suomen vienti on laahannut Ruotsin viennin perässä. Tässä tutkimuksessa on vertailtu viennin tuotekohtaisten kysyntäsokkien vaikutuksia Ruotsin ja Suomen vientimenestykseen ja yritysten toimintaympäristöön. Tutkimus on tehty hyödyntäen 15 vuoden seurantajakson kattavaa aineistoa Suomen ja Ruotsin teollisuuden vientiyrityksistä. Tutkimus osoittaa, että suomalaiset ja ruotsalaiset vientiyritykset reagoivat keskimäärin samalla tavoin kansainvälisen kaupan muutoksiin. Esimerkiksi, positiiviset tuotekohtaiset kysyntäsokit ovat lisänneet yritysten kokonaisvientiä ja vähentäneet niiden riskiä poistua vientimarkkinoilta. Myös taloudellisesti vahvemmat yritykset ovat pärjänneet kansainvälisen kaupan turbulensseissa taloudellisesti heikompia yrityksiä paremmin.

Suomalaisten ja ruotsalaisten vientiyritysten välillä löytyy myös eroavaisuuksia. Taloudellisesti vahvemmat ruotsalaiset yritykset ovat pystyneet vaimentamaan negatiivisten vientisokkien vaikutuksia lisäämällä sekä vientituotteiden että vientimaiden määrää vuosien 2007–2014 välisenä aikana. Vastaavia sopeutustoimia ei kuitenkaan havaita suomalaisten yritysten osalta. Nämä eroavaisuudet voivat osin selittää sen, miksi suomalaisten ja ruotsalaisten yritysten vienti on erkaantunut finanssikriisin jälkeisenä aikana Ruotsin hyödyksi.

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Keywords: Export competition, Financial strength, Firm-level, Trade flows

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1. Introduction

Global and regional macroeconomic shocks may hit countries very differently depending on the country characteristics such as size, financial stability, and export dependency. Small export-dependent economies are usually hit harder by the demand shocks in other countries than large economies because the latter typically have large domestic markets. However, even among small and advanced economies, the effect of demand shocks has been shown to vary greatly depending on the specific export product specialization and heterogeneous responses among exporters.

The link between aggregate export development and micro-level heterogeneity has been the focus of trade economists for more than two decades. Since Melitz (2003) introduced firm heterogeneity into Krugman's (1980) model of intra-industry trade, it has become a standard platform for analyzing a host of issues in international trade.[1] In the first groundbreaking contributions, productive firms self-select to exporters (Melitz, 2003; Yeaple, 2005; Bernard et al., 2007a,b). The literature that followed incorporated another layer of heterogeneity—namely heterogeneity at the product level—to international trade models and empirical analysis (Bernard et al., 2006; Nocke and Yeaple, 2006; Feenstra and Ma, 2008; Baldwin and Gu, 2009; Eckel and Neary, 2010; Arkolakis and Muendler, 2011; Mayer et al., 2014). The aggregate responses to changes in the trading environment emerge thus as a combination of endogenous dynamics of self-selection to exporters across firms and the dynamics of product choices within firms.

[1]In Melitz (2003), model firms are assumed to have constant markups of price over marginal cost. Bernard et al. (2003) and Melitz & Ottaviano (2008) develop models of firm heterogeneity in which firm markups are endogenous and show that trade liberalization can have a pro-competitive effect in reducing the price charged by a given firm through a lower markup of price over marginal cost.

Although the literature on heterogeneous firms and trade is already extensive, there are still areas of research to be explored further. In this paper, we focus on the behavior of incumbent exporters in a dynamic setting where demand conditions change due to business cycles and macroeconomic shocks. We go beyond aggregate exports and analyze the effect of product-destination-specific shocks on firm-level exports to shed light on the heterogeneous impact of changing market conditions on exporters.

This paper provides several contributions to the literature. First, we analyze demand shocks over a long period, from 1999 to 2014, which allows us to draw conclusions about episodes of both positive and negative demand shocks on the performance of heterogeneous exporters. Second, we compute the measures of firm-specific demand shocks by using information on the firms' initial product- and destination-specific export portfolios and analyze how demand shocks impact the export decisions of the incumbent heterogenous exporters, both at intensive and extensive margins. We distinguish heterogeneous exporters by their initial financial strength, since the previous literature suggests that this is an important determinant of the performance of exporting firms. Third, we use the universe of product, firm-specific, and destination-specific export data from two countries, Finland and Sweden. The two Nordic countries make an interesting case, as they share many similar characteristics, such as financial development, the degree of openness and export dependency, and the structure of export industries. However, despite the many similarities, the growth of the aggregate exports of the two countries has diverged ever since the financial crisis of 2008–2009. Using data from two similar countries with different paths of export development provides new insights into the role of the firm-level factors that are potentially independent or may interact with demand shocks.

During the period of study, we distinguish between two episodes with different macroeconomic shocks affecting the demand for exports. Both Finnish and Swedish exporters grew rapidly during the 1999–2007 period, which was characterized by the increased export

demand partially driven by China's becoming a member of the WTO. This growth period was followed by the financial crisis in 2007–2008, which was detrimental to global demand and, hence, had a negative effect on the export sectors in both Finland and Sweden. However, after the financial crisis, the development in total exports of the two countries began to diverge. We aim to shed light on the explanation for the divergence of Finnish and Swedish exports in the aftermath of the financial crisis by analyzing the effect of demand shocks on the firm-product-destination level exports. The firm-level focus allows us to account for firm heterogeneity, both in shocks and responses, and relates our study to the literature on heterogeneous firms and trade (Melitz, 2003; Bernard et al., 2012).

Our study is related to the branch of literature analyzing the effects of specific periods of financial distress, such as the 2007–2009 crisis, on both industrial output and exports (e.g., Levchenko et al., 2010; Cetorelli and Goldberg, 2011; Chor and Manova, 2012; Bricongne et al., 2012; Görg and Spaliara, 2014; Paravisini et al., 2015).[2] Dell'Ariccia et al. (2008) show that during periods of financial distress, industries that depend more on external finance are disproportionately affected. Kroszner et al. (2007) confirm these results and find that the contraction is more pronounced in countries with more developed financial systems. Studies analyzing the effects of financial crises on exports have found that a portion of the negative effects observed are likely due to financial frictions; in addition, industries with a higher propensity to export are hurt relatively more (Borensztein and Panizza, 2010; Amiti and Weinstein, 2011; Berman et al., 2012).

In addition to the papers concentrating on past crises, there is also extensive literature specifically investigating the role of financing constraints during the 2007–2009 financial crisis.

[2] Iacovone et al. (2019) rely on data from 160 countries during 1970–2012, including 147 banking crises. They show that exporters that are more dependent on external banking finance grow significantly less during financial crises.

Some of these studies find that the financial channel could have been a factor contributing to the trade collapse (Cetorelli and Goldberg, 2010; Chor and Manova, 2012). Several studies have suggested that the effects were more pronounced in industries that relied on bank financing, had few assets that could be used as collateral, or had limited access to trade credit (Bricongne et al., 2012; Görg and Spaliara, 2014; and Paravisini et al., 2014). Levchenko et al. (2010) and Eaton et al. (2016), on the other hand, suggest that the drop in demand was more important than restrictive credit provisions. However, a smaller group of studies that explicitly analyze the link between finance and trade, both theoretically (Manova, 2013; Chaney, 2016) and empirically (Greenaway et al., 2007; Minetti and Zhu, 2011; Manova et al., 2015; Muûls, 2015), have found evidence of the significant effects of financial constraints on both the extensive (more products and destinations) and intensive margins and that this impact goes above and beyond the effect on production.

In this study, we extend the literature by taking a firm-level long-term perspective. The long period of the study extends over years with both positive and negative macroeconomic and product-country level demand shocks. This allows us to analyze how firm characteristics such as financial strength interact with firm responses both in good and bad times. We follow previous studies and use liquidity and equity from the firms' balance sheets to proxy their financial strength (e.g., Greenway et al., 2007; Berman and Héricourt, 2010; Wagner, 2014 for a survey).[3] The interaction between firms' financial strength and the effect of demand shocks is not straightforward. For instance, sound financial conditions, such as less exposure to external

[3] Alternative ways to measure credit constraints are to use the credit rating scores provided by credit rating agencies (e.g., Muúls, 2015) or to use the subjective assessments of firms collected in surveys (Wagner, 2014, for a survey). For example, Minetti and Zhu (2011) used a binary indicator for credit rationing based on answers to survey questions about denied credits. Nevertheless, their measure for credit rationing was strongly correlated with firms' financial factors drawn from the balance sheet, such as liquidity and leverage ratios.

finance or higher equity or liquidity, usually indicate that the money is managed effectively and that the business will be able to pay off its debts, even in times of weaker demand. Thus, lending institutions are expected to be more inclined to extend credit to firms with better financial strength that are hit by a negative demand shock. However, higher equity (or lower debt ratio) may also indicate that the firm lacks investment and innovation opportunities and growth potential or perhaps is more conservative due to the heavier reliance on funding from shareholder equity than from debt. The relationship between higher debt ratio and firm-level performance is found to be non-monotonic. For example, Coricelli et al. (2012) show that that TFP (total factor productivity) growth increases with leverage (higher debt ratio) until it reaches a critical threshold beyond which leverage is negatively linked to TFP growth.

Our results suggest that aggregate export demand shocks had, on average, similar effects on the total exports and the likelihood of exporting among Finnish and Swedish firms, although the effects were slightly stronger and more precisely estimated for Finnish firms. Once we distinguish the effects by the sign of the shock and the financial strength of the firm, different patterns of responses are revealed. In general, we find that a firm's financial strength may act as a cushion against negative shocks, while firms with better financial strength grow faster in terms of exporting during positive trade shocks. However, the responses of the Finnish and Swedish firms seem to differ in some salient respects. The Swedish firms that were exposed to negative export demand shocks during the 2007–2014 period expanded their product lines and market areas, while the Finnish firms did not make such adjustments. Consequently, the adverse effects of the negative shocks on the total exports and the likelihood of exit from exporting were more pronounced for Finland than for Sweden. Furthermore, distinguishing the effects by the financial strength of the firms suggests that the financially stronger Swedish firms were able to mitigate the adverse effects of the negative demand shocks by adding new products and destinations. Similar adjustments were not observed among the financially stronger Finnish

firms facing negative demand shocks. These differences in the survival strategies among heterogeneous firms could provide an explanation for why the growth of Finnish aggregate exports has been sluggish while the Swedish aggregate exports recovered more rapidly after the financial crisis of 2008–2009 and have been hit less hard by the other negative macroeconomic shocks that followed after the financial crisis.

The remainder of the paper is structured as follows. Section 2 presents the stylized facts regarding exports in Finnish and Swedish firms. Sections 3 and 4 present the empirical strategy and data used in the analysis, respectively. The results of the analysis are discussed in Section 5. Section 6 concludes, summarizing the main results and outlining future research.

2. Stylized facts of exports in Finland and Sweden

During the period of study, we distinguish between two macroeconomic shocks affecting the demand of exporters. In the first period from 1999 until 2007, export demand increased as China became integrated in the world economy and global trade was growing rapidly. Both Finland and Sweden are home to several exporters and multinational firms that could exploit the new opportunities on the world market and benefit from the increasing global demand for products such as telecommunication equipment and products, machinery and other capital goods, pulp and paper, and consumer goods. During the first study period, approximately 60% of the growth in the Finnish manufacturing industry came from the electronics industry and 20% from other metal industries (Holmström et al., 2014). Swedish manufacturing similarly grew substantially over the same period. In fact, Swedish manufacturing was a world leader in productivity growth and generated an annual value-added growth of 5.3% between 1993 and 2007. A large part of this growth came from export-driven demand. The strongest growth was in the electrical and

optical products (the telecom industry), followed by transport equipment and the chemical and mechanical engineering industries (McKinsey, 2013).

As the financial crisis hit the global markets in 2008, the decline in exports was sharper than that of the total output between 2008 and 2011. The sudden dip in the global demand had a profound effect on the export sectors in both Finland and Sweden, as Figure 1 shows. However, the development in total exports of the two countries began to diverge after the financial crisis. While Sweden, among other advanced countries, experienced a rapid recovery in exports by the end of the second episode, Finland continued to suffer from sluggish export growth and did not return to the pre-crisis level of exports. During the global financial crisis, Finland's GDP declined by almost 9% (compared to a decline of only 4.8% in Sweden), which reflects the vulnerability of the economy to international growth trends. A decrease in the total output was heavily affected by the meltdown of the Nokia-led ICT cluster, and the paper industry faced falling demand in Europe. The profitability of the basic metals also deteriorated due to a decline in world market prices (Holmström et al., 2014). Sweden's more robust export recovery was aided by the fact that the country has a broader manufacturing base that is less dependent on capital goods than Finland.

The recovery of exports was further hampered by several adverse events in the period of 2011–2014. The Euro sovereign debt crisis, which started in Greece, caused shockwaves that were felt across the rest of Europe through a contagion of debt crises in Spain, Italy, and Ireland. At the end of the period, export demand was further affected by several parallel shocks—the slowing economic growth in China caused stock market turbulence and led to a devaluation of the yen; Greece defaulted on debt repayment to the IMF in 2015—all culminating in a referendum vote for Brexit in the UK in 2016. These parallel shocks weakened the economic outlook in Europe and the demand for exports, as may be seen in Figure 1. However, once

again, Finland was hit harder than Sweden and the other significant exporting countries in Europe.

[Add figure 1 here]

An additional factor that contributed to the slow recovery of Finnish exports after the financial crisis was the large wage increases that employers' organizations and trade unions agreed upon in collective agreements (TES) in various sectors in 2007. Due to the agreements, wages increased on average by 5% in 2008 and by 4% in 2009, despite the collapse of the GDP by 8.3% in 2009. The anti-competitive impact of these wage increases on real unit labor costs (RULC) in Finland can be seen in Figure 2, which plots the development of the costs in manufacturing for Finland, Sweden, Germany, the UK, and the US. It should be noted that the real unit labor costs decreased in Finland until the financial crisis; thereafter, they increased more rapidly than in Germany, the UK, and the US. After 2010, the real unit labor costs increased in Finland even more rapidly than in Sweden. The wage increases contributed to a decline in the cost-competitiveness of the Finnish firms in relation to Sweden and other countries after the financial crisis.

[Add figure 2 here]

It is worth noting that, while Finland is part of the eurozone, Sweden has opted not to adopt the euro. This means that the Swedish central bank is free to set its own monetary policy and, hence, able to be proactive regarding the economic climate in Sweden. This is not the case in Finland, where monetary policy is set by the European Central Bank (ECB). In addition, there are some restrictions on fiscal policy dictated by the Stability and Growth Pact of the monetary union. Therefore, Finland is required to keep its fiscal budget in check, which means that the fiscal

response to the macroeconomic climate is likely to be much more muted than in Sweden's case. In times of economic crises, Sweden has benefited from having national currency and monetary policy that act as a cushion (Korkman and Suvanto, 2015). For instance, in 2008–2009, when Finland suffered from the loss of cost competitiveness due high wage increases, Sweden benefited from a depreciation of the Swedish Krona against the euro and USD, as shown in Figure 3. This helped Swedish exports recover (faster) in the wake of the Great Financial Crisis.

ˆAdd figure 3 here '

3. Empirical estimation strategy

3.1. Firm-level export demand shocks

To analyze the causal effect of export demand shocks on firm exports and other performance, we follow Mayer et al. (2021) and Aghion et al. (2022) in constructing an exogenous firm-level measure of export demand shocks. The underlying idea is that the changes in destination *j*'s imports of product *s* from the world (excluding exporter's country of origin) between *t* and t_0 (the initial year of the period) proxy the export demand faced by firm *f*. For a firm with multiple products and destinations, we construct an overall firm-level measure by weighting destination *j*'s imports of product *s* with the shares of product and destination-specific exports in the export portfolio of the firm *f* in t_0.

More formally, consider an exporter *f* that exports a product *s* to destination *j* at an initial date t_0 and let $M_{j,s,t}$ denote the aggregate import flow in product *s* into country *j* from all countries except the country of origin of the exporter (i.e., Finland or Sweden) at time $t > t_0$. $M_{j,s,t}$ reflects the size of the (*s, j*) export market at time *t*. By excluding the total exports from

the country of origin to destination *j*, we seek to exclude the sources of variation that originate in the firm's home country and may be correlated with changes for the firm. We then sum over the $M_{j,s,t}$ across destinations *j* and products *s* weighted by the relative importance of each product-market *(s, j)* in firm *f*'s exports at the initial date t_0. Finally, we multiply the weighted export demand measure by the firm's initial export intensity (defined as the ratio of exports to total production of the firm *f* at t_0) so that the impact of any export shock is proportional to a firm's exports in total production.

Let t_0 is the first year of the studied period including all firms with positive exports. $X_{f,j,s,t0}$ denotes firm *f*'s export flow to market (*j, s*) at time t_0. The export demand shock for firm *f* between the start and the end of the period is then constructed as:

$$\Delta D_{f,t} = \sum_{j,s} w_{f,j,s,t_0} \frac{\Delta M_{j,s,t}}{\frac{1}{2}(M_{j,s,t} + M_{j,s,,t_0})} \quad (1)$$

where the weight $w_{f,j,s,t_0} \equiv (X_{f,t_0}/S_{f,t_0})(X_{f,j,s,t_0}/X_{f,t_0})$ represents firm *f*'s initial share of the sales of product *s*, at the HS6 level, to destination *j*, $X_{f,,t_0} \equiv \sum_{j,s} X_{f,j,s,t_0}$ represents the firm's total exports, and S_{f,t_0} represents the firm's total sales at start year t_0. Thus, the sum of exposure weights $w_{f,j,s,t0}$ across (*s, j*)'s is different from one since the weight also includes firm *f*'s overall export intensity in total sales. It implies that firms with identical export portfolios may still have a different shock exposure depending on their export intensity.

The constructed demand shock resembles a standard shift-share or "Bartik" (Bartik, 1991) setting in which the aggregate shocks are combined with the measures of shock exposure. The shift share instruments measuring the shock exposure by the changes in destination-product specific imports as a proxy for export supply have been used in previous studies analyzing, for instance, offshoring and import competition (e.g., Hummels et al., 2014). We note that the time

variation in our demand shock $\Delta D_{f,t}$ stems from the variation in the world export flow $M_{j,s,t}$ and not the firm-level weights, which are fixed at the start year of the period of analysis.

3.2 The expected effects of export demand shocks on exporting

A negative shock implies that the destination market for the export good is contracting, which, on average, is expected to impact the exports of a firm adversely, either as contracting export sales or as a product- or firm-level exit from the market. The expected effect of an expanding destination market or a positive export demand shock is, however, ambiguous, since a growing market not only increases the sales per firm but also induces market entry leading to tougher competition. Thus, the competition effect on firm-level exports could be either negative or positive, depending on both the characteristics and responses of heterogeneous firms. However, we expect that the positive market size effect dominates, although some firms might be crowded out from the market. Ultimately, the effect of demand shocks on exporting is an empirical question.

The previous literature provides some further information on the different mechanisms through which an increase in an export market affects firms. Aghion et al. (2022) present a framework where an increase in market size in any export destination will attract new firms into the export market as more firms find it profitable to sell there. As support for the market size and competition effect, they present a positive correlation between the export demand shocks and the various measures of firm entry into the corresponding destination markets. Aghion et al. (2022) find that the combination of the direct market size effect and its induced competition effect leads to a skewed innovation response where the firms closest to the technological frontier increase innovation the most and the least productive firms could

decrease innovation. Although Aghion et al. (2022) do not specifically focus on the long-term effects of demand shocks on exports, it is not far-reaching to anticipate that the firm-level differences in the innovation response translate into differences in the future success on the export markets.

Mayer et al. (2014) focus on the effects of competition on the intensive product margin of incumbent exporters. "Tougher" competition in a market is characterized by a larger number of sellers and a lower average price of sellers, which both induce a downward shift in the distribution of mark-ups across firms. Due to the variable price elasticities, the firms selling the same set of products in different markets skew their sales toward their best performing products in markets where they face tougher competition (due to the higher price elasticities in those markets). The data on French exporters across export market destinations provides strong empirical confirmation of this competitive effect.[4]

Some empirical studies also highlight that an expansion in the export product market attracts more low-wage import competition, particularly from China, which leads to fiercer competition (e.g., Auer et al., 2013). Nilsson Hakkala and Pan (2019) used the product-firm-level data for Finland and find that increased Chinese share of the export market decreased prices and the total value of export goods, crowded out firm-product-destination level exports, and deteriorated the overall firm performance for the Finnish exporters.

The main focus of our analysis is the interaction between the demand shocks in export markets and the financial strength of the firm. A negative demand shock in foreign markets causing a slump in export revenues may have implications on the firm's ability to meet its

[4] Eckel and Neary (2010) highlight another pro-competitive effect that arises when firms internalize the effects of new products on the sales of their existing products. This cannibalization effect operates at the extensive margin and generates an additional incentive for multi-product firms to drop their worst performing products when faced with increased competition from trade.

financial obligations, such as those of repaying loans and servicing debt. The financial distress following the initial shock could also decrease the firm's creditworthiness, making it more difficult for the firm to access the credit market. Access to credit is particularly important in times of financial distress, as it helps the firm weather the headwind by looking for new export markets, upgrading products, and/or innovating new products. If credit access is constrained, the firm may have to cut back on investments, production, and workforce. Firms with stronger finances, such as those with low debt levels and higher liquidity, are in a better position to absorb a negative demand shock, to benefit from a positive demand shock, and to continue innovating new products, investing in their business, and expanding into new markets. Thus, we would expect the financial strength of a firm to mitigate the adverse effects of the negative shocks and to amplify the favorable effects of the positive shocks.

3.3 Estimation models

Next, we present our baseline estimation model for analyzing the effect of export demand shock variable $\Delta D_{f,t}$ on firm-level responses. We define our specification in first-differences, which eliminates any bias that would be generated by a correlation between non-time-varying firm characteristics (likely to affect current and future exports) and the level of the demand shock $\Delta D_{f,t}$. We note that this type of correlation between the changes in the demand shock $\Delta D_{f,t}$ and the firm characteristics is substantially less likely than a correlation with the level of the demand shock $D_{f,t}$. For instance, Aghion et al. (2022) find, in a control function, that there is a strong correlation between the demand shock in levels and the firm characteristics (better performing firms tend to export to destinations with higher levels of demand), but that there is no correlation between those variables and changes in demand $\Delta D_{f,t}$. Furthermore, Borusyak et al. (2022) and Goldsmith-Pinkham et al. (2020) point out that even when such a correlation between the firm

characteristics and future demand shocks remains, the induced bias disappears as the number of shocks (our combination of destination-product pairs) grows large. Our baseline estimation model is specified as:

$$\Delta Y_{f,t} = \beta_1 \Delta D_{f,t} + X_{ft0}' \boldsymbol{\gamma} + e_{f,t} \qquad (2)$$

where $\Delta Y_{f,t}$ is defined as the change in the firm-level performance and $\Delta D_{f,t}$ is the export demand shock defined in Equation (1) between the start and the end year of the period. X_{ft0} is a vector of the firm-level characteristics at the start year.

We expect firms to react to the shocks between the start and the end year, both at the intensive (changes in exports for a previously exported product *s* to a destination *j*) and the extensive margin (changes in the set of products *s* sold across destinations *j*). At the intensive margin, the variable $\Delta Y_{f,t}$ is defined as total exports, sales, employment or productivity, and, at the extensive margin, it is defined as the number of products or destinations or an exit from exporting.

We divide our sample period from 1999 to 2014 into pre- and post-financial crisis periods, 1999–2007 and 2007–2014, motivated by the macroeconomic events affecting the demands that were discussed in the introduction. It should be noted that, although we split the study period according to time-specific macroeconomic developments, our measures of export demand shocks are product- and firm-specific. This implies that firm-specific export demand shocks could be positive during a period of adverse macroeconomic developments, or vice versa.

We further test whether there is a symmetrical or asymmetrical relationship between the export demand shock and the firm's performance in exporting. To this end, we estimate Equation (3) and allow the positive and negative export demand to differ as follows:

$$\Delta Y_{f,t} = \beta_1 \Delta D_{f,t} I^N_{f,t} + \beta_2 \Delta D_{f,t} I^P_{f,t} + X_{ft0}{}' \boldsymbol{\gamma} + e_{f,t} \quad (3)$$

where $I^N_{f,t}$ is an indicator variable that equals 1 if the export demand shock of firm *f* in year *t* is negative and equals 0 otherwise. Similarly, I^P_{ti} is an indicator variable that equals 1 if the export demand shock of firm *f* in year *t* is positive and equals 0 otherwise.

In addition to the direct effect of the export demand shocks on a firm's performance, we add an interaction between the demand shock measure and the firm's initial financial strength at the start year. A firm's initial financial strength in t_0, in interaction with the export demand shock measure, captures the indirect competition effect of a demand shock in the export markets. We create an indicator variable P^L_{f,i,t_0} to all firms equaling 1, if the firm's *f* financial strength at start year t_0 is below the median within their 2-digit sector *i* and equals 0 otherwise. Similarly, P^H_{f,i,t_0} equals 1, if the firm's *f* financial strength at start year t_0 is above the median within their 2-digit sector *i* and equals 0 otherwise. Relating the financial strength of a firm to the financial strength of firms within the same 2-digit industry neutralizes the differences due to physical and human capital intensity and other industry-level differences in proxies of financial strength. Our estimation model with heterogeneous effects is specified as:

$$\Delta Y_{f,t} = \beta_1 \Delta D_{f,t} P^L_{f,i,t_0} + \beta_2 \Delta D_{f,t} P^H_{f,i,t_0} + X_{ft0}{}' \boldsymbol{\gamma} + e_{f,t} \quad (4)$$

Our final estimation strategy is to examine the effects of the negative and positive demand shocks by the firm's initial financial strength at the start year.

To analyze whether the effects of the positive and negative shocks depend on the firm heterogeneity in terms of financial strength, we add interactions between the negative demand shock measure $\Delta D_{f,t} I^N_{f,t}$ and the firm's initial financial strength at start year, divided into firms that are below or above the median within their 2-digit sector, as illustrated in P^L_{f,i,t_0} and P^H_{f,i,t_0}.

Similarly, the model is augmented with interactions between the positive demand shock measure $\Delta D_{f,t} I^P_{f,t}$ and the indicator variables P^L_{f,i,t_0} and P^H_{f,i,t_0}. Our estimation model with four heterogeneous effects is specified as:

$$\Delta Y_{f,t} = \beta_1 \Delta D_{f,t} I^N_{f,t} P^L_{f,i,t_0} + \beta_2 \Delta D_{f,t} I^N_{f,t} P^H_{f,i,t_0} + \beta_3 \Delta D_{f,t} I^P_{f,t} P^L_{f,i,t_0} + \beta_4 \Delta D_{f,t} I^P_{f,t} P^H_{f,i,t_0} + X_{ft0}' \boldsymbol{\gamma} + e_{f,t} \quad (5)$$

As discussed in this section, we expect financially weaker firms to suffer more from the negative demand shocks and benefit less from the positive demand shocks than the financially strong firms. In the estimations for the total sample, the sign of the coefficient of the interaction terms will depend on whether the negative or the positive shocks dominate the respective group of firms during the sub-period. For this reason, we will also estimate the effects of the shocks and their interactions with financial strength separately for the firms experiencing positive respective negative shocks.

4. Data sources and measures

4.1. Data from Finland and Sweden

This analysis is based on various administrative registers from Statistics Finland and Statistics Sweden. The key data from Finland are the Financial Statement panel data, which include firms' most essential profit and loss accounts and balance sheet data. Key variables such as value added and other provisional variables are comparable over time. The data exhaustively cover all independent business enterprises in almost all industries from 1999 onwards. All enterprises with at least 20 employees are included in the direct data collection, and the data

of mainly smaller enterprises and non-respondent enterprises are derived from administrative records (business taxation registers). The data include information on important background characteristics for industry, number of personnel (originates from the Business Register), value added, sales, current, and equity ratios. The data from Sweden originates from Statistics Sweden (SCB) and consists of merged information from multiple databases. The FEK (Structural Business Statistics) database is the business register of all Swedish firms with detailed information on the number of employees, industry, sales, and the financial accounts of the firm. The firm-level data for Finland include information for the 1999–2016 period and, for Sweden, for the 1999–2014 period.

To measure an exogenous export demand shock instrument, we utilize the Comtrade database and firm-level customs data sources from both Sweden and Finland. The Comtrade database is a comprehensive register of all export and import flows between country pairs and includes goods classifications up to the 6-digit HS2002 level. The UN's Comtrade data in connection to the Finnish and Swedish customs data are used to calculate for each good-reporting country pair the total imports from the world market and the imports from Finland or Sweden. The customs datasets cover both the exports and imports of goods at the firm level for the period from 1999. These data include the total values of imports and exports to/from all partner countries. The goods are categorized at the most detailed goods category (8-digit level) based on the CN (Combined Nomenclature). In the analysis, we consequently aggregate the goods category to the 6-digit product level.

4.2. Variables

Four variables are used to capture a firm's performance in exporting. All the data sources and variable definitions are summarized in Table A1 of the appendix. The first outcome is the total value of the firm's exports in euros/SEK. The second outcome is an indicator variable describing whether a firm *f* exited exporting between the years t_0 and t, conditional on surviving. We include two additional measures to describe firm-level exporting at the extensive margin, namely the number of products that are being exported and the number of destination countries to which a firm exports its products. These two variables are measured to firms that export both at the initial and last year. Accordingly, we examine the effect of export demand shock on a firm's sales (in euros/SEK), number of personnel, and labor productivity (value added per worker). Each continuous variable is measured as the difference in logarithmic forms between years t_0 and t.

We analyze how firms with different financial strength levels respond to demand shocks in their export markets. This question is related to the extensive literature dealing with credit constraints and firm-level performance. Credit constraints are usually not directly observable, and, therefore, indirect measures derived from financial information of the balance sheets are often used to proxy the probability of credit constraints (e.g., Greenway et al., 2007; Berman and Héricourt, 2010; Wagner, 2014 for a survey). The most common measures of the firm's financial health are the liquidity ratio and leverage ratio. The liquidity ratio measures a company's ability to pay short-term obligations, while the leverage ratio or its various proxies, including debt-to-equity ratio (see, e.g., Knudsen and Lopatin, 2023), measures the level of debt or how much capital comes in the form of debt. We follow previous literature and use the current ratio as a measure for liquidity and equity ratio as the measure for the relation between the firm's equity to total assets, which is considered as an inverse to leverage. To measure the firm's initial financial strength, we use indicator variables for the current and equity ratios at

the start year t_0, measured as the below or above sector-specific median current or equity ratios. In the estimations, we use the current ratio as our main proxy of financial strength, because the definition of "equity ratio" is not exactly the same in the Finnish and Swedish data sets.

The model is further augmented with controls for the initial industry at year t_0 (9 indicators). The information on industry in the manufacturing sector is based on the Standard Industrial Classification and is categorized into nine aggregated groups based on a 2-digit classification. These categories are food products and beverages; textiles, wearing, and leather products; wood, pulp, and paper products; chemicals, rubber, and non-metallic products; metal products; machinery and equipment; electrical and optical equipment; transport equipment; and furniture and recycling.

4.3. Descriptive statistics

Table 1 reports the summary statistics of the exporting firms in the manufacturing sector for the years 1999, 2007, and 2014. For Finland, the total level of exports peaked in 2007 (36 million euros) and decreased to 28 million by the year 2014. For Sweden, the level of exports was approximately the same in 2007 and 2014 (243 million SEK). The average number of products being exported has increased over time both in Finnish and Swedish firms, from 15 products in 1999 to 17 and 19 products in 2014 for Sweden and Finland, respectively. Finnish firms have exported their products to 13 countries and Swedish firms have exported to 14 countries, on average. Finnish exporters are slightly larger than Swedish exporters, measured by the number of employees. The financial strength of the firms has increased from 1999 to 2014 both in Finland and Sweden. For example, the current ratio was approximately 2.0 in 1999 and increased to 2.4 in Finland and to 2.2 in Sweden. Current ratios of 2.0 or greater would generally indicate good liquidity. Equity ratio has been approximately 39% in Finnish firms, while in Sweden, the average equity ratio has increased from 25% to 33% between 1999

and 2014. The largest sectors both in Finland and Sweden are wood, pulp and paper products, metal products, and the machinery and equipment sector, totaling over 50% of the entire manufacturing industry.

ˆAdd Table 1 in here ‘

5. Firm-level adjustments to export demand shocks

5.1. Baseline estimation results

The estimation results of the baseline specification from Equation (2) are reported in Table 2. The results show that an export demand shock had a positive impact on the value of firms' total exports and a negative impact on the likelihood of an exit from the export markets and the number of exporting countries for the period 1999–2007 (Panel A). The parameter estimates are statistically significant at least at the 1% significance level for Finland but not statistically significant at the conventional level regarding the level of exports for Sweden. We document strong impacts on the alternative measures of firm-level performance for the 1999–2007 period. In particular, the export demand shock increased the sales and labor productivity in both the Finnish and Swedish exporters operating in the manufacturing sector. We also find that such a demand shock had a positive effect on the number of employees for Finland and the number of exported products for Sweden.

Thus, we find that both Finnish and Swedish export firms benefitted from the global demand shocks during the first period stretching until 2007, arguably partly caused by China entering the World Trade Organization (WTO) in 2001 and the increasing integration of the world economy. In the post-financial-crisis period (2007–2014), the impact of export demand shocks diverged for the Finnish and Swedish firms (Panel B). While the shocks had a statistically significant and negative effect on the exit probability and the number of export

destinations for Finland, the shocks positively impacted sales, employment, and productivity for Sweden.

ˆAdd Table 2 in here ‘

Next, we separate the effect of the demand shock by the sign of the shock. The regression estimates for the overall demand shock could hide an important heterogeneity depending on whether the shock was positive or negative. Tables 3 and 4 report the results based on Equation (3), separating the effects of the two types of export demand shocks on the firm-level performance for the two sub-periods. The results for Finland suggest that the relationship between demand shocks and exports is symmetric: positive demand shocks increase the value of exports while negative shocks decrease it. Similarly, a positive shock decreases the probability that the firm will exit the export market and a negative shock increases it. The *F*-tests also suggest that we can reject $\beta_1 = \beta_2$ (see Columns 1-2) for both periods. This implies that the effects of negative and positive export demand shocks were statistically significantly different from each other. Positive shock also increased sales and employment in Finnish exporters during the 1999–2007 period, but did not during the post-financial crisis period after 2007. We also report that the number of trading destinations decreased because of a positive export demand shock (Columns 4 of Tables 3 and 4).

For Sweden, the estimated effects of the positive demand shock are statistically significant for most of the performance outcomes, except for the effect on the value of exports and the number of employees in the 1999–2007 period (Table 3 of Panel B). As expected, the positive export demand shocks decreased the exit probability and increased sales and labor productivity. The estimations for Sweden also suggest that positive shocks reduced the number of exported products and the number of trading destinations. While these findings might seem counterintuitive, they are consistent with the previous studies that have found that firms drop

their marginal products in markets with increasing sales or tougher competition (see e.g., theoretical prediction of Mayer et al., 2014; empirical evidence of Nilsson Hakkala and Pan, 2019).

The imprecise estimates of the negative shock in the first period could be explained by the fact that the number of firms experiencing a negative export demand shock was quite small—only 49 firms in Finland and 53 firms in Sweden in this period. The results for the second sub-period of 2007–2014 suggest that positive shocks decreased the exit probability and the number of destinations, while negative shocks increased these outcomes. In general, the results for Sweden resemble the Finnish results. However, there are also some salient differences in the estimates of some of the variables for the two countries. While the negative shocks had statistically no significant effects on the number of products and trading destinations of the Finnish firms, they did have an effect on these variables for the Swedish firms: they expanded their operations by increasing the number of both the exported products and destinations following a negative export demand shock during the second sub-period of 2007–2014. This response is the opposite of the one that we found for the positive shock. It suggests that Swedish firms look for new destinations and add new products when facing a decreased export demand in their existing markets. The negative export shock also increased the employment and productivity of the Swedish export firms. Altogether these results suggests that the Swedish firms demonstrated resilience and had plausibly better strategies to counter the negative demand shocks on their export markets. For Sweden, the estimates for the exit probability, number of products, and the number of trading destinations are statistically significantly different for positive and negative shocks (see *F*-tests in Columns 2–4 of Table 4).

ˆAdd Tables 3 and 4 here ‘

5.2. Heterogenous impacts by financial strength.

The results from Equation (4) separating the effects by the financial strength of the firm are reported in Tables 5 and 6. We use the current ratio as a measure for the initial financial strength of a firm at the start year t_0. A high current ratio is above the median current ratio within the 2-digit sector and a low current ratio is below the median current ratio within the same 2-digit sector. The results of where we use the equity ratio as an alternative measure of firm-level financial strength are reported in Tables A2 and A3 of the appendix.

The results for Finland show that firms with stronger finances benefited more from an export demand shock than firms with weaker ones during the 1999–2007 period (Table 5, Panel A). For this period, we find that the value of exports increased more following a demand shock if the firms initially had a current ratio above the median within the 2-digit sector. Also, the financially stronger firms were less likely to exit exporting than the financially weaker firms. The effect of an export demand shock on the number of employees was also larger in the firms with strong financial strength than in those with weak financial strength during the 1999–2007 period. The negative effect of an export demand shock on the number of export destinations is statistically significant for firms with lower liquidity. These results for Finnish firms remain robust regarding using equity ratio as an alternative measure for the initial financial strength in most respects (Table A2 of the appendix).

In the 2007–2014 period, there are no distinct differences in the responses to the export demand shock between the financially stronger and weaker firms in Finland (Table 6, Panel A). According to the estimations, an export demand shock is negatively related to the exit probability, but the effect is statistically significant only among firms that are considered financially stronger. As was found for the first period, the number of export destinations seemed to decrease for firms with a lower liquidity. The findings are robust regarding using the equity ratio as a measure for financial strength (Table A3 of the Appendix). For the exit

probability, according to *F*-tests, the hypothesis that the coefficients for the firms with different financial strength are equal is not rejected when using the current ratio but it is rejected for using the equity ratio (*F*-test: 3.41, p < 0.100). It should be noted, however, that we have a small sample size, which makes it less likely to obtain precisely estimated coefficients. This implies that the *F*-tests are unlikely to reject the hypothesis of $\beta_1 = \beta_2$ even when the differences in the point estimates are large.

The results in Table 5 for Sweden indicate that financially stronger firms did not perform differently from the financially weaker firms during the 1999–2007 period. The coefficient estimates are not statistically significantly different from each other. The results are robust to the choice of measure of financial strength, as confirmed by the estimation results for the equity ratio as an alternative measure for the firm's initial financial strength (Table A2 of the appendix). In the second period of 2007–2014, there is some evidence suggesting that the financially weaker Swedish firms decreased the number of export destinations while the financially stronger firms increased the number of products following an export demand shock (Column 4 of Table 6, Panel B). There is also a positive and statistically significant effect on sales, employment, and labor productivity in the financially stronger but not in the financially weaker firms.

ˆAdd Tables 5-6 here ˈ

Last, the results from Equation (5), separating the effects of positive and negative demand shocks by the financial strength of the firm are reported in Tables A4 and A5 of the appendix using current ratio as our main variable for the firm's financial strength. We first analyze the results for the first sub-period of 1999–2007 and compare these with those reported earlier in Tables 2 and 5. For Finland, we find that the negative export demand shock decreased the value of exports and increased the likelihood of an export exit only among the financially

weaker firms (Table A4, Panel A). This suggests that better financial strength may act as a cushion against contracting demand in the world trade markets. A positive export demand shock increased the value of exports, and decreased the exit probability from exporting; the point estimates are higher among the financially stronger firms, as expected. However, we cannot reject the hypotheses that the estimated coefficients between the financially stronger and weaker firms are statistically significantly different from each other for these outcomes. For the other outcomes, we find that the positive export demand shock increased employment in the financially stronger but not in the financially weaker firms.

The results for Sweden suggest that the positive export demand shock decreased the exit probability from exporting and the number of products and export destinations, as reported earlier in Table 3. However, the effects are shown to be similar in firms that belong to below or above the median current ratio within the same 2-digit industries. The effects of positive shocks on these outcomes are similar to the effects for Finland, except that the increased export demand did not have any statistically significant effect on the number of exported products.

Table A5 documents the results for the second sub-period of 2007–2014. For Finland, a negative export demand shock decreased the level of exports, the number of destinations, and employment, but only among the firms with lower liquidity. These effects are statistically significant, but we cannot reject the hypothesis that they are significantly different for the two groups of firms. The negative shocks increased the probability of exit from exporting irrespective of the financial strength of the firm, although the point estimate was larger for the weaker firms. For the firms experiencing positive shocks, there are no distinct differences in the effects between the financially stronger and weaker firms.

For Sweden, a negative export demand shock decreased the level of exports and increased the risk that the firm would leave exporting. As expected, the effects are larger in firms with a lower financial strength. We can also reject that $\beta_1 = \beta_2$, the F-test being 3.70 for

the value of exports (Column 1, $p < 0.100$) and 5.73 for exiting exporting (Column 2, $p < 0.050$). Positive shocks decreased the number of exported products and trading destinations. Although the point estimates are higher among the financially weaker firms, we cannot reject $\beta_1 = \beta_2$.

Distinguishing the effects by both the sign of the demand shock and the financial strength uncovered some salient differences in the pattern of responses among Finnish and Swedish exporters. The most distinct differences between the two countries were found in the period after the financial crises when the Swedish firms hit by negative demand shocks expanded the number of products and the number of export destinations, while the Finnish firms did not (Table 4). This strategy seemed to be successful, since sales, employment, and productivity increased simultaneously. The same pattern of effects is found when the negative shocks interacted with the financial strength (Table A5). These results suggest that the financially stronger Swedish firms facing negative demand shocks outperformed the Finnish ones by means of their adjustment strategy at the extensive margin. Further, the financially weaker firms both in Finland and Sweden reduced their exports and more likely exited exporting when hit by the negative demand shocks on their export markets. In this respect, the adjustments were similar both at the intensive and the extensive margins for the Finnish and Swedish exporters.

6. Conclusions

This study analyzes the behavior of incumbent exporters in a dynamic setting where demand conditions change due to business cycles and macroeconomic shocks. Our study contributes to the literature on heterogenous firms and trade by focusing on the interaction between demand shocks and firms' financial strength. We go beyond aggregate exports by analyzing the effect of product-destination specific demand shocks on firm-level exports at intensive and extensive margins, and on the overall firm performance.

Our results suggest that aggregate export demand shocks had, on average, similar effects on the total exports and the likelihood of exporting among Finnish and Swedish firms, although the effects were slightly stronger and more precisely estimated for Finnish firms. Both Finnish and Swedish export firms benefitted from the overall positive global demand growth during the first period stretching until 2007, arguably partly caused by China's joining the World Trade Organization (WTO) in 2001 and the increasing integration of the world economy. In the post-financial crisis period (2007–2014), the impact of export demand shocks diverged for the Finnish and Swedish firms. The shocks decreased the exit probability and the number of export destinations for Finland. For Sweden, the shocks increased sales, employment, and productivity.

Once we distinguish the effects by the sign of the shock and the financial strength of the firm, different patterns of responses are revealed. In general, we find that a firm's financial strength may act as a cushion against negative shocks, while firms with better financial strength grow faster in terms of exporting during positive trade shocks. However, the responses of the Finnish and Swedish firms seem to differ in some salient respects. The Swedish firms that were exposed to negative export demand shocks during the 2007–2014 period expanded their product lines and market areas, while the Finnish firms did not make such adjustments. Consequently, the adverse effects of the negative shocks on total exports and the likelihood of exit from exporting were more pronounced for Finland than for Sweden.

Furthermore, distinguishing the effects by the financial strength of the firms suggests that Swedish firms with strong finances were better positioned to mitigate the adverse effects of the negative demand shocks by expanding their export product portfolios by adding new products and new destinations while the Finnish firms did not seem to benefit from the financial strength when facing negative demand shocks.

The differences in the survival strategies could provide one explanation for why the growth of Finnish exports has been sluggish since the financial crisis while the Swedish exports recovered and have been hit less hard by the other negative macroeconomic shocks that followed between 2011 and 2014.

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Tables

Table 1: Summary statistics of the variables for exporters

	Finland			Sweden		
	1999	2007	2014	1999	2007	2014
Total value of exports (in millions €/SEK)	26.36	36.18	27.75	162	243	242
Number of products	15.16	15.80	19.06	14.50	14.12	16.97
Number of destinations	11.09	12.91	13.69	14.54	13.99	15.47
Sales (in millions €/SEK)	58.93	97.43	81.88	350	534	587
Number of employees	188.60	181.28	157.44	175.97	151.69	148.44
Labor productivity (VA per employee)	66,672	74,730	73,554	468,375	667,258	766,870
Current ratio	1.99	2.23	2.35	2.00	2.04	2.22
Equity ratio	39.90	38.52	38.10	24.82	29.58	33.04
Food products and beverages	0.060	0.052	0.061	0.051	0.064	0.072
Textiles, wearing and leather products	0.068	0.043	0.030	0.027	0.020	0.018
Wood, pulp and paper products	0.190	0.162	0.152	0.168	0.136	0.130
Chemicals, rubber and non-metallic products	0.143	0.163	0.160	0.116	0.111	0.117
Metal products	0.146	0.169	0.185	0.184	0.226	0.227
Machinery and equipment	0.159	0.191	0.200	0.163	0.181	0.180
Electrical and optical equipment	0.115	0.117	0.122	0.067	0.067	0.068
Transport equipment	0.049	0.049	0.050	0.079	0.073	0.070
Furniture and recycling	0.070	0.052	0.041	0.144	0.123	0.116
Number of firms	1683	1583	1478	2798	2594	2338

Notes: The samples for each year include manufacturing exporters with at least 20 employees in a firm.

Table 2. The effect of export demand shock

	Export (1)	Exit exporting (2)	No. of exported products (3)	No. of destinations (4)	Sales (5)	Employ-ment (6)	Producti-vity (7)
			Panel A: 1999-2007				
FIN: shock	2.481***	-0.328***	-0.071	-0.215***	0.277***	0.235**	0.140*
	(0.567)	(0.043)	(0.095)	(0.078)	(0.107)	(0.103)	(0.080)
Obs.	1,202	1,202	993	993	1,179	1,184	1,140
R^2	0.045	0.066	0.017	0.050	0.051	0.041	0.029
SWE: shock	0.166	-0.146***	0.260***	-0.264***	0.256***	0.089	0.159***
	(0.488)	(0.027)	(0.073)	(0.070)	(0.084)	(0.078)	(0.054)
Obs.	2,159	2,159	1,983	1,983	2,064	2,077	2,025
R^2	0.008	0.024	0.018	0.013	0.029	0.012	0.011
			Panel B: 2007-2014				
FIN: shock	0.615	-0.091**	0.055	-0.183**	-0.009	-0.017	0.153
	(0.671)	(0.046)	(0.135)	(0.088)	(0.151)	(0.159)	(0.143)
Obs.	1,240	1,240	1,084	1,084	1,195	1,211	1,153
R^2	0.026	0.029	0.014	0.013	0.027	0.027	0.026
SWE: shock	0.273	-0.031	0.168	0.045	0.289**	0.171*	0.283***
	(0.502)	(0.031)	(0.121)	(0.217)	(0.138)	(0.101)	(0.103)
Obs.	2,233	2,233	2,032	2,032	2,114	2,127	2,074
R^2	0.002	0.004	0.006	0.008	0.022	0.009	0.024

Notes: Other controls include industry fixed effects. Robust standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 3: The effects of positive and negative export demand shocks, 1999-2007

	Export (1)	Exit exporting (2)	No. of exported products (3)	No. of destinations (4)	Sales (5)	Employ-ment (6)	Producti-vity (7)
Panel A: Finland							
Shock negative	-1.657	0.305**	-0.271	-0.137	-0.043	0.270	0.563
	(1.895)	(0.123)	(0.309)	(0.257)	(0.393)	(0.470)	(0.464)
Shock positive	2.639***	-0.352***	-0.062	-0.218***	0.289**	0.234**	0.124
	(0.595)	(0.045)	(0.102)	(0.083)	(0.113)	(0.108)	(0.083)
F-test: $e_1=e_2$	4.17 **	21.63 ***	0.36	0.08	0.60	0.01	0.85
Obs.	1,202	1,202	993	993	1,179	1,184	1,14
R^2	0.045	0.070	0.017	0.050	0.051	0.041	0.030
Panel B: Sweden							
Shock negative	3.453	-0.064	-0.481	-0.054	1.621	0.683	-0.021
	(4.198)	(0.203)	(0.329)	(0.107)	(1.704)	(0.869)	(0.223)
Shock positive	0.107	-0.147***	-0.256***	-0.268***	0.231***	0.078	0.163***
	(0.492)	(0.027)	(0.075)	(0.071)	(0.081)	(0.079)	(0.055)
F-test: $e_1=e_2$	0.62	0.16	0.43	2.12	0.66	0.48	0.62
Obs.	2,159	2,159	1,983	1,983	2,064	2,077	2,025
R^2	0.009	0.024	0.018	0.013	0.030	0.012	0.011

Notes: Other controls include industry fixed effects. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 4: The effects of positive and negative export demand shocks, 2007-2014

	Export (1)	Exit exporting (2)	No. of exported products (3)	No. of destinations (4)	Sales (5)	Employ-ment (6)	Producti-vity (7)
Panel A: Finland							
Shock negative	-1.938**	0.222***	-0.080	-0.099	-0.114	0.000	0.165
	(0.802)	(0.060)	(0.191)	(0.132)	(0.187)	(0.246)	(0.219)
Shock positive	3.250***	-0.415***	0.197	-0.271*	0.101	-0.035	0.141
	(1.149)	(0.077)	(0.224)	(0.159)	(0.278)	(0.252)	(0.204)
F-test: $e_1=e_2$	11.77 ***	34.30 ***	0.78	0.55	0.35	0.01	0.01
Obs.	1,240	1,240	1,084	1,084	1,195	1,211	1,153
R^2	0.031	0.044	0.014	0.013	0.028	0.027	0.020
Panel B: Sweden							
Shock negative	-0.734	0.202**	0.474***	0.565***	0.336***	0.183*	0.413**
	(0.961)	(0.092)	(0.081)	(0.134)	(0.113)	(0.098)	(0.186)
Shock positive	1.684	-0.358***	-0.279	-0.716***	0.221	0.154	0.182
	(1.146)	(0.066)	(0.193)	(0.166)	(0.316)	(0.221)	(0.143)
F-test: $e_1=e_2$	2.18	19.62***	11.75***	31.57***	0.11	0.01	0.86
Obs.	2,233	2,233	2,032	2,032	2,114	2,127	2,074
R^2	0.003	0.017	0.010	0.022	0.022	0.009	0.025

Notes: Other controls include industry fixed effects. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 5: The effect of export demand shock by financial strength (current ratio), 1999-2007

	Export (1)	Exit exporting (2)	Number of exported products (3)	Number of destinations (4)	Sales (5)	Employment (6)	Productivity (7)
Panel A: Finland							
Shock_Low current	1.716**	-0.288***	-0.170	-0.260***	0.202	0.067	0.299 **
	(0.686)	(0.049)	(0.120)	(0.098)	(0.142)	(0.144)	(0.118)
Shock_High current	3.020***	-0.352***	0.025	-0.153	0.338	0.373 ***	0.016
	(0.666)	(0.050)	(0.112)	(0.085)	(0.120)	(0.109)	(0.076)
F-test: $e_1=e_2$	3.08 *	1.64	2.16	1.11	0.78	4.17 **	6.56 **
Observations	1,202	1,202	993	993	1,179	1,184	1,140
R-squared	0.046	0.066	0.019	0.050	0.052	0.043	0.035
Panel B: Sweden							
Shock_Low current	-0.261	-0.130***	-0.257***	-0.286***	0.189*	0.007	0.154**
	(0.622)	(0.034)	(0.087)	(0.086)	(0.111)	(0.116)	(0.076)
Shock_High current	0.555	-0.160***	-0.263***	-0.244***	0.317***	0.164*	0.164***
	(0.488)	(0.027)	(0.094)	(0.081)	(0.102)	(0.088)	(0.063)
F-test: e1=e2	1.69	0.92	0.00	0.20	0.96	1.53	0.01
Observations	2,159	2,159	1,983	1,983	2,064	2,077	2,025
R-squared	0.009	0.025	0.018	0.013	0.029	0.013	0.011

Notes: Other controls include industry fixed effects. CR = current ratio. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 6: The effect of export demand shock by financial strength (current ratio), 2007-2014

	Export (1)	Exit exporting (2)	Number of exported products (3)	Number of destinations (4)	Sales (5)	Employment (6)	Productivity (7)
Panel A: Finland							
Shock_Low current	0.086	-0.051	0.048	-0.233**	0.011	-0.087	0.155
	(0.784)	(0.049)	(0.182)	(0.100)	(0.237)	(0.167)	(0.149)
Shock_High current	1.124	-0.126*	0.051	-0.118	-0.038	0.044	0.153
	(1.028)	(0.072)	(0.193)	(0.136)	(0.186)	(0.258)	(0.228)
F-test: $e_1=e_2$	0.71	0.87	0.00	0.49	0.03	0.19	0.00
Observations	1,240	1,240	1,084	1,084	1,195	1,211	1,153
R-squared	0.026	0.029	0.014	0.013	0.009	0.027	0.026
Panel B: Sweden							
Shock_Low current	-0.163	-0.069	-0.081	-0.359**	-0.083	0.094	0.146
	(0.765)	(0.043)	(0.186)	(0.166)	(0.233)	(0.212)	(0.153)
Shock_High current	0.359	-0.017	0.261**	0.212	0.420***	0.180*	0.447***
	(0.655)	(0.038)	(0.125)	(0.246)	(0.156)	(0.106)	(0.137)
F-test: $e_1=e_2$	0.26	0.85	2.40	3.96**	3.27*	0.14	2.25
Observations	2,233	2,233	2,032	2,032	2,114	2,127	2,074
R-squared	0.002	0.004	0.007	0.012	0.023	0.009	0.026

Notes: Other controls include industry fixed effects. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Figures

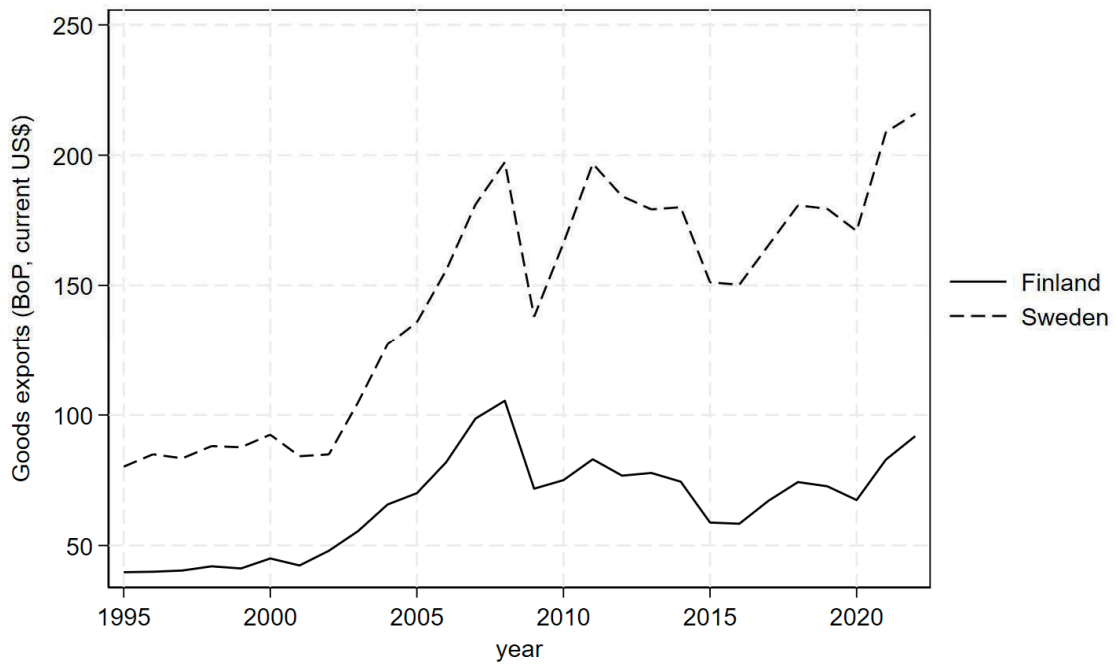

Figure 1. Exports of goods from Finland and Sweden (current Billion USD), 1995-2021. Source: World Development Indicators.

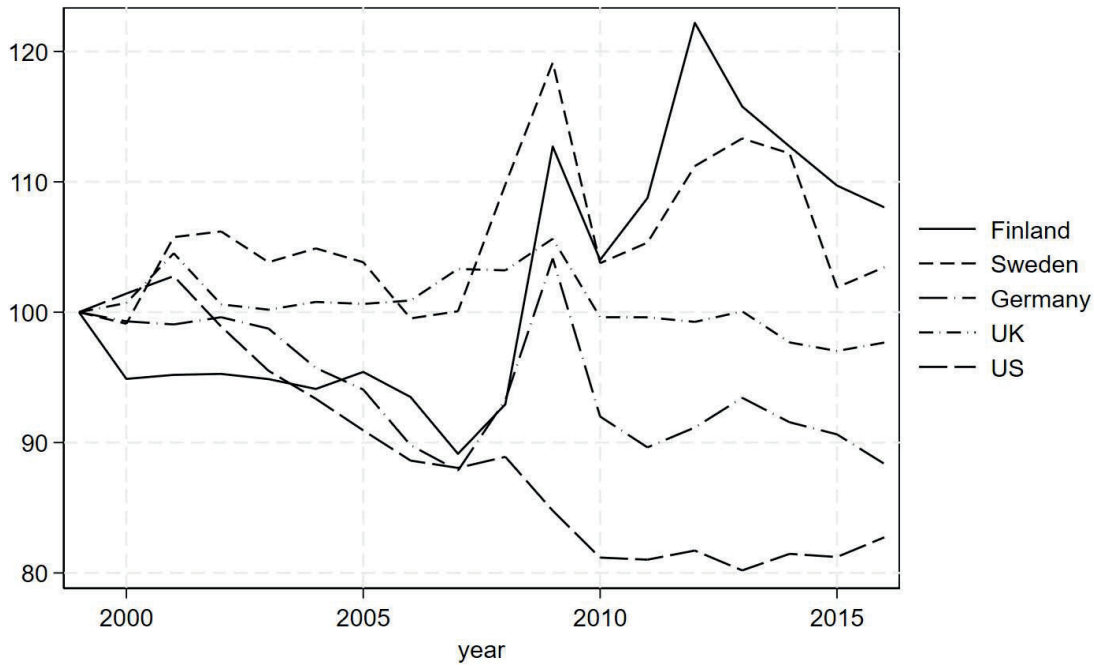

Figure 2. Real Unit Labor Costs (1999=100) Source: Annual macro-economic database of the European Commission.

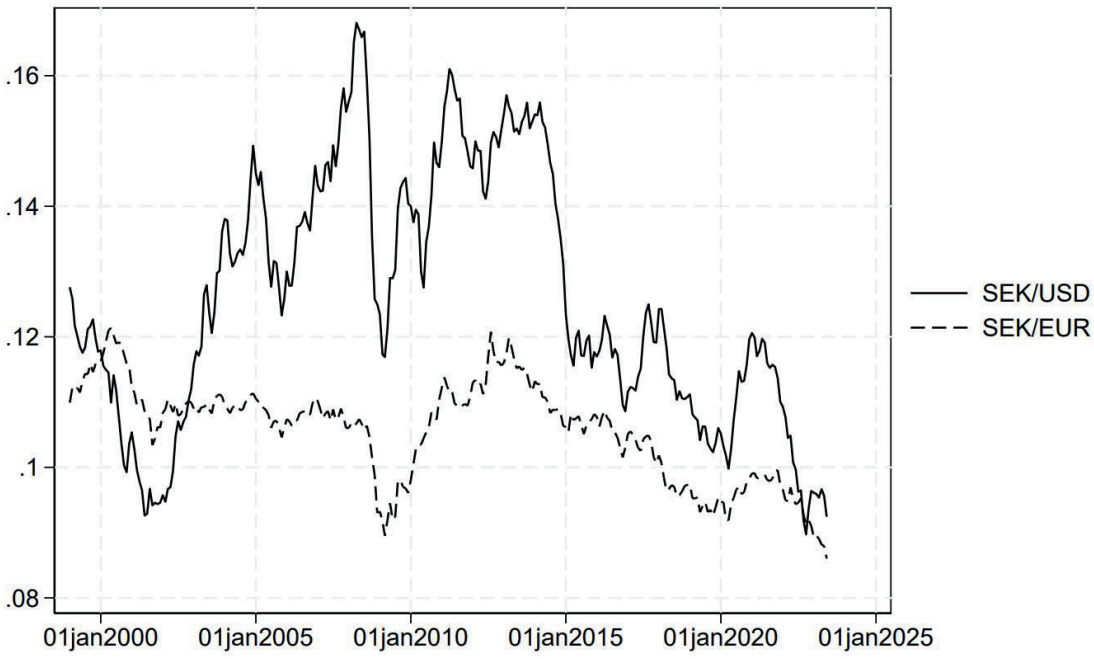

Figure 3. Average monthly exchange rates of Swedish Krona versus the US Dollar and the Euro between 1999 and June 2023. Source: Oanda.com

Appendix

Table A1: Data sources and variable definition

Variables	Data source
Export demand shock	UN's Comtrade data and Finnish and Swedish Customs data (definition in Equation 1)
Exports	Value of total exports (euro/SEK). Information from the Finnish/Swedish Customs data.
Exporter exit	An indicator variable that gets a value of 1 if a firm exited exporting between years t_0 and t. Information on exports come from the Finnish/Swedish Customs data.
Number of products	Number of products (at 4-digit level) to be exported. Information based on the Finnish/Swedish Customs data.
Number of destination countries	Number of countries where the firm exports its products. Information based on the Finnish/Swedish Customs data.
Sales	Value of sales (euro/SEK). Information is obtained from the Financial Statement data in the case of Finland and the FEK (Structural Business Statistics) database in the case of Sweden.
Number of employees	Number of personnel. Information is obtained from the Financial Statement data in the case of Finland and the FEK (Structural Business Statistics) database in the case of Sweden.
Productivity	Labor productivity, measured as the value added per worker. Value added and number of employees originate from the Financial Statement data in the case of Finland and the FEK (Structural Business Statistics) database in the case of Sweden.
Current ratio	Firms' current ratio (%), measured as: (financial assets + current assets) / current creditors. Information is obtained from the Financial Statement data for Finland. In the case of Sweden, it is measured as current assets (including cash) divided by short-term debt and is obtained from the FEK (Structural Business Statistics) database.
Equity ratio	Firm's equity ratio (%). The variable for Finland is measured as: 100* (equity + value adjustment + optional reserves) / balance sheet total (%). Information is obtained from the Financial Statement data. For Sweden, the ratio is calculated as equity divided by total assets. This information is obtained from the FEK (Structural Business Statistics) database.
Sector	Nine indicators based on 2-digit Standard Industrial Classification: food products and beverages; textiles,

wearing, and leather products; wood, pulp, and paper products; chemicals, rubber, and non-metallic products; metal products; machinery and equipment; electrical and optical equipment; transport equipment; and furniture and recycling. Information is obtained from the Financial Statement data in the case of Finland and the FEK (Structural Business Statistics) database in the case of Sweden.

Table A2: The effect of export demand shock by financial strength (equity ratio), 1999-2007

	Export (1)	Exit exporting (2)	Number of exported products (3)	Number of destinations (4)	Sales (5)	Employment (6)	Productivity (7)
Panel A: Finland							
Shock_Low equity	1.710**	-0.279***	-0.110	-0.162*	0.333***	0.147	0.283***
	(0.701)	(0.050)	(0.109)	(0.087)	(0.119)	(0.135)	(0.098)
Shock_High equity	3.065***	-0.362***	-0.025	-0.237**	0.228	0.312***	0.013
	(0.655)	(0.050)	(0.121)	(0.097)	(0.139)	(0.119)	(0.099)
F-test: $e_1=e_2$	3.35 *	2.71	0.43	0.56	0.50	1.28	6.33 **
Observations	1,202	1,202	993	993	1,179	1,184	1,140
R-squared	0.046	0.066	0.018	0.049	0.051	0.041	0.034
Panel B: Sweden							
Shock_Low equity	0.181	-0.154***	-0.327***	-0.307***	0.273***	0.098	0.222***
	(0.638)	(0.034)	(0.093)	(0.084)	(0.091)	(0.083)	(0.077)
Shock_High equity	0.150	-0.138***	-0.191**	-0.219***	0.240**	0.080	0.093
	(0.531)	(0.030)	(0.088)	(0.078)	(0.119)	(0.113)	(0.068)
F-test: e1=e2	0.00	0.24	1.61	0.89	0.07	0.02	2.12
Observations	2,159	2,159	1,983	1,983	2,064	2,077	2,025
R-squared	0.008	0.025	0.018	0.013	0.029	0.012	0.012

Notes: Other controls include industry fixed effects. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table A3: The effect of export demand shock by financial strength (equity ratio), 2007-2014

	Export (1)	Exit exporting (2)	Number of exported products (3)	Number of destinations (4)	Sales (5)	Employment (6)	Productivity (7)
Panel A: Finland							
Shock_Low equity	-0.158	-0.031	0.056	-0.259***	-0.114	0.016	0.001
	(0.696)	(0.047)	(0.161)	(0.099)	(0.193)	(0.203)	(0.125)
Shock_High equity	1.853	-0.183**	0.040	-0.046	0.160	-0.070	0.397
	(1.168)	(0.075)	(0.229)	(0.154)	(0.233)	(0.241)	(0.286)
F-test: $e_1=e_2$	2.40	3.41*	0.00	1.40	0.84	0.08	1.77
Observations	1,240	1,240	1,084	1,084	1,195	1,211	1,153
R-squared	0.027	0.030	0.014	0.030	0.028	0.027	0.029
Panel B: Sweden							
Shock_Low equity	1.291*	-0.139***	0.032	-0.305**	0.195	0.231	0.154
	(0.746)	(0.045)	(0.169)	(0.154)	(0.188)	(0.145)	(0.142)
Shock_High equity	-0.304	0.011	0.196	0.164	0.279	0.117	0.416***
	(0.792)	(0.033)	(0.149)	(0.259)	(0.182)	(0.139)	(0.145)
F-test: $e_1=e_2$	2.13	7.45***	0.55	2.59	0.10	0.33	1.75
Observations	2,233	2,233	2,032	2,032	2,114	2,127	2,074
R-squared	0.003	0.005	0.006	0.010	0.021	0.009	0.025

Notes: Other controls include industry fixed effects. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table A4: The effect of positive and negative export demand shock by financial strength (current ratio), 1999-2007

	Export (1)	Exit exporting (2)	No. of exported products (3)	No. of destinations (4)	Sales (5)	Employment (6)	Productivity (7)
Panel A: Finland							
Shock neg_CR low	-2.216*	0.297***	-0.336	-0.235	-0.164	0.138	0.289
	(1.287)	(0.092)	(0.306)	(0.261)	(0.389)	(0.462)	(0.412)
Shock neg_CR high	6.407	0.305	0.746	1.305	1.517	2.014	3.945*
	(18.559)	(1.134)	(1.688)	(0.907)	(1.782)	(2.256)	(2.338)
Shock pos_CR low	1.898***	-0.319***	-0.164	-0.266**	0.217	0.058	0.286**
	(0.727)	(0.051)	(0.129)	(0.105)	(0.151)	(0.152)	(0.123)
Shock pos_CR high	3.086***	-0.367***	0.025	-0.161*	0.340***	0.363***	-0.004
	(0.682)	(0.051)	(0.115)	(0.089)	(0.123)	(0.111)	(0.075)
F-test: $e_1=e_2$	0.22	0.00	0.41	2.72*	0.86	0.67	2.34
F-test: e3=e4	2.48	0.92	1.97	1.05	0.62	4.00 **	6.62 **
Obs.	1,202	1,202	993	993	1,179	1,184	1,14
R^2	0.046	0.069	0.019	0.050	0.052	0.043	0.039
Panel B: Sweden							
Shock neg_CR low	16.011	-0.484	-2.625	-0.870	3.911	1.715	-0.511
	(20.026)	(1.240)	(2.310)	(0.946)	(7.578)	(4.879)	(0.345)
Shock neg_CR high	2.416	-0.029	-0.335	0.001	1.433	0.596	0.020
	(3.641)	(0.179)	(0.336)	(0.085)	(1.638)	(0.808)	(0.265)
Shock pos_CR low	-0.324	-0.130***	-0.251***	-0.287***	0.168	-0.002	0.157**
	(0.619)	(0.034)	(0.088)	(0.087)	(0.109)	(0.117)	(0.077)
Shock pos_CR high	0.483	-0.162***	-0.257***	-0.248***	0.285***	0.151*	0.169***
	(0.496)	(0.027)	(0.096)	(0.083)	(0.098)	(0.089)	(0.064)
F-test: $e_1=e_2$	0.44	0.13	0.96	0.85	0.10	0.05	1.49
F-test: e3=e4	1.67	1.05	0.00	0.16	0.80	1.44	0.02
Obs.	2,159	2,159	1,983	1,983	2,064	2,077	2,025
R^2	0.010	0.025	0.018	0.013	0.031	0.013	0.011

Notes: Other controls include industry fixed effects. CR = current ratio. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table A5: The effect of positive and negative export demand shock by financial strength (current ratio), 2007-2014

	Export (1)	Exit exporting (2)	No. of exported products (3)	No. of destinations (4)	Sales (5)	Employment (6)	Productivity (7)
Panel A: Finland							
Shock neg_CR low	-2.719***	0.246***	-0.031	-0.222*	-0.319	-0.299**	-0.073
	(0.741)	(0.062)	(0.265)	(0.129)	(0.227)	(0.144)	(0.171)
Shock neg_CR high	-1.036	0.190**	-0.128	0.038	0.122	0.342	0.435
	(1.332)	(0.089)	(0.249)	(0.175)	(0.221)	(0.389)	(0.396)
Shock pos_CR low	3.116**	-0.377***	0.142	-0.253	0.351	0.120	0.392
	(1.488)	(0.095)	(0.272)	(0.184)	(0.435)	(0.328)	(0.243)
Shock pos_CR high	3.292**	-0.435***	0.219	-0.261	-0.159	-0.207	-0.098
	(1.470)	(0.095)	(0.314)	(0.224)	(0.302)	(0.314)	(0.267)
F-test: $e_1=e_2$	1.56	0.37	0.08	2.00	2.19	2.76*	1.57
F-test: e3=e4	0.01	0.28	0.04	0.00	1.10	0.56	2.30
Obs.	1,240	1,240	1,084	1,084	1,195	1,211	1,153
R^2	0.031	0.043	0.014	0.013	0.029	0.029	0.031
Panel B: Sweden							
Shock neg_CR low	-2.911***	0.394***	0.585**	0.289	-0.012	0.165	0.208
	(0.946)	(0.067)	(0.254)	(0.247)	(0.268)	(0.258)	(0.271)
Shock neg_CR high	-0.440	0.155*	0.405***	0.604***	0.345***	0.141	0.751***
	(0.989)	(0.085)	(0.079)	(0.134)	(0.108)	(0.117)	(0.282)
Shock pos_CR low	1.671	-0.385***	-0.527**	-0.840***	-0.116	0.056	0.083
	(1.162)	(0.065)	(0.254)	(0.237)	(0.365)	(0.327)	(0.200)
Shock pos_CR high	1.938	-0.351***	-0.053	-0.568***	0.556	0.248	0.255
	(1.703)	(0.094)	(0.247)	(0.198)	(0.426)	(0.247)	(0.181)
F-test: $e_1=e_2$	3.70*	5.73**	0.49	1.36	1.66	0.01	2.10
F-test: e3=e4	0.02	0.13	2.15	0.93	1.74	0.27	0.47
Obs.	2,233	2,233	2,032	2,032	2,114	2,127	2,074
R^2	0.004	0.018	0.010	0.022	0.023	0.009	0.027

Notes: Other controls include industry fixed effects. CR = current ratio. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

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