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ABSTRACT

Beyond Borders: Do Gender Norms and Institutions Affect Female Businesses?*

In this paper, we investigate whether gender norms and institutions act as a constraint to the performance of female businesses. We exploit novel and unique micro data on start-ups in Denmark, which we combine with information on individual-level characteristics of the entrepreneur as main decision maker of the firm. We overcome the challenge of disentangling norms and institutional biases against women from other constraints and hurdles that female businesses might face by exploiting detailed trade data. In this trade context, we study the relative performance of firms across markets with varying institutions, while controlling for other factors that affect female businesses uniformly across all markets. We provide evidence that gender inequality and institutional biases against women in trade partner countries play an important role in explaining gender differences in export and import behaviour. We also perform an event study of a concrete policy change in a destination market – the introduction of quotas for the share of females on the boards of directors in Norway – and how it has affected the gender gap in trade participation.

JEL Classification: F14, J16, M13

Keywords: gender inequality, firm internationalization, start-up performance

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1 Introduction

Women experience worse economic outcomes than men in many spheres of day-to-day life. In the economics literature, the issues frequently discussed are inequality in employment opportunities, pay, and promotions (e.g., Goldin, 2021; Kunze & Miller, 2017). There also is a well-documented gender gap in starting your own business, which women are less likely to do than men (see, e.g., the review in Klapper & Parker, 2011). While Klapper & Parker (2011) attribute such gender gaps in entrepreneurship mainly to factors in the business environment that affect female and male entrepreneurs differently, gender norms and biases against women may have a role to play as well. For instance, such biases have been shown to arise in business-to-business sales, due to what Lanzrath et al. (2023) refer to as *male centricity* – essentially the idea that it is difficult for women to be admitted to the "old-boys club" that characterises many sales departments. This argument harks back to studies in psychology and sociology, which show how individuals prefer to associate with other individuals that have similar attitudes and beliefs (e.g., Inzlicht & Good, 2006; McPherson et al., 2001). We expand on these issues, asking the question: What role do gender norms in society and (institutional) biases against women play for the performance of female-run businesses?

Much research on female entrepreneurship provides evidence that firms that do get set up by women generally perform worse than those established by men, in terms of sales, profitability, or other aspects of firm performance, in both developed and developing countries (e.g., Rosa et al. (1996), Fairlie & Robb (2009) for the UK and the US, and Batista et al. (2022), Hardy & Kagy (2018) for Mozambique and Ghana).[1] These findings have been argued to be driven by a variety of constraints – either internal or external – that female entrepreneurs face. For example, the literature shows that females (i) find it more difficult to get access to finance, (ii) are more risk averse and less competitive than men, and (iii) may invest less time and effort in the business due to family commitments or other societal constraints (Field et al., 2010; Ackah et al., 2024; Campos & Gassier, 2017).[2]

Gender differences in start-up performance may also be due to gender norms affecting women as business leaders. Evidence on this specific type of constraint is, however, scant. In this paper,

[1] Klapper & Parker (2011) provide a literature review on earlier work for developing countries.

[2] It is important to point out that in this paper we focus on female entrepreneurs, i.e., the entry of new and generally small firms. There is also a literature looking at the gender composition of management boards of established firms, mainly for developed countries. This literature in many cases concludes that gender diversity can improve company performance, see, e.g., Green & Homroy (2018), Flabbi et al. (2019), Smith et al. (2006).

we aim to fill this gap in the literature. We disentangle different factors underlying performance differences by exploiting trade data. Specifically, our identification strategy utilizes the cross-country dimension of the data in order to disentangle gender norms and (institutional) biases in trade partner countries from other constraints. In a nutshell, we investigate whether female start-ups find it more difficult than their male counterparts to enter and expand into male-centred markets with strong gender norms or institutions that adversely affect women's economic participation and outcomes. This may be the case because trade partners in more gender-unequal destination countries may be less inclined to transact with women. In addition, female entrepreneurs may be deterred by the perception of male-centricity or the fear of discrimination.

Studying the trade performance of female entrepreneurs is an important issue in itself, as entering new export markets, and importing high-quality intermediates, is crucial for firms to grow. We start our empirical analysis by showing that female entrepreneurs are less engaged in international trade than their male counterparts, in terms of both their total exports and imports, as well as the number of import origins from which they purchase. Next, we provide evidence that gender norms in the trade partner country have a role to play in explaining gender differences in firms' export and import behaviour.

We have access to a novel and unique dataset on start-ups in Denmark over the 2001 – 2019 period. Denmark is an interesting case in point. On the one hand, Denmark is generally considered a relatively gender-equal country: For example, according to the 2023 Gender Gap Index of the World Economic Forum, Denmark is ranked 23rd in the world, performing similarly to countries such as Switzerland and Australia, but worse than other Nordic countries (including Sweden and Norway). On the other hand, however, Denmark has one of the lowest rates of female entrepreneurship in Europe, well below the European average (Schonard & Muller, 2023).

The micro data allows us to observe the main entrepreneur as the person behind the start-up, as well as characteristics of that individual, including their gender. We are thus able to identify the person that is responsible for setting up the firm and for running the business. This setting provides us with a very clear identification of the main decision maker in the firm. Moreover, the firms considered tend to be small. This is different from large and mature firms, where there are in most cases several decision makers, including both men and women, within the same company.

We combine these data with detailed information on firms' trading activities across export destinations and import origins. We measure gender norms and institutions across markets using

country level data on different indices of gender inequality from the World Bank and the World Economic Forum. The World Bank's Women, Business and the Law (WBL) index focuses on discrimination in laws and legal institutions, while the World Economic Forum's Gender Gap index is based on inequality in economic and social outcomes.

Our econometric analysis provides clear evidence that female start-ups from Denmark are disadvantaged compared to male start-ups when trading with countries with strong gender norms or institutional biases against women. This finding holds regardless of which measure of gender inequality we use. Specifically, we show that the gender gap in the probability of exporting to a given destination is higher in more gender-unequal countries. We also find some evidence that female start-ups that do export to a given destination sell less, the higher the gender inequality in the trade partner country. On the import side, we only find such a detrimental effect at the extensive margin, but not at the intensive margin. These findings are highly policy relevant, as they highlight an important and heretofore overlooked obstacle on the path to the empowerment of women in the global economy.

Our identification strategy exploits the firm-trade partner dimension of the data. Specifically, we include firm–year fixed effects which account for any type of constraint that female businesses may face which plausibly affect their trading behaviour across all markets (such as access to finance, risk preferences, or family commitments). More in general, these fixed effects control for any time-varying firm characteristics that may be correlated with gender and trading (e.g., size, productivity, industry affiliation).

The indices of gender inequality that we use in our analysis give, by their very nature, an indication of the overall societal norms or inequalities, rather than pinpointing specific aspects of inequality that could easily be identified and targeted by policy. To provide a more illustrative and well-defined case, we also use a policy change towards more gender equality in Norway as a case study. In December 2003, the Norwegian Parliament passed a regulation requiring that companies have at least 40 percent female representation on their boards (see Storvik, 2011). While the country was already, in an international comparison, well ahead of others in terms of gender equality, this policy signals a move towards furthering such equality even more. Evaluating this policy change in an event-study framework shows that, indeed, the export probability of female start-ups from Denmark to Norway increased more than the probability of male star-ups after this policy change, relative to the control group of other destinations. There is no corresponding trade-enhancing effect on imports, though.

Our paper expands a small but growing literature that looks at the relationship between country-level institutions and gender inequality. For example, Hauge et al. (2023), using data for immigrants in Norway, show that cultural norms towards women in the migrants' home country affect females' willingness to compete. Choi & Greaney (2022) examine how multinational enterprises from gender-equal countries transfer these gender norms to host countries when investing abroad. Furthermore, Ashraf et al. (2020) argue and provide evidence that the absence of rule-of-law in a country can discourage female entrepreneurship. We look at a related yet different aspect here, considering the role of institutional biases against women and gender equality in export destinations and import origins.

We also contribute to the literature on the role of gender discrimination for women's economic outcomes. While studies examining gender wage gaps based on regression-based methods typically cannot directly speak to discrimination, experimental evidence suggests that discrimination against females can be substantial; see Neumark (2018) for a review. Moreover, a recent paper by Sin et al. (2022) shows that productivity-adjusted gender wage gaps vary across industries in a manner which is consistent with taste-based discrimination. Different from this literature, we consider gender gaps among entrepreneurs rather than gender gaps in employment and wage outcomes. Our findings on the export and import behaviour of female start-ups speak to the role of actual or anticipated discrimination in trade partner countries.

A small number of studies have investigated the relationship between the gender of decision makers within the firm and firms' exporting activities. Krenz (2019) and Davies & Mazhikeyev (2021) consider the effects of female ownership on firm export behaviour (independent of destination characteristics). Hoch & Rudsinske (2022) examine how the female share of directors affects export sales in a sample of large listed companies, also investigating the role of gender-related institutions in export markets. Compared to these papers, our data on start-ups allows us to obtain a much more direct measure of female influence on firms' business decisions.[3] In addition, we avoid any reverse causality problems inherent in looking at established firms, in that existing firms might hire particular types of managers or directors. We also expand the analysis by considering import activity, which has not been looked at heretofore.[4]

[3]Specifically, firm owners and board members may affect broader business strategies but not necessarily day-to-day decisions within companies. Moreover, for the channel that we consider here – (the fear of) potential discrimination in certain trade partner countries – having a woman in a mixed-gender team of directors can have very different effects compared to having a woman as the sole or principal decision maker within the firm.

[4]In studying the trade behaviour of start-ups, we also draw on the literature on so-called 'born globals', i.e., firms which start engaging in trade shortly after their inception (Choquette et al., 2017).

Finally, our paper also relates to the well-established literature on the impact of trade, or more broadly globalisation, on gender inequality. Recent examples of such studies include Kis-Katos et al. (2018), Bøler et al. (2018), Brussevich (2018), Bonfiglioli & De Pace (2021), Halvarsson et al. (2022) and Benguria & Ederington (2023). We look at a different channel in our paper, investigating how gender equality in the trade partner country affect the decisions of female entrepreneurs to engage in exporting or importing activities.

The rest of the paper is structured as follows. In the next section, we describe our data sources and provide some descriptive statistics on the relationships to be investigated. We then outline our empirical model and methodology, before discussing results. The final section summarises and concludes.

2 Data

2.1 Data Sources

For our empirical analysis, we link various Danish micro datasets. Most importantly, we exploit two novel datasets which contain information on the individuals behind new start-ups in Denmark (referred to as 'entrepreneurs' in the following). These data contain a unique person identifier, which allows us to link them to other individual-level registers. Moreover, the data contain a unique firm identifier, through which we can link each start-up to other firm-level registers, including detailed firm-destination-level trade data. We combine these register data with alternative measures of gender norms and institutions across countries. In this section, we discuss the data sources and construction of key variables of interest; the following section presents summary statistics. See Appendix A for further details.

2.1.1 Data on Entrepreneurship

Information on entrepreneurship comes from two separate registers: IVPE and IVPS contain information on start-ups which are formed as personally owned businesses ("personlig ejede virksomheder") and limited liability companies ("selskaber")[5], respectively. The former register contains information on the firm identifier (CVR number) and person identifier (PNR number), with the link being unique. In the latter register, the link between firm and entrepreneur need

[5]More accurately, IVPS includes information on private limited companies and joint stock companies. However, we observe only a small number of start-ups founded as joint stock companies. For conciseness, we will therefore refer to them jointly as limited liability companies throughout the rest of this paper.

not be unique, and additional information is available regarding the type of link between the person and the company. For example, an individual may be linked to a new start-up because of being the founder, or because of being a member of the board. In our analysis, we restrict attention to the individual with the highest 'priority', which we will refer to as the entrepreneur. In our robustness analysis, we also consider the sub-sample of start-ups for which the person behind the company is the founder. See Appendix A.1 for a detailed discussion. The data on entrepreneurship has been collected since 2001, and we therefore exploit the 2001–2019 period. We deliberately exclude the year 2020 due to the corona pandemic, which significantly affected entrepreneurship as well as trade.

2.1.2 Individual-level Data Sources

Via the personal identification number (PNR), we can link the data on the people behind start-ups to individual-level registers. In particular, we extract information on demographics (gender, age, civil status, number of children) as well as labour market experience. From the educational register (UDDA) we construct indicator variables for the highest obtained education as well as an indicator variable for whether the individual has a business/economics degree.[6]

2.1.3 Firm-level Data Sources

We employ the general firm statistics (FIRM) to identify each firm's main sector of activity, and to construct other firm-level variables of interest (such as labour productivity and total employment). We restrict the sample to firms within the following two sectors: manufacturing and wholesale/retail.[7] These two sectors account for the bulk of goods exports.[8] Notably, women are more likely to become entrepreneurs in the wholesale and retail sector than within manufacturing. In our empirical analysis, we will carefully account for differences across sectors and industries by including industry-year effects.

In order to measure firm internationalization, we exploit the external trade statistics (UHDI) for Denmark. These data contain information on firm-destination/origin-level exports and imports. We restrict the sample as follows. First, in terms of import origins and export destina-

[6]This latter indicator variable includes both university degrees as well as post-secondary degrees.

[7]Specifically, we choose the sample of firms based on their industry affiliation in the year of founding. Some firms switch sector in subsequent years – we retain these cases in our sample.

[8]We do not have information on exports of services and thus exclude firms in service sectors other than wholesale/retail from the analysis.

tions, we restrict the sample to those countries for which we can obtain information on gender norms and institutions; cf. Section 2.1.4. Second, in terms of firms, we limit the sample to start-ups exporting (importing) at least once during the sample period. That is, we focus on the sample of start-ups with at least one episode of internationalization.

2.1.4 Measuring Gender Norms and Institutions

Our interest lies in whether gender norms in society and institutions disadvantaging women in trade partner countries act as a barrier to the internationalization of Danish female start-ups. These norms and institutions can be multi-faceted. To capture different aspects (that may of course very well be correlated), we obtain different measures of gender-specific institutions and gender inequality across countries, provided respectively by the World Bank and the World Economic Forum (WEF).

Our first measure is the Women, Business and the Law (WBL) index provided by the World Bank. The WBL index measures the extent to which women are discriminated against in a country's laws and legal institutions, and, in particular, how women's economic decisions are affected by the law.[9] Information on laws and institutions is gathered from interviews with respondents with expertise in laws on family, labor and violence against women. We exploit information on the overall WBL index, which is calculated as an aggregation across different measures. The index ranges from 0 to 100, with 100 indicating equal rights for men and women. Hence, the higher the index, the more equal the treatment of women in laws and institutions. We re-scale the data such that values range from 0–1. See World Bank (2023) for further information on the methodology.

The WBL index is available for 190 economies and covers our entire sample period. Notably, it is based on the actual (legal) institutions affecting women's economic decisions. Some of the legal aspects that enter the index only affect the economic rights of women who reside in the country itself (e.g., inheritance laws and laws on discrimination in pay or employment). Still, these laws may convey important information about the social norms towards women in the country. In addition, other aspects of a country's legal system that influence the WBL index can be argued to also directly affect female entrepreneurs from foreign countries that want to

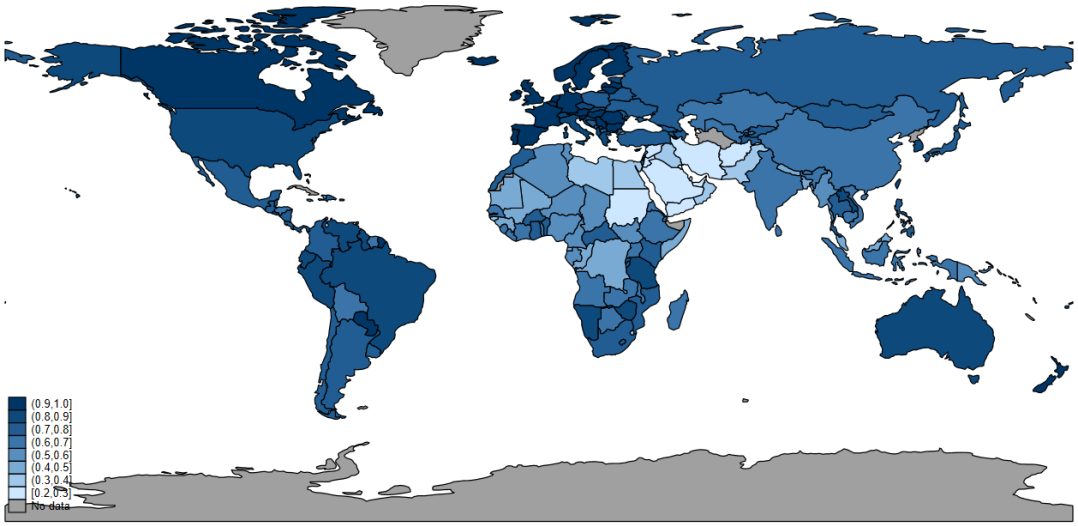
[9]For this purpose, the WBL exploits information on laws affecting women in eight different areas: Going places, starting a job, getting paid, getting married, having children, running a business, managing assets and getting a pension. Examples includes laws affecting women's decisions to work, laws on discrimination against women in the workplace, laws affecting women's rights to start or run a business, obtain credit, etc.

do business in the country. This includes, for example, restrictions on women's mobility (which might put limits on women's ability to conduct business travel in the country), as well as legal provisions that affect women's right to sign contracts.

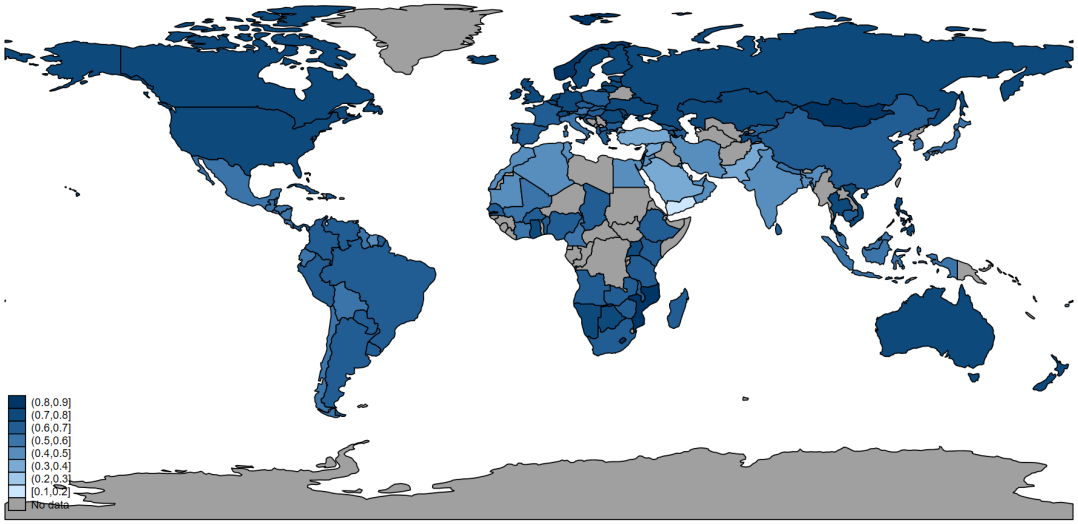
Our second measure is the gender gap index of the WEF. For our purpose, two concepts underlying this index are particularly noteworthy: first, measurement is based on outputs (such as gaps in economic outcomes) rather than inputs (such as policies, norms, and cultures). This, thus, provides a different angle than the WBL index, which is based on a country's (legal) institutions. Second, the index measures gaps (rather than levels) in outcomes between men and women, such that differences in economic development do not affect measurement. The WEF provides four sub-indices of gender gaps in (i) Economic Participation and Opportunity, (ii) Educational Attainment, (iii) Health and Survival and (iv) Political Empowerment, as well as an overall index combining these four dimensions of gender inequality. In our empirical analysis, we will exploit the first sub-index (since it provides information on the extent to which women are disadvantaged in the economic sphere), as well as the overall index.[10] We have retrieved data for these two indices covering 148 countries for the period 2006–2019. Similar to the WBL index, the indices are constructed on a 0–1 scale where higher values imply higher gender equality.

Figure 1 visualizes how legal institutions disadvantaging women (as measured by the WBL index), gender gaps in economic outcomes (as measured by the WEF economic gap index) and overall gender gaps (WEF overall gap index) varied across the world in the year 2010 (in the middle of our sample period). While high-income developed countries generally tended to have higher gender equality, we see considerable variation even within regions. Generally speaking, the three indices paint a fairly similar picture of the pattern of gender inequality across the world. They are indeed highly correlated (cf. Table B.3 in the Appendix). However, it is notable that countries frequently tend to score lower values on the WEF sub-index for Economic Participation and Opportunity compared to the overall gender gap index (Panels b and c). This reflects the circumstance that many countries have successfully reduced or eliminated gender gaps in domains such as education and health, but have failed to (yet) close the gaps in outcomes in the economic domain.

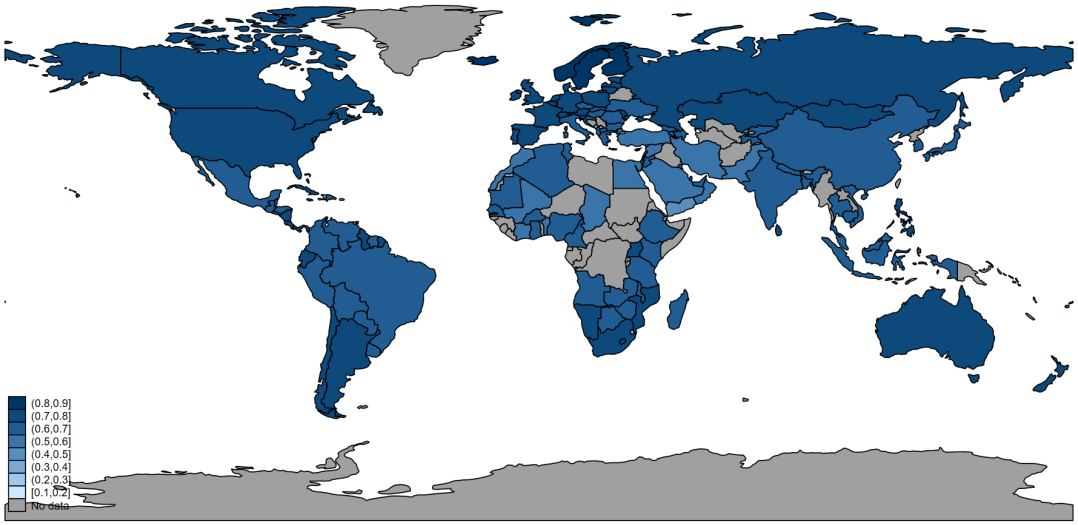
[10]The gender gap index for Economic Participation and Opportunity is based on the following statistics: (i) differences between women and men in labour force participation rates, (ii) the ratio of estimated female-to-male earned income, (iii) a qualitative indicator gathered through the World Economic Forum's annual Executive Opinion Survey (wage equality for similar work), (iv) the ratio of women to men among legislators, senior officials and managers, and (v) the ratio of women to men among technical and professional workers. Overall, the index thus captures differences between men and women in economic participation, remuneration, and career advancement.



(a) Women, Business and the Law Index (2010)



(b) WEF Gender Gap: Economic Participation and Opportunity (2010)



(c) WEF Gender Gap: Overall Gender Gap (2010)

Figure 1: Gender Inequality and Institutions around the World

Figure 2: Entrepreneurship in Denmark, By Gender of Founder

(a) Start-ups in Wholesale/Retail & Manufacturing

(b) Start-ups in Sample

2.2 Descriptives on Entrepreneurship in Denmark

Our firm-level sample spans the period 2001–2019.[11] Within this period, we observe a total of 57,719 new start-ups in the sectors of interest. However, due to our focus on firm internationalization and the ensuing sample restrictions (cf. above), our final sample(s) are much smaller: in our analysis of firms' import behaviour, 16,119 firms are included. Our sample for the study of firms' export behaviour contains 9,099 firms. In the following, we report statistics for the combined sample, including 17,905 start-ups which import and/or export at least once during the sample period.[12]

The majority (79%) of start-ups in our sample are from the wholesale/retail sector. Thus, our sample only contains 3,771 start-ups within manufacturing (consistent with the general trend towards the servitization of the economy, and the idea that the sunk costs of establishing a business are higher in the latter sector).[13] The majority (76%) of start-ups in our sample are limited liability companies.

Figure 2(a) shows the evolution of entrepreneurship in the manufacturing and wholesale/retail sectors in Denmark over the sample period (before sample restrictions). As expected, entrepreneurship is pro-cyclical, and we see a considerable decrease in the number of start-ups during the financial crises 2008/2009. Consistent with previous literature on gender differences in entrepreneurship (Kelley et al., 2010), Figure 2(a) reveals that the number of male start-ups is much larger than the number of female start-ups. Moreover, the share of female start-ups

[11]The registers on start-ups are available from 2001 and onwards. Due to the corona crisis, we exclude 2020 from the data.

[12]For comparison, we report summary statistics for the full sample of start-ups within the manufacturing and wholesale/retail sectors, before sample restrictions, in Section B.3 of the Appendix.

[13]See Figure B.2 in the Appendix for the distribution of new start-ups across industries within the two sectors, manufacturing and wholesale/retail.

Table 1: Summary Statistics for Start-ups in the Sample

	Male start-ups		Female start-ups	
	mean	N	mean	N
Panel A: Individual-level characteristics				
Age	41.72	13,706	40.00	3,943
Working Experience, in years	13.15	13,706	10.23	3,943
Bachelor or higher degree	0.226	13,706	0.282	3,943
Post-secondary non-tertiary education	0.638	13,706	0.562	3,943
Secondary schooling or lower	0.135	13,706	0.157	3,943
Business degree	0.264	13,706	0.219	3,943
Multiple start-ups within the year	0.070	13,706	0.028	3,943
Married	0.598	13,706	0.602	3,943
At least one child in HH	0.578	13,706	0.646	3,943
Panel B: Firm-level characteristics (year of founding)				
Personally owned start-ups	0.201	13,706	0.371	3,943
Limited liability company	0.799	13,706	0.629	3,943
Revenue, in 100,000DKK	38.79	13,706	19.47	3,943
Positive employment, indicator	0.429	13,706	0.353	3,943
Employment, FT equivalents	1.044	13,706	0.542	3,943
Survival to t+3[a]	0.862	12,417	0.841	3,532
Panel C: Firm-level characteristics, t+3 after founding				
Revenue, in 100,000DKK	93.42	10,707	43.27	2,972
Positive employment	0.647	10,707	0.566	2,972
Employment, FT equivalents	2.669	10,707	1.560	2,972

Notes: This table reports summary statistics for the combined sample, including those 17,905 start-ups which import and/or export at least once during the sample period. Statistics are reported separately by gender of the founder/entrepreneur behind the start-up. In Panel C, the sample is restricted to those start-ups which were founded before 2017, and which survived until $t+3$ after the founding date. [a] Since the sample period ends in 2019, the survival probability until $t+3$ is set to missing for firms founded in the year 2017 or later.

in the total number has only increased marginally over time (mainly driven by a decline in the number of male start-ups).

Figure 2(b) shows the number of new start-ups in each year in our combined sample of 17,905 startups which export and/or import at least once during the sample period. Several points are worth noting. First, our sample restrictions imply that we only consider a small fraction of all start-ups within the two considered sectors, and the overall number of start-ups is therefore much lower in Figure 2(b) compared to 2(a). Second, firms that are founded at the beginning of the sample period are more likely to be included in our sample than those founded in the last few years. Again, this pattern is sensible since start-ups will typically first expand domestically before they venture into international markets.[14] Third, the gap in entrepreneurship is more pronounced after sample restrictions compared to before. This pattern is due to the fact that female entrepreneurs are less likely to expand internationally.

[14]Figure B.1 in the Appendix shows the number of firm-year observations included in the sample, which gradually builds up over time.

Table 1 reports summary statistics for the characteristics of entrepreneurs and their start-ups in our sample, separately by gender of the entrepreneur.[15] The upper part of the table highlights several interesting differences between male and female entrepreneurs: for example, female entrepreneurs have on average somewhat fewer years of working experience, but are more likely to have a Bachelor's degree (or higher). At the same time, female entrepreneurs are less likely than their male counterparts to have a medium-level education (post-secondary non tertiary) but more likely to only have only primary or secondary education. A significant fraction ($> 20\%$) of entrepreneurs have a business degree. A small number of individuals in our sample is linked to several start-ups in the same year, and this is more likely for men than women. Finally, in terms of other demographics, we note that female entrepreneurs are equally likely to be married, but have a higher probability of having children in the household.

Next, we turn to the characteristics of the start-ups in their year of founding and three years after founding[16] (Panels B and C of Table 1). Male start-ups are larger than female start-ups, both in the year of founding and three years after, and these size differences hold in terms of both revenue and employment. Note that the probabilities of having positive employment in the year of founding are rather low: 42.9 % for male start-ups and 35.3% for female start-ups. For this reason, we do not impose any employment thresholds for our analysis. In fact, even three years after founding, only 57–65% of all surviving start-ups record a positive number of FTE employees.

3 Internationalization of Start-ups and Gender: Firm-level Evidence

Before we delve into our analysis of the patterns of trade across countries, we document to what extent female and male start-ups differ in their overall internationalization performance. Specifically, we ask whether female start-ups in our sample – which *do* internationalize at some point – nevertheless perform worse than their male counterparts, in terms of total exports or imports, as well as the number of destination markets reached and the number of import origins from which they source.[17]

[15] See Section B.3 in the Appendix for summary statistics on entrepreneurship before sample restrictions.

[16] Since our period of observation ends in 2019, we calculate survival probabilities until $t + 3$ only for firms founded before 2017. Panel C reports summary statistics in $t + 3$ after founding conditional on survival.

[17] See Section C.1 of the Online Appendix for a complimentary analysis of export and import behaviour at the extensive margin, based on the sample of all start-ups within manufacturing and wholesale/retail, before further

Table 2: Firm Internationalization and Gender

Panel A: Export behaviour

	Total exports (in logs)			Number of export destinations (in logs)		
	Baseline	+ Firm Controls	+ Individual Controls	Baseline	+ Firm Controls	+ Individual Controls
	(1)	(2)	(3)	(4)	(5)	(6)
Female Founder	-0.2737***	-0.2098***	-0.2284***	-0.0130	0.0083	0.0067
	(-3.439)	(-2.711)	(-2.850)	(-0.413)	(0.275)	(0.218)
Observations	40,450	40,450	38,582	40,450	40,450	38,582
R-squared	0.119	0.144	0.151	0.099	0.126	0.138
Fixed effects	industry#year founding year	industry#year founding year	industry#year founding year	industry#year founding year	industry#year founding year	industry#year founding year

Panel B: Import behaviour

	Total imports (in logs)			Number of import origins (in logs)		
	Baseline	+ Firm Controls	+ Individual Controls	Baseline	+ Firm Controls	+ Individual Controls
	(1)	(2)	(3)	(4)	(5)	(6)
Female Founder	-0.4482***	-0.2957***	-0.2726***	-0.0610***	-0.0282*	-0.0332**
	(-7.537)	(-5.164)	(-4.566)	(-3.618)	(-1.739)	(-1.962)
Observations	71,163	71,163	67,778	71,163	71,163	67,778
R-squared	0.162	0.196	0.201	0.101	0.137	0.142
Fixed effects	industry#year founding year	industry#year founding year	industry#year founding year	industry#year founding year	industry#year founding year	industry#year founding year

Notes: The table reports the coefficient estimates and t-statistics from the regression of different dependent variables on a female dummy and a set of control variables, which varies across columns. Firm controls include the (log of the) number of FT-equivalent employees (plus the founder), measured in the year of founding, and a dummy variable for type of start-up. Individual-level controls include age, labour market experience, a dummy for having a tertiary education and a dummy for having a business education. Robust t-statistics, clustered by firm, in parentheses. *** p<0.01, ** p<0.05, * p<0.1

To this aim, we run the following type of regression:

$$Y_{ft}^{(s)} = \beta FemaleFounder_f + \boldsymbol{\gamma} X_{ft} + \gamma_{st} + \gamma_{founding\ year} + \varepsilon_{ft} \tag{1}$$

where f denotes firm, t denotes time and s denotes industries. $FemaleFounder_f$ is a dummy variable for whether the firm has a female founder, and standard errors are clustered by firm. We condition on industry-year fixed effects γ_{st}[18] as well as fixed effects for the founding year $\gamma_{founding\ year}$, which together implies controlling for firm age as well. Doing so is important as female start-ups are less likely to survive, and firms are likely to become more internationalized as they mature. X_{ft} is a set of firm-specific control variables, discussed below.

Table 2 summarizes our findings. For each outcome variable of interest, we report results from three specifications, starting with a parsimonious model with only the fixed effects discussed

sample restrictions.

[18]While we sample firms based on their industry in the year of founding, we allow firms to switch industries over time. Thus, industry-year fixed effects are based on the industry-affiliation of the start-up in the current year. Note that a small but non-negligible fraction of start-ups switch industries over time.

above in columns (1) and (4), adding further firm controls in columns (2) and (5), and finally including a number of individual-level controls for the founder of the firm in columns (3) and (6). Notably, since we are taking the log of the dependent variables, the sample is restricted to firm-years with positive exports (Panel A) or positive imports (Panel B).

On the export side, an interesting pattern emerges. First, if we consider the level of export sales, we see negative, significant, and economically large effects of having a female founder. These negative effects are smaller, but remain sizeable and statistically significant, in the regressions with further control variables in columns (2)–(3). In the most stringent specification of column (3), we find that start-ups with a female founder export, on average, 22.8% less than their male counterparts. In contrast, we do not find significant differences across male and female start-ups in the number of export destinations (cf. columns (4)–(6)).

If female start-ups have the same destination portfolio as male start-ups but lower total export sales, then these findings together would imply that they sell less to any given destination. However, lower export sales per destination may also be due to female start-ups having a different portfolio of destination markets– and these destinations may be less lucrative than others (that are served by male start-ups). In the following section, we provide evidence that destination characteristics – in particular, gender norms and institutions in the destination – indeed affect male and female entrepreneurs differently, consistent with the idea that these firms have different destination portfolios.

On the import side, we also find large gender differences in terms of import purchases: even in the most stringent specification, a start-up with a female founder is predicted to have, on average, 27.3% lower imports than a comparable male start-up. Interestingly, for the case of imports, we also see significant gender differences in terms of the number of import origins from which start-ups are sourcing. Thus, lower import purchases are at least partly driven by a lower number of sourcing countries.

4 Gender Norms and Institutions and the Internationalization of Start-ups

This section addresses our main research question, namely, whether gender norms and institutions in foreign markets act as a barrier to the internationalization (and, thereby, growth) of female start-ups. To this aim, we firstly examine whether the effect of gender on firm interna-

tionalization differs across export destinations and import origins depending on the countries' gender norms and institutions. The analysis is complemented by an event study, focusing on a well-defined policy change in one of Denmark's most important trade partners, Norway.

4.1 Empirical Approach

For most countries in our sample, our measures of gender norms and (institutional) biases against women have changed only slowly over time. As a baseline, we therefore exploit a regression framework where identification of the coefficient of interest is based on the cross-country variation in these variables. Specifically, the model of interest is specified as follows:

$$Y_{fct}^{(s)} = \alpha FemaleFounder_f \times CountryChar_{ct} + \gamma_{ct} + \gamma_{sc} + \gamma_{ft} + \varepsilon_{fct} \tag{2}$$

where c denotes countries, s denotes industries, and $CountryChar_{ct}$ is a country characteristic (such as the WBL index). In the following, we consider four dependent variables $Y_{fct}^{(s)}$, all measured at the firm-country-year level: a firm's destination-specific export status and export sales, as well as its origin-specific import status and import purchases. α is the main coefficient of interest, capturing how the effects of gender vary with country characteristics.

Importantly, the cross-country dimension of our data allows us to include firm-year fixed effects γ_{ft} in our empirical model. Thus, we identify α from the variation in export and import behaviour across countries within a given firm and year. Specifically, these firm-year fixed effects account for any constraint or hurdle faced by female entrepreneurs (such as restricted access to finance) which affects their performance equally across all markets. More in general, γ_{ft} accounts for differences in the characteristics of female and male start-ups, including differences in firm size, age, and productivity. However, the main effect of gender ($FemaleFounder_f$) is also absorbed into γ_{ft}, meaning that we can no longer identify the overall effect of gender on firm internationalization. Thus, our findings regarding overall gender differences in firm internationalization, uncovered in Table 2, should be kept in mind.

Our empirical model also includes country-year fixed effects, denoted γ_{ct}, capturing any country-specific determinants of trade (such as distance, GDP, etc.) affecting firms' exports and imports. In addition, we add industry-country fixed effects γ_{sc} to the specification. These fixed effects are crucial as we observe an unequal distribution of female and male founders across different industries (cf. Figure B.2 in the Appendix), and because different industries may respond differently to country characteristics. For example, previous studies show that

trade intermediaries (such as wholesalers) account for a larger share of exports and imports in destinations that are harder to enter (Schröder et al., 2003; Bernard et al., 2015).

While the detailed fixed effects included in Equation (2) thus allow us to control for a range of unobservables which may otherwise hamper identification, two concerns regarding our empirical strategy remain. First, firm characteristics that are correlated with gender (such as firm size) may have heterogeneous effects across export destinations and import origins. If so, they will not be absorbed into the firm-year fixed effects. Second, other country characteristics may affect male and female entrepreneurs differently. In particular, female entrepreneurs might find it harder to engage with business partners in distant destinations, e.g., due to family obligations restricting their business travel.

In order to mitigate these concerns, we extend our empirical model and include additional interaction terms: first, an interaction of firm size (log employment) with the country's gender equality; second, an interaction of the female dummy with the geographic distance from Denmark.[19,20] The amended empirical model is specified as follows:

$$\begin{aligned} Y_{fct}^{(s)} =& \alpha_1 FemaleFounder_f \times CountryChar_{ct} + \alpha_2 FemaleFounder_f \times \ln distance_c + \\ & \alpha_3 FirmSize_{ft} \times CountryChar_{ct} + \gamma_{ct} + \gamma_{sc} + \gamma_{ft} + \varepsilon_{fct} \end{aligned} \tag{3}$$

In Equations (2) and (3), the coefficients of interest (α and α_1, respectively) are identified from both the within-country as well as the cross-country variation in gender norms and institutions (where the cross-country variation is arguably more sizeable).[21] As an alternative and somewhat more conservative approach, we also perform regressions where only the within-country time variation is exploited:

$$\begin{aligned} Y_{fct}^{(s)} =& \alpha_1 FemaleFounder_f \times CountryChar_{ct} + \\ & \alpha_3 FirmSize_{ft} \times CountryChar_{ct} + \gamma_{ct} + \gamma_{fc} + \gamma_{ft} + \varepsilon_{fct} \end{aligned} \tag{4}$$

[19]Data on the population-weighted distance from Denmark is obtained from the CEPII's Gravity Database (Conte & Mayer, 2022).

[20]Bøler et al. (2018) show that firms with an export portfolio of destinations with a lower business hour overlap with the home country have higher gender wage gaps. Their findings are consistent with the idea that such destinations require employee flexibility in order to communicate with business partners, and women are (perceived to be) less flexible. We note, here, that destination distance is strongly correlated with business hour overlap. In addition, we argue that entrepreneurs behind new start-ups venturing into export markets would need to be flexible not just in communicating with foreign business partners, but also in business travel.

[21]Figure 1 above visualizes the cross-country variation in the WBL and WEF indices of gender equality for a given sample year. For comparison, Figure B.4 in the Online Appendix shows the within-country variation of these variables.

Specifically, we have replaced industry-country fixed effects with firm-country fixed effects γ_{fc}. Thus, a positive coefficient estimate of α_1 would now indicate that firms founded by female entrepreneurs react more to a *change* over time in the country-specific characteristic of interest compared to firms founded by male entrepreneurs. The interaction of Female Founder with distance will be absorbed into this fixed effect.

4.2 Results

4.2.1 Export Behaviour Across Destination Markets

Table 3 shows the results from estimating Equations (2), (3) and (4) using export data at the firm-destination level. We consider two outcome variables. In columns (1) to (3), we measure the export status using a dummy equal to one if firm f exports to destination c in year t, and zero otherwise. Here, the sample includes all start-ups which record positive exports to at least one of the destinations in our sample, and at least one sample year (cf. above). Columns (4) to (6) turn to the intensive margin, i.e., destination-specific export sales conditional on exporting to the destination market. Here we further restrict the sample to firm-years with positive exports in the current year. The table includes three panels which are based on the different measures of gender equality: Panel A uses the WBL index on laws and institutions, Panel B the WEF sub-index on gender gaps in economic participation and opportunity, and Panel C the WEF index for overall gender gaps.

Across all three panels, results for the extensive margin of exporting in columns (2)–(3) confirm our hypothesis: gender gaps in export participation widen in destination markets with legal institutions that hamper women's economic rights (lower values of the WBL index). They also widen in destinations with higher levels of gender inequality (lower values of the WEF indices). Importantly, thus, we find very similar patterns independent of the measure of gender norms and institutions that we employ.

The implied magnitudes are also substantial: based on the most demanding, and thus conservative, specification in column (3), we predict that an increase in the WBL index by one standard deviation increases the relative export probability of female start-ups compared to male start-ups by 0.14 percentage points. This amounts to an increase by 15.4 percent, when judged against the overall probability in this sample of 0.89 percent.[22] To give a more concrete

[22]The standard deviation of the WBL index is 0.185, the coefficient estimate of interest is 0.0074 and the sample propensity is 0.0089. See Table B.2 in the Online Appendix for summary statistics of macro variables.

Table 3: Start-ups' Export Behaviour and Gender Institutions in Destination Markets

	Export status			ln Exports		
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: WBL Index						
Female * WBL index	0.0016	0.0076***	0.0074***	0.7091**	0.1004	0.5078
	(0.486)	(3.737)	(2.849)	(2.165)	(0.441)	(0.529)
Female * ln distance		-0.0002			-0.1440***	
		(-0.306)			(-3.098)	
Ln Size * WBL index		0.0422***	0.0385***		0.8502***	0.6519***
		(18.865)	(22.100)		(10.500)	(4.669)
Observations	15,146,387	15,146,387	15,116,441	114,809	114,809	98,872
R-squared	0.157	0.162	0.534	0.525	0.527	0.819
Fixed effects	firm#year country#year industry#country	firm#year country#year industry#country	firm#year country#year firm#country	firm#year country#year industry#country	firm#year country#year industry#country	firm#year country#year firm#country
Average of dep. var.	0.0089	0.0089	0.0089	11.9652	11.9652	12.1673
Panel B: WEF Gender Gap in Economic Participation and Opportunity						
Female * Gender gap	0.0056*	0.0111***	0.0094***	0.7007*	0.0164	2.6554***
	(1.665)	(4.889)	(4.369)	(1.754)	(0.046)	(3.418)
Female * ln distance		-0.0006			-0.1403***	
		(-0.571)			(-2.654)	
Ln Size * Gender gap		0.0400***	0.0353***		1.2076***	0.6545***
		(21.628)	(22.774)		(10.348)	(3.172)
Observations	9,871,502	9,871,502	9,814,375	102,862	102,862	88,882
R-squared	0.179	0.181	0.571	0.523	0.525	0.824
Fixed effects	firm#year country#year industry#country	firm#year country#year industry#country	firm#year country#year firm#country	firm#year country#year industry#country	firm#year country#year industry#country	firm#year country#year firm#country
Average of dep. var.	0.0122	0.0122	0.0123	11.9949	11.9949	12.1948
Panel C: WEF Overall Gender Gap						
Female * Gender gap	0.0161	0.0386***	0.0283***	1.9724**	0.7266	3.6945***
	(1.278)	(4.705)	(4.220)	(2.525)	(1.099)	(3.302)
Female * ln distance		-0.0005			-0.1125**	
		(-0.462)			(-2.216)	
Ln Size * Gender gap		0.1599***	0.1379***		2.5654***	1.2156***
		(22.809)	(25.621)		(10.557)	(3.962)
Observations	9,889,194	9,889,194	9,819,638	102,868	102,868	88,882
R-squared	0.179	0.185	0.571	0.523	0.527	0.824
Fixed effects	firm#year country#year industry#country	firm#year country#year industry#country	firm#year country#year firm#country	firm#year country#year industry#country	firm#year country#year industry#country	firm#year country#year firm#country
Average of dep. var.	0.0122	0.0122	0.0123	11.9949	11.9949	12.1948

Notes: The table reports the coefficient estimates and t-statistics from the regression of different dependent variables on a female dummy and its interaction with institutions in export destinations, plus a set of fixed effects. Robust t-statistics, clustered by firm, in parentheses. *** p<0.01, ** p<0.05, * p<0.1

example, we predict that increasing the level of women's economic rights from the level of Saudi Arabia to the one in Brazil would increase the relative export probability of female start-ups by 0.4 percentage points, almost 50 percent of the overall sample probability.[23] Similarly, increasing

[23]The WBL index of Saudi Arabia in 2010, mid-sample, was equal to 0.26 while it was 0.82 for Brazil.

the WEF gender gap index for economic participation and opportunity from the level of Turkey (0.38 in 2010) to the level of Romania (0.71 in 2010) is predicted to reduce the gender gap in export participation by 0.3 percentage points, or 24.5 percent of the sample probability.

Interestingly, comparing results in columns (2) and (3), we note that controlling for firm-destination fixed effects barely affects our estimates. In contrast, a comparison of columns (1) and (2) reveals that controlling for the additional interaction terms of Equation (3) is indeed important. Specifically, estimates increase in size and statistical significance when moving from column (1) to (2). This pattern is driven by the fact that female start-ups tend to be smaller, combined with the positive coefficient on the interaction term between firm size and the WBL/WEF indices.

In columns (4)–(6) of Table 3, we turn to the intensive margin of exporting. Once more, we notice that adding additional interaction terms, as suggested in Equation (3), is important. Moreover, estimates are here more sensitive to the measure of gender norms and institutions that we employ, and to the sets of fixed effects included. Our hypothesis on the effects of destination characteristics on the relative export performance of female start-ups is supported only based on gender equality in outcomes (as represented by the WEF gender gap indices in panels B and C) rather than gender equality in the country's legal institutions (i.e., the WBL index; panel A). Moreover, this only holds conditional on the most detailed set of fixed effects in column (6).

Focusing on results in Panels B and C, we find that the relative performance of female compared to male start-ups in terms of export sales does not vary systematically with the destination's gender equality in the cross-section of countries (cf. column (5)). However, improvements in a country's level of gender equality over time lead to significant increases in the relative export performance of female start-ups (cf. column (6)). Again, the implied magnitudes are substantial: increasing the WEF index of Panel B by one standard deviation is predicted to increase export sales of female compared to male start-ups by 32.7 percent (=0.121 * 2.6554).

Overall, Table 3 confirms that institutional biases against women and gender equality in destination markets significantly impact the relative performance of female start-ups, especially at the extensive margin. These results may reflect two factors: first, potential business partners in more gender-unequal destination countries may be less inclined to transact with women. Second, female entrepreneurs may be deterred by the fear of discrimination in certain destination markets. Interestingly, in case of the WBL index, we find significant effects only at the extensive margin. In contrast, conditional on exporting to a destination market, the relative export per-

formance of female start-ups does not vary significantly with the destination's legal institutions affecting women. This pattern might suggest that the fear of discrimination is likely to play at least some role in explaining the observed patterns.

4.2.2 Import Behaviour Across Import Origins

Next, we consider the role of gender gaps in import origins for the import activity of female start-ups. Intuitively, we would expect import decisions of female entrepreneurs to be less affected than export decisions by (actual) gender discrimination. In the case of exports, foreign customers in a destination country with a high level of gender inequality may prefer to engage with male rather than female business partners. In addition, these foreign customers may also undervalue the quality of products supplied by a female entrepreneur. In contrast, suppliers in these countries may not be concerned about the gender of their customer firms in Denmark. However, female entrepreneurs' fear of discrimination in certain markets might be relevant on the import side as well.

The evidence reported in Table 4 is indeed mixed. Considering first our preferred specifications for the import decision in columns (2) and (3), we only find the expected positive coefficient on the interaction terms of interest conditional on firm-destination fixed effects; i.e., when identified based on within-country changes in the WBL/WEF indices. With this caveat in mind, coefficient estimates in column (3) are very similar in size to those reported in Table 3, implying that the effect of gender equality in trade partner countries has similar effects on gender gaps in export and import participation. In contrast, coefficient estimates in columns (4) to (6) across all three panels suggest that women's economic rights and gender equality do not play a role for the decision by female entrepreneurs how much to import – given that the firm already imports from this destination.

Taken together, the results for the export and import behaviour of start-ups suggest that institutional biases against women and gender inequality in trade partner countries are an important determinant of whether a firm, if it is run by a woman, exports to or imports from a country. These country characteristics may make it more difficult for women to enter into business relationships with partners (presumably more likely to be male) in these countries. In addition, female entrepreneurs might self-select to not engage with trade partners in these countries because of the fear of discrimination. Once a trade relationship is established, we find some evidence that female entrepreneurs still find it more difficult to export more to these countries

Table 4: Start-ups' Import Behaviour and Gender Institutions in Import Origins

	Import status			ln Imports		
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: WBL Index						
Female * WBL index	-0.0062***	0.0014	0.0089***	-0.3490	-0.2648	-0.4809
	(-4.560)	(1.467)	(6.070)	(-1.077)	(-0.812)	(-0.524)
Female * ln distance		0.0016***			0.0297	
		(4.456)			(0.695)	
Ln Size * WBL index		0.0318***	0.0272***		-0.1515	-0.3173*
		(26.265)	(29.673)		(-1.230)	(-1.960)
Observations	23,122,179	23,122,179	23,029,614	167,694	167,694	139,712
R-squared	0.141	0.144	0.548	0.545	0.545	0.852
Fixed effects	firm#year country#year industry#country	firm#year country#year industry#country	firm#year country#year firm#country	firm#year country#year industry#country	firm#year country#year industry#country	firm#year country#year firm#country
Average of dep. var.	0.0087	0.0087	0.0087	10.9704	10.9704	11.3080
Panel B: WEF Gender Gap in Economic Participation and Opportunity						
Female * Gender gap	-0.0056***	0.0007	0.0062***	-0.6948*	-0.6178*	0.9974
	(-3.587)	(0.520)	(4.834)	(-1.922)	(-1.694)	(1.303)
Female * ln distance		0.0021***			0.0393	
		(4.602)			(0.856)	
Ln Size * Gender gap		0.0258***	0.0179***		-0.1072	0.1272
		(23.052)	(23.631)		(-0.706)	(0.774)
Observations	15,589,220	15,589,220	15,462,515	132,936	132,936	109,921
R-squared	0.152	0.153	0.578	0.552	0.552	0.862
Fixed effects	firm#year country#year industry#country	firm#year country#year industry#country	firm#year country#year firm#country	firm#year country#year industry#country	firm#year country#year industry#country	firm#year country#year firm#country
Average of dep. var.	0.0106	0.0106	0.0106	11.0886	11.0886	11.4477
Panel C: Overall WEF Gender Gap						
Female * Gender gap	-0.0189***	0.0060*	0.0254***	-0.8007	-0.3717	1.6409
	(-3.989)	(1.795)	(6.353)	(-1.189)	(-0.474)	(1.158)
Female * ln distance		0.0020***			0.0471	
		(4.632)			(0.883)	
Ln Size * Gender gap		0.1076***	0.0714***		-0.0569	-0.2410
		(27.337)	(26.977)		(-0.215)	(-0.714)
Observations	15,616,849	15,616,849	15,470,280	132,936	132,936	109,921
R-squared	0.152	0.155	0.578	0.551	0.552	0.862
Fixed effects	firm#year country#year industry#country	firm#year country#year industry#country	firm#year country#year firm#country	firm#year country#year industry#country	firm#year country#year industry#country	firm#year country#year firm#country
Average of dep. var.	0.0105	0.0105	0.0106	11.0886	11.0886	11.4477

Notes: The table reports the coefficient estimates and t-statistics from the regression of different dependent variables on a female dummy and its interaction with institutions in export destinations, plus a set of fixed effects. Robust t-statistics, clustered by firm, in parentheses. *** p<0.01, ** p<0.05, * p<0.1

(intensive margin) while this is not the case for imports.

4.3 Robustness Analysis

In this section, we discuss a number of robustness exercises which we perform in order to substantiate our findings. In the Online Appendix, for each robustness exercise, we provide results based on the empirical models in Equations (3) and (4), and for each of the four measures of firm internationalization (firms' export and import behaviour at the extensive and intensive margins). We focus on the WBL index as our preferred measure of institutions affecting women in their economic decision making. Note from Table 3 that this choice of gender inequality measure implies that we are conservative regarding the effects on the intensive margin of exporting.

4.3.1 Gender Biases or Risk Attitudes?

It is frequently argued that women and men differ in their risk attitudes (Croson & Gneezy, 2009; Bertrand, 2011), though the evidence for such gender differences is less clear-cut among managers or other individuals with a business background (Johnson & Powell, 1994; Adams & Funk, 2012; Faccio et al., 2016). One concern is that our measures of institutions and gender inequality may be correlated with a country's risk, and that our findings thus far are therefore driven by women's risk attitudes. To investigate this concern, we turn to OECD data on country risk. In the data, countries are rated on a 7-point scale, with 7 being the highest risk category. In addition to the OECD data, which provide a concrete measure of destination risk, we hypothesize that a country's perceived risk may be correlated with income per capita.

We include an additional interaction of the female dummy with country risk (measured by either the OECD risk measure or GDP per capita) in our regressions. Results, reported in Panels A and B of Table C.2, reveal only mixed evidence for gender differences in risk attitudes. Importantly, however, our results on the importance of gender inequality in destination markets for the extensive margin of exporting and importing remain robust in statistical significance and magnitude.

4.3.2 Gender Differences in Growth Aspirations?

One of the reasons for why female start-ups experience lower growth may be due to gender differences in growth aspirations as well as differences in the motivations for entering entrepreneurship. Specifically, for females, entering entrepreneurship may sometimes reflect the choice to be self-employed to better balance work and family obligations (such as child care). For males, instead, choosing to be an entrepreneur is more often motivated by actual business opportunities; cf.

the review in Carranza et al. (2018). In our regressions, which only exploit the cross-country variation in export and import behaviour within firm-years, these gender differences should be accounted for, unless they affect firms' trading behaviour differently across markets.

We provide two sets of robustness checks to address any remaining concerns. First, we restrict the sample to those start-ups which start recording positive employment within three years from the founding date. This restriction should eliminate start-ups that are solely means of self-employment. Second, we limit our analysis to limited liability companies which – given capital requirements – may be more likely to be start-ups founded with growth aspirations. Results for these two sub-samples, reported in Table C.3 of the Online Appendix, are very similar to our benchmark results.[24]

4.3.3 Alternative Measures of Gender Biases

Thus far, we have exploited information on gendered institutions from the World Bank's WBL index and gender inequality outcomes from the WEF. We have argued that gender biases will be reflected in such outcome measures. To provide further credibility to this hypothesis, we turn to data from the 5th wave of the World Values Survey (WVS). In this survey, respondents in 67 countries were asked about their opinions on different questions and social issues. Inter alia, respondents were asked to which extent they agreed that "On the whole, men make better business executives than women do" with answer categories ranging from 1 ("Strongly agree") to 4 ("strongly disagree"). We construct the country-specific average of this survey item and use it as a direct measure of biased gender attitudes. In line with our hypothesis, this measure is strongly and positively correlated with the WBL and WEF index measures (see Table B.3).

Regression results exploiting this measure of biased gender attitudes, reported in Panel A of Table C.4, show the expected positive interaction effect with the female dummy for both the extensive and intensive margin of exporting, but no – or even negative – interaction effects for firms' import behaviour. (Note, though, that this measure does not vary across time and thus does not allow us to include firm-destination fixed effects.) Apart from being statistically significant, the implied effects are substantial: for the extensive margin of exporting, we predict that a standard deviation increase in the WVS measure of biased attitudes increases the export probability by 0.28 percentage points, or 12 percent of the export probability in this sample.

[24] In the sample including only limited liability companies and the specification with firm-destination fixed effects, the interaction term of the WBL index with the female dummy turns insignificant in the regression for export status, but only marginally so.

Another issue with the WBL and WEF gender equality measures is that they combine various dimensions into a single index number, thereby not allowing us to disentangle which dimension of gender equality is particularly important for the trading behaviour of female start-ups. As an alternative approach, we extract data on the share of women among members of the board of directors for the largest listed companies from the Gender Statistics Database of the European Institute for Gender Equality (EIGE). These data are available for 32 European countries over the period 2003–2019. Exploiting the female share of directors as an alternative, and very concrete, measure of gender differences in economic leadership confirms our main findings: we find consistently positive effects on the export and import gap of female vs. male start-ups; see Panel B of Table C.4. Coefficient estimates and implied magnitudes are, however, much larger for the export probability.[25] For the intensive margin, results are again less robust: here, the main interaction effect of interest is only statistically significant in specifications without firm-destination fixed effects.

4.3.4 Heterogeneity Across Genders or Heterogeneity Across Skills?

As alluded to in Section 4.3.1 above, the evidence for differences in risk attitudes between males and females is less clear once one considers individuals with a degree in business or management (Johnson & Powell, 1994; Adams & Funk, 2012; Faccio et al., 2016). In order to see whether such an effect due to the educational background may also drive our findings, we add an interaction of the WBL index with an indicator for whether the entrepreneur has a business degree.

The results in Panel A of Table C.5 indeed show that there is an educational aspect, in the sense that entrepreneurs with a degree in business are more likely to export to markets with more gender-friendly institutions. The estimates are, however, only statistically significant when not controlling for firm-destination fixed effects. Importantly, however, the inclusion of the additional regressor does not change our main finding on the importance of gender norms for the export and import activity of female start-ups.

4.3.5 Other Robustness Checks

We complete our robustness analysis with a few sensitivity checks, which we discuss in more detail in Section C.2 of the Online Appendix. First, we exploit additional information regarding

[25]Specifically, a one-standard deviation increase in the share of female directors is predicted to increase the export (import) probability by 0.7 percentage points (0.1 percentage points), which amounts to 22 percent (6 percent) of the export (import) probability.

the link between the individual behind the company and the start-up, restricting our sample to firms where the 'entrepreneur' is also the founder (cf. Section 2.1.1). Second, we consider various restrictions of the sample in terms of the countries under consideration. Finally, we analyze to what extent there are differences across the two broad sectors – manufacturing and wholesale/retail – included in our sample.

4.4 An Event Study of the Norwegian Gender Quota

In our analysis thus far, we use data on gender equality in a large number of countries with different institutional settings and characteristics. The indices we use give, by their very nature, an indication of the overall biases or inequalities in institutions, outcomes or opportunities, rather than allowing us to pinpoint specific aspects of inequality that could easily be identified and targeted by policy. Moreover, from a methodological point of view, identification thus far relies on within-country changes in the gender-specific country-level variables (due to the inclusion of firm-country fixed effects), where the estimated effect is then an average effect across countries.

To complement this analysis, we now turn to a somewhat different identification strategy. Specifically, we use a concrete policy change towards more gender equality in Norway as a case study. Norway is an interesting case in this context because it implemented a quota for female board members from 2004. In December 2003, the Norwegian Parliament passed a regulation requiring that companies have at least 40 percent female representation on their boards. As such, Norway was the first country in the world to implement such a quota. The policy change signals a move towards furthering gender equality in the country, and in particular a move away from male-centricity in companies' boardrooms, which may also have trickled-down to other management functions within firms and society at large.

Exploiting this policy change is particularly useful for our purposes for at least two reasons. First, Norway is a direct neighbour of Denmark. Therefore, this change of institutions can be argued to have been 'visible' in Denmark, in the sense that it was discussed in the media and in the wider public. Hence, entrepreneurs were likely aware of this policy change, and female start-ups might have been encouraged to foster business transactions with Norwegian customers or suppliers. Second, the policy change can be seen as exogenous to the trading decision of Danish start-up firms, which allows us to estimate its causal impact.

In order to exploit the introduction of the quota for our purposes, we use an event-study

design. In particular, we estimate the following event study regression:

$$Y_{fct}^{(s)} = \sum_{\substack{t=2001,...2011 \\ t \neq 2003}} \delta_t 1(c = NO) \times Female_f + \gamma_{fc} + \gamma_{ft} + \gamma_{ct} + \epsilon_{fct}, \tag{5}$$

where the dependent variable is an indicator whether a firm exports respectively imports from country c in a given year. We choose the year 2003 (one year before the implementation of the gender quota) as the reference period. $1(c = NO)$ is an indicator for the country being Norway. The 'treatment effects' are given by the coefficient estimates δ_t for $t = 2004, 2005, ...2011$. Notably, the model includes country-year fixed effects γ_{ct}, and firm-year fixed effects γ_{ft}, and the treatment effects are thus identified based on differences across female and male startups in the evolution of the dependent variable $Y_{fct}^{(s)}$ in Norway after the implementation of the quota. Standard errors are clustered by firm.

For this part of the analysis, we restrict the sample to firms founded before 2004, as we can only observe changes in trading activities for firms which existed already prior to the event date.[26] We start observing these firms in 2001 (or 2002 or 2003, depending on the founding date), and follow them up to 2011, giving us a ten year window of data for our analysis.[27] As a baseline, we include all other countries in our sample as comparison group.[28] The results of the event study regressions are reported in Figure 3.

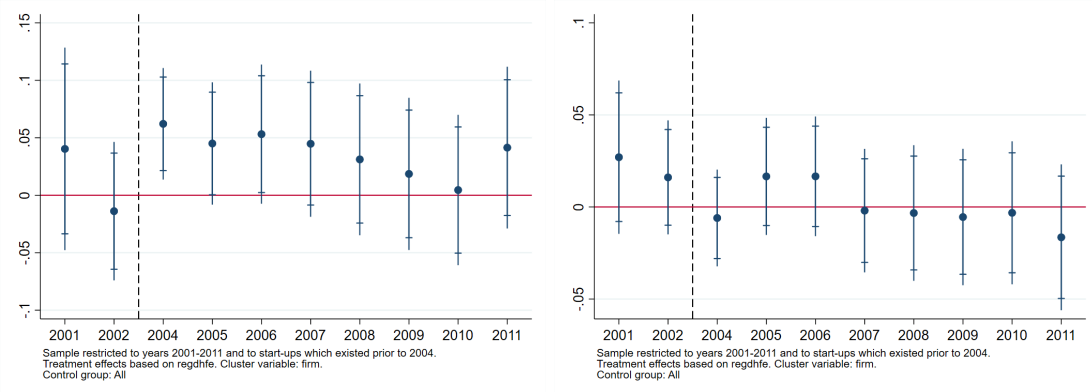
It is reassuring to note that the coefficients on the interaction terms before the implementation of the policy change, i.e., in 2001 and 2002, are statistically insignificant in both the export and import analysis. This pattern suggests the absence of different pre-treatment trends, an important assumption of the event study analysis.

The graphs show that the probability for a female-led Danish start-up to export to Norway increases immediately after the policy change in 2004. The effect is still noticeable in 2005 and 2006 but turns statistically insignificant afterwards. This result is, thus, in line with the evidence from the analysis of cross-country data above. We do, however, not find any corresponding effect of the policy change for the probability to import from Norway.

[26] Since few firms are 'born globals', i.e., engage in trading activity from their first year of existence, we do not aim to study trading behaviour at the intensive margin for this part of the analysis.

[27] Of course with our data we could also look at later years. We chose not to do so, as we would expect the strongest effect in the years following the policy change. Also, including more years would lead to more firms dropping out of the sample, potentially affecting our results.

[28] Having other countries besides Norway allows us to include firm-year fixed effects, and thus control for firm-specific shocks that affects export behaviour across all markets.



(c) Export probability

(d) Import probability

Figure 3: Results from the Event Study

Taken together, the results suggest that the policy change had a strong signalling effect for female start-ups in Denmark. Given that Norway has been one of the countries with the highest level of gender equality (see Section 2) it is unlikely that Norwegian buyers or customers cared about the gender of their Danish business partner. Also, it is important to note that, while the quota was announced in early 2004 it only become law, and thus enforceable, from 2008 onwards (Storvik, 2011). The fact that we already see an immediate effect on Danish female entrepreneurs after the announcement in 2004 clearly indicates that this acted as a strong signal that Norway had become more open to female businesses, encouraging Danish female entrepreneurs to start selling to this country.

In robustness checks, reported in Section C.4 of the Online Appendix, we verify that different choices of comparison countries yield similar results. Firstly, as Norway is very different from the 'average' country in our sample, in that it is very close to Denmark in terms of geography, culture, and history, we have estimated our event study based on a sample of comparison countries which arguably are more comparable to Norway in these respects. In the first instance we used Sweden, Island, Finland and Germany, and in second instance those four plus France, Belgium and Austria.

Secondly, Norway may also be considered different from other European neighbors of Denmark in that it is not a member of the European Union. While this may be less of a problem in terms of institutional differences – which are generally similar in Norway and the EU, as Norway is a member of the European Economic Area – it implies that the trade data is collected in a different way, since Intra-EU and Extra-EU trade in EU countries is recorded differently.[29] In

[29]Most importantly, there are thresholds for transactions included in intra-EU trade statistics. Extra-EU trade

order to deal with this issue, we also ran the estimation using only non-EU countries as comparison group. All these estimations produce results that are similar to those reported in Figure 3.

5 Conclusion

This paper examines how the decisions to engage in international trade activities by female start-ups are influenced by gender norms and institutions in the trade partner countries. The main idea behind this empirical exercise is that female entrepreneurs find it more difficult than their male counterparts to enter markets that are male-centred, in the sense that they have strong social norms that generate a bias against women, e.g., because they limit the participation of women in the economy or society. This is because trade partners in the destination country may be less inclined to transact with women as their societies are more male-centred, or because women-led firms may be deterred by the perception of male-centricity in the destination country.

Using new and highly detailed micro level data on Danish start-ups, we provide robust evidence that female start-ups are less active in terms of exporting or importing on markets that display high levels of gender inequality. We complement this cross-country analysis with an event study related to a relevant policy change in Norway.

Taken together, our findings are highly policy relevant, as they highlight an important and heretofore overlooked obstacle on the path to the empowerment of women in the global economy. Since entering new export markets and importing quality goods is crucial for firms to grow, our findings have important implications for the growth prospects of female businesses. While the results are established using data for Denmark, there is no reason to think that they are exclusive to the Danish economy. As long as there are biases against women in society, female entrepreneurs may be impeded in their endeavours to expand their operations abroad.

There are also implications for the customer or supplier companies abroad, however. If they indeed refrain from transacting with firms that are run by female managers because of a bias against women in society, then these companies are deprived of a large variety of products and services that are sold by female entrepreneurs. This limits their choice set and, ultimately, reduces welfare for those firms.

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is recorded from customs data, while intra-EU trade is based on companies' VAT returns, for which thresholds apply. Note that as a result of this, export probabilities for Danish firms to Norway are much higher than export probabilities to, e.g., neighbouring Sweden.

What can policy do? If females are less keen to engage with countries that display biases against women solely because of some signalling effect, then policy can be useful to increase participation, e.g., through bringing female entrepreneurs in contact with role models, establish mentorship programs or specialised educational courses. Also, the use of online platforms, which have been shown to boost export activities of female firms (Poole & Volpe Martincus, 2023), may be a useful tool to overcome barriers.

However, if females trade less with countries because of actual discrimination on the part of the trade partner, then cross-country or international policy efforts may be necessary to reduce gender discrimination in possible trade destinations in order to enable women to expand their export activities. This will also have positive consequences for the firms abroad, which will benefit from a larger variety of products.

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A Data Appendix

Data on start-ups is extracted from two registers on entrepreneurship: IVPE contains information on personally owned start-ups and IVPS contains information on start-ups founded as limited liability companies and joint stock companies. Below, we discuss each of these data sources in turn, and subsequently discuss how we clean the combined dataset.

A.1 Data on Start-ups

The registers on entrepreneurship are based on new registration numbers from *den Erhvervsdemografiske database* (the Business Demographic Database). According to Statistics Denmark, they have a coverage rate for new CVR numbers (firm identifiers) of approximately 88 percent. This is because the content of *den Erhvervsdemografiske database* includes, among other things, public entities, etc., which are not included in the data on entrepreneurship. Furthermore, the entrepreneurship registers are limited to VAT-liable private 'urban' enterprises.[i]

A.1.1 Personally Owned Businesses

Personally owned businesses are, by law, only owned by one single individual, who is the sole decision maker within the company. In the data, the link between firm (CVRNR) and entrepreneur (PNR) is therefore unique. Notably, starting a personally owned business is not subject to any capital requirements. In our sample, female start-ups are more likely to be personally owned businesses, consistent with the evidence from other countries that female entrepreneurs face higher barriers to obtaining financing for their businesses (cf. Carranza et al. (2018) for a review). At the same time, founding a personally owned business implies that the owner is personally liable for the company with his/her own assets.

A.1.2 Private Limited Companies and Joint Stock Companies

Private limited companies and joint stock companies could, in principle, be linked to several 'entrepreneurs'. In the corresponding register, whether we observe only one – or potentially multiple – individuals behind the company varies across years.

From 2001 until 2013, only one individual is recorded as the 'person behind the company' for each start-up. For some of the years, auxiliary variables are provided which record the

[i]Private urban enterprises (*private byerhverv*) include enterprises in the following sectors: manufacturing, construction and civil engineering, as well as private service industries.

type of link between the individual and the company. Specifically, this holds for the periods 2001–2006 and 2009–2013. For 2007 and 2008, however, no such auxiliary variable exists. The recorded links can, for example, be "founder and employed", "founder", "member of the board and employee" etc.

From 2014 and onwards, the information on the people behind private limited companies and joint stock companies is no longer limited to only include one person behind the company. In cases where several people can be linked to the company, all are included, and auxiliary variables can be used to identify the type of link which exists between the individual and the employee. To make the data for these later years comparable to the first years of the sample period, we only choose the individual with the highest 'priority' (typically the founder).

Given the auxiliary variables that exist for some of the years, we also provide a robustness analysis where we restrict the sample to those companies where the individual identified as the person behind the company is the founder. See Panel B of Table C.5 for results.

A.2 Data Cleaning

The data on new start-ups contains information on the firm identifier (CVRNR), person identifier (PNR), and the year in which the company was founded. Via the firm identifier, we link these data to the general firm statistics, from which we retrieve information on industry, number of employees, etc.

We select the sample of start-ups based on their industry affiliation in the start-up year, restricting the sample to those start-ups within manufacturing and wholesale/retail. In a few cases, firms subsequently change their main activity (e.g., some manufacturing start-ups subsequently change their main activity and move into 'knowledge services', which includes activities such as R&D). We keep these firm-year observations to avoid sample truncation due to firms switching industry.

Some start-ups appear in the general firm statistics (FIRM) already before their founding year. We only keep those start-ups which appear in the firm statistics for the first time in the year of founding, or the previous year. For a small number of firms, the difference between the founding year recorded in the statistics on start-ups and the first year in the general firm statistics exceeds one year. In such cases, we eliminate the start-up from the sample, as the founding year might be measured with error. Next, consider cases where the firm appears in the firm register already in the year prior to official founding year according to the entrepreneurship

data. There could be plausible reasons for why this is the case. For example, firms might have started with minimal activity in 2001, but first have been registered as a new start-up in 2002. In fact, if a firm appears in the general firm statistics already in the year before the official founding data according to the entrepreneurship data, revenues are often zero or negative in that year. For these start-ups, we drop the year prior to the official founding year (unless the firm records 75,000 DKK (ca. 10,000 EUR) or more in revenues), but keep all subsequent observations for our analysis.

Furthermore, we carefully handle firms and firm-year-observations for which non-positive revenue is recorded in the data. First, we drop all firm-year observations for start-ups which do not record positive revenue in any of the first three years after their founding.[ii] This restriction drops only a small number of firms, and it minimizes the concern that the founding year recorded in the data is not the year in which the firm became active. Second, for each firm, we register the last year in which we see positive revenue, and drop all observations from subsequent years. These cases are likely start-ups which went out of business, but continue to be recorded in the firm register.[iii] Furthermore, we would not expect a firm to export if it does not record positive sales.

Finally, we need to consider how to treat firms with zero employment. Not surprisingly, new start-ups record only few employees (if any), especially in the first years of their existence. Conditioning the sample on firms having positive employment would therefore lead to a very considerable drop in the number of start-ups included. For this reason, we do not impose any restrictions in terms of employment, but only consider such restrictions in our robustness analysis (cf Panel A of Table C.3).

[ii] This includes cases where the firm does not appear in the general firm statistics in the first three years after its founding – for example, because of not meeting requirements regarding minimum levels of activity, or because the firm is founded in a sector other than our sample sector, and then switches sector in later years.

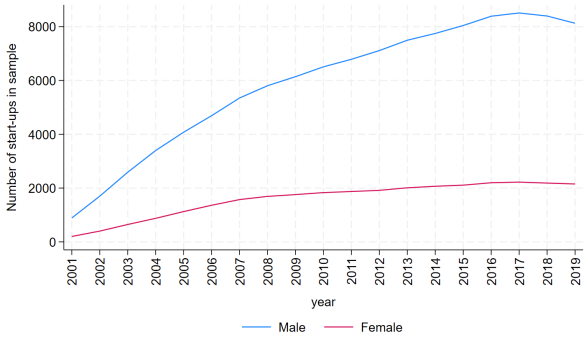
[iii] In theory, the firm register should only contain information on firms with a minimum level of activity.

B Additional Figures and Summary Statistics

B.1 Firms in Sample

Figure B.1 shows the number of firm-year observations included in the sample, which gradually builds up over time.

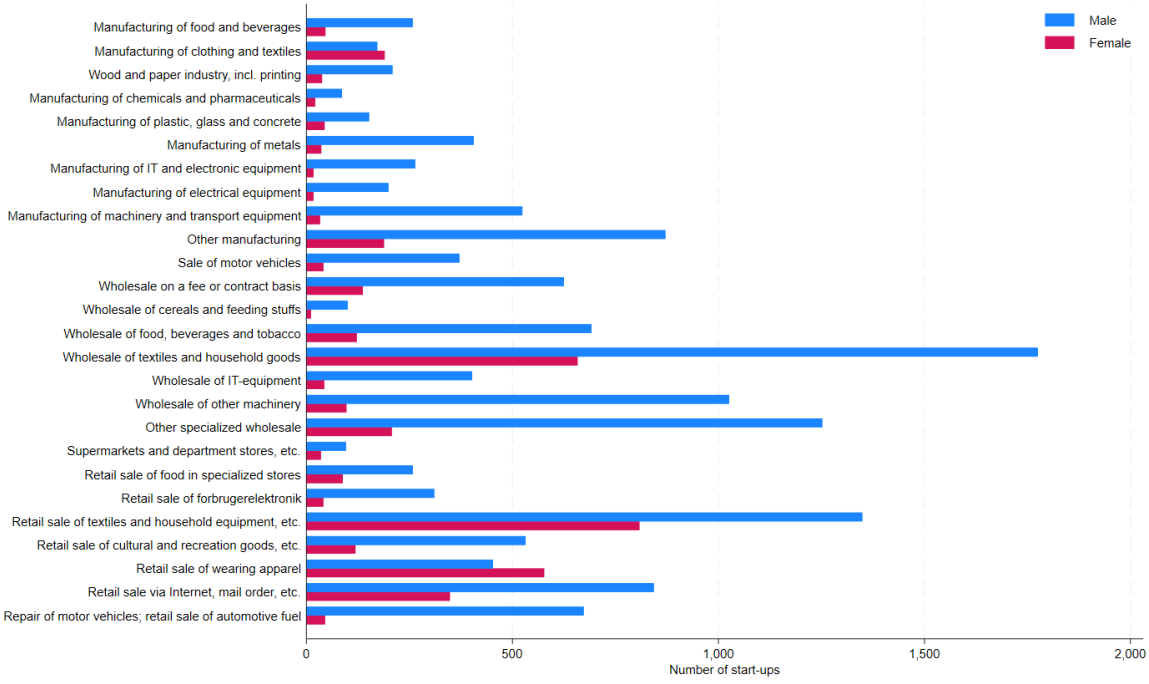
Figure B.1: Number of Start-ups in Sample, by Year and Gender



B.2 Distribution of Start-ups Across Industries

Figure B.2 shows the distribution of new start-ups across industries within the two sectors manufacturing and wholesale/retail.

Figure B.2: Number of Start-ups in Sample, by Industry



We observe interesting and intuitive differences in the industry distribution of male and fe-

male entrepreneurship. In particular, we see only two industries ("Manufacturing of clothing and textiles" and "Retail sale of wearing apparel") in which the number of female start-ups exceeds the number of male start-ups. In all remaining industries, male start-ups are in a majority, but in some industries (such as "Manufacturing of metals", "Repair of motor vehicles" or "Wholesale of IT equipment") their dominance is more pronounced than in others (e.g., "Wholesale of textiles and household goods", "Retail sale of food in specialized stores"). Specifically, these patterns are consistent with data from other countries, which have also found that female entrepreneurship is more common in the retail industries; cf. the review in Carranza et al. (2018).

B.3 Summary Statistics for Manufacturing and Wholesale/Retail Start-ups

Table B.1 provides summary statistics for all Danish start-ups within the two sectors (Manufacturing and Wholesale/Retail) before sample restrictions; i.e., including also those start-ups which never imported or exported throughout the sample period.

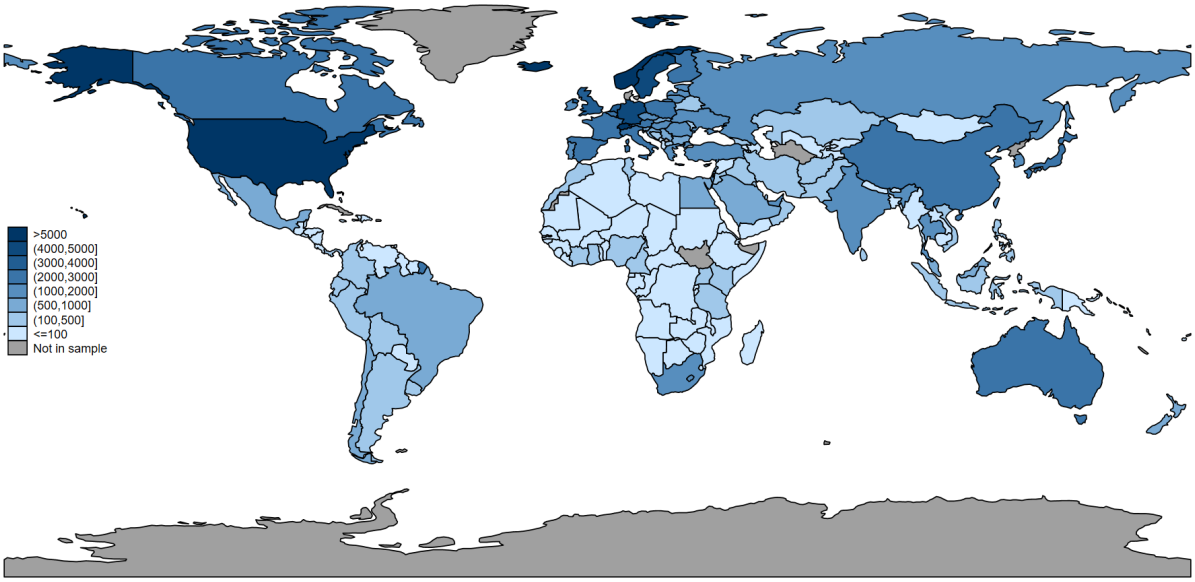
Table B.1: Summary Statistics for Manufacturing and Wholesale/Retail Start-ups

	Male start-ups		Female start-ups	
	mean	N	mean	N
Panel A: Individual-level characteristics				
Age	40.40	42,250	39.99	14,548
Working Experience, in years	12.86	42,250	10.88	14,548
Bachelor or higher degree	0.160	42,250	0.210	14,548
Post-secondary non-tertiary education	0.663	42,250	0.586	14,548
Secondary schooling or lower	0.177	42,250	0.204	14,548
Business degree	0.219	42,250	0.231	14,548
Multiple start-ups within the year	0.0632	42,250	0.0239	14,548
Married	0.555	42,250	0.588	14,548
At least one child in HH	0.558	42,250	0.636	14,548
Panel B: Firm-level characteristics (year of founding)				
Personally owned start-ups	0.371	42,250	0.560	14,548
Limited liability company	0.629	42,250	0.440	14,548
Revenue, in 100,000DKK	23.49	42,250	12.71	14,548
Positive employment, indicator	0.383	42,250	0.325	14,548
Employment, FT equivalents	0.751	42,250	0.460	14,548
Survival to t+3[a]	0.734	36,392	0.673	12,791
Panel C: Firm-level characteristics, t+3 after founding				
Revenue, in 100,000DKK	53.60	26,721	27.43	8,613
Positive employment	0.550	26,721	0.515	8,613
Employment, FT equivalents	1.926	26,721	1.214	8,613

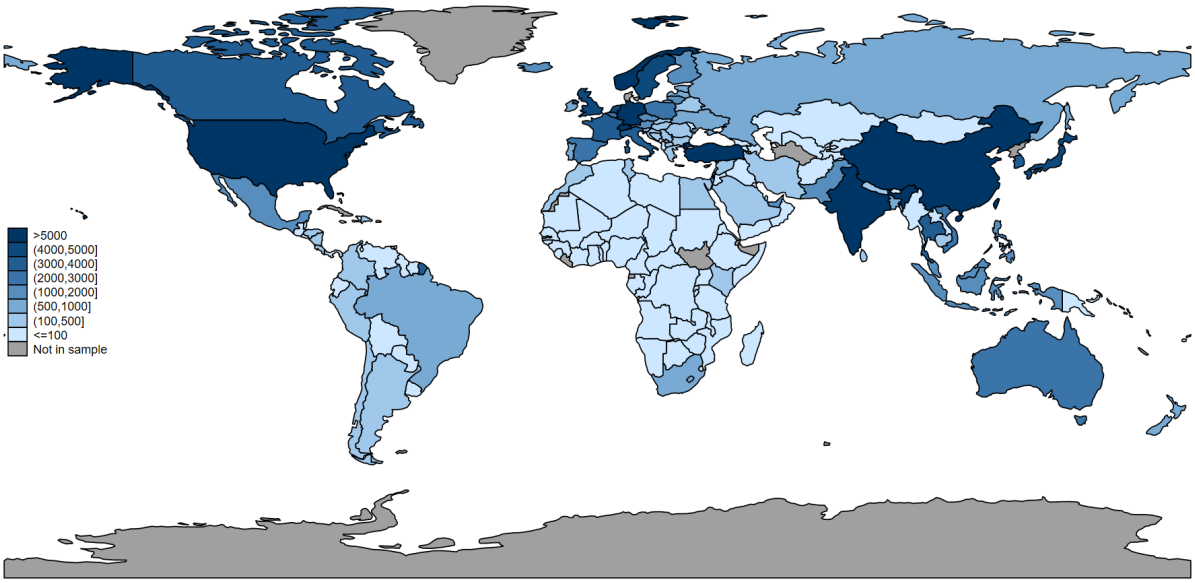
Notes: This table reports summary statistics for the combined sample, including those 17,905 start-ups which import and/or export at least once during the sample period. Statistics are reported separately by gender of the founder/entrepreneur behind the start-up. In Panel C, the sample is restricted to those start-ups which were founded before 2017, and which survived until $t + 3$ after the founding date. [a] Since the sample period ends in 2019, the survival probability until $t + 3$ is set to missing for firms founded in the year 2017 or later.

B.4 Trade Behaviour of Start-ups across Destinations

Figures B.3(a) and B.3(b) show the number of firm-years with, respectively, positive exports or imports, by country in our sample. On the export side, Norway and the United States stand out as the most popular destinations, closely followed by Sweden, Germany, Iceland and Switzerland. These countries are also among the most important trade partners of Danish start-ups on the import side, but here we additionally see countries such as Turkey, India and China being popular import origins.



(a) Number of Export Observations in Sample



(b) Number of Import Observations in Sample

Figure B.3: Number of Observations with Positive Exports and Imports, by Country

B.5 Summary Statistics for Gender Inequality Measures

Table B.2 reports summary statistics for the different measures of gender norms, gender inequality, and institutions that we exploit throughout the paper and the robustness analysis. Table B.3 provides information on the correlation coefficients between these different measures. Importantly, all measures are highly albeit imperfectly correlated.

Table B.2: Summary Statistics for Gender Inequality Measures

	mean	sd	N (country-years)	N (countries)
WBL Index	0.679	0.185	3,532	217
WEF Gender Gap (econ.)	0.638	0.121	1,897	153
WEF Gender Gap	0.685	0.0607	1,900	155
WVS	2.725	0.432	1,002	67
EIGE	16.24	10.08	499	32

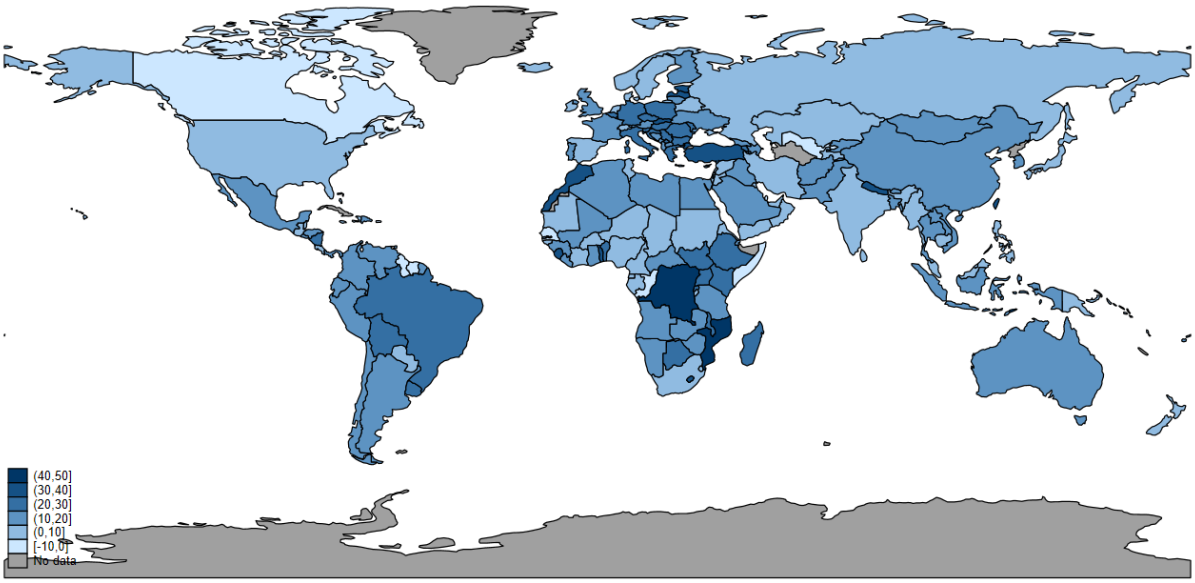
Notes: This table reports summary statistics for the different measures of gender inequality that we exploit in the paper, as well as the corresponding number of countries and country-year observations for which these measures are available.

Table B.3: Correlations between Gender Inequality Measures

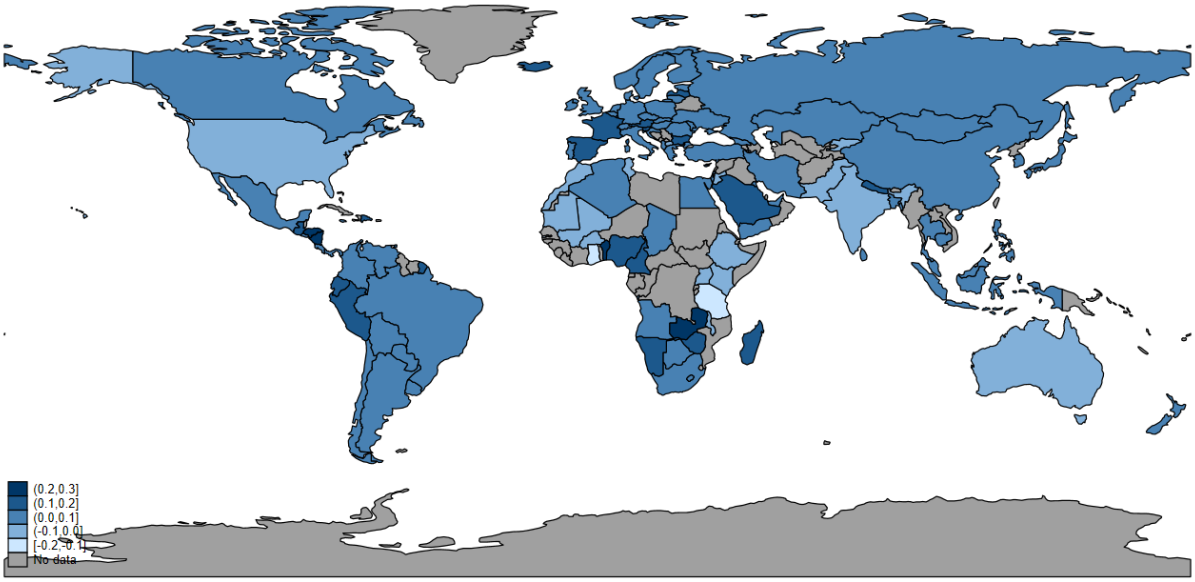
	WBL index	WEF Gender Gap (econ.)	WEF Gender Gap	WVS	EIGE
WBL index	1,000				
	3532				
WEF Gender Gap (econ.)	0.6060	1,000			
	1897	1897			
WEF Gender Gap	0.6929	0.7523	1,000		
	1900	1897	1900		
WVS	0.7432	0.5050	0.7069	1,000	
	1002	708	708	1002	
EIGE	0.4368	0.5935	0.7071	0.4422	1,000
	499	418	418	249	499

Notes: This table reports correlation coefficients for the different measures of gender inequality that we exploit in the paper, as well as the corresponding number of country-year observations based on which each correlation is calculated.

In part of our regression analysis, we condition on firm-destination fixed effects, thereby exploiting only the within-country variation in our gender equality measures over time. Figures B.4(a) and B.4(b) show the extent to which the WBL index and the WEF sub-index for economic participation and opportunity vary across the period of observation for each country in the sample.



(a) Within-Country Changes in the WBL index, 2001–2019



(b) Within-Country Changes in the WEF economic index, 2006–2019

Figure B.4: Within-Country Changes in Gender Equality and Institutions

Notes: The figures show within-country changes in the WBL index and the WEF sub-index for economic participation and opportunity, computed as the difference in these indices between the last and the first year of observation.

C Additional Results and Robustness Analysis

C.1 Additional Results for Section 3

Since firms in our sample are included based on their trade participation decision, we abstract from studying the extensive margin of exporting/importing in our firm-level analysis of trading behaviour in Section 3 of the main text. In Table C.1, we report complimentary results using an export (import) indicator as dependent variable. These regressions are based on the full sample of start-ups within the manufacturing and wholesale/retail sectors; i.e., before sample restrictions.

Notably, we see sizeable differences in trade participation across male- and female-founded firms in the most parsimonious model of columns (1) and (4). However, interestingly, the lower propensity of female-founded firms to participate in international markets seems to be entirely driven by a few firm-specific observables (cf. the insignificant coefficient estimates in columns (2) and (5)), and this finding is reinforced when adding controls for the characteristics of the founder; cf. column (3) and (6).[iv]

Table C.1: Firm Internationalization and Gender: Extensive Margins

	Export indicator			Import indicator		
	Baseline	+ Firm Controls	+ Individual Controls	Baseline	+ Firm Controls	+ Individual Controls
	(1)	(2)	(3)	(4)	(5)	(6)
Female Founder	-0.0193***	-0.0021	-0.0057*	-0.0170***	0.0025	-0.0024
	(-6.392)	(-0.708)	(-1.835)	(-4.440)	(0.656)	(-0.597)
Observations	369,457	369,457	350,304	369,457	369,457	350,304
R-squared	0.124	0.147	0.152	0.141	0.158	0.165
Fixed effects	industry#year founding year	industry#year founding year	industry#year founding year	industry#year founding year	industry#year founding year	industry#year founding year

Notes: The table reports regression results for the full set of start-ups within wholesale/retail and manufacturing (before sample restrictions). The table reports the coefficient estimates and t-statistics from the regression of different dependent variables on a female dummy and a set of control variables, which varies across columns. Firm controls include the number of FT-equivalent employees (plus the founder) in the year of founding and a dummy variable for type of start-ups. Individual-level controls include age, labour market experience, a dummy for having a tertiary education and a dummy for having a business education. Robust t-statistics, clustered by firm, in parentheses. *** p<0.01, ** p<0.05, * p<0.1

C.2 Discussion of Further Sensitivity Checks

In the following, we discuss results from the sensitivity checks outlined in Section 4.3.5.

First, we exploit additional information regarding the link between the individual behind the

[iv] Interestingly, the coefficient estimate on the female dummy in the regression with firm export status turns negative and marginally significant again in column (3). Note however, that this estimate is lower by an order of magnitude compared to the one in column (1).

company and the start-up, restricting our sample to firms where the 'entrepreneur' is also the founder (cf. Section 2.1.1). This sample restriction reinforces our baseline estimates; cf. Panel B of Table C.5.

Second, we consider various restrictions of the sample in terms of the countries under consideration (see Table C.6 for results): (i) we note from Figure 1 that Middle Eastern and Northern African (MENA) countries exhibit the highest degrees of gender inequality, and we therefore make sure that our results do not hinge on the inclusion of these countries in the sample (see Panel A for results); (ii) given differences in how the trade data is collected for intra-EU and extra-EU trade, we investigate to what extent results hold across these two sub-samples of countries. Notably, export and import probabilities are much higher for intra-EU trade than for trade with non-EU countries, and the size of coefficient estimates can therefore not readily be compared. With this caveat in mind, we note that the pattern in terms of significance of the estimates is consistent across both sub-samples: for example, statistical significance continues to be strong for the specification for the export probability without firm-destination fixed effects, but vanishes for the specification where these fixed effects are included.

To further investigate these findings, we turn to the two measures of gender inequality in outcomes from the WEF. For the sample of non-EU countries, we find positive and significant coefficient estimates on the interaction term of interest across all specifications for the extensive margin of exporting, confirming our results for the full sample. For the EU sample of countries, however, these estimates are only statistically significant in the specification without firm-destination fixed effects. Results from this analysis are available on request.

Finally, we analyze to what extent there are differences across the two broad sectors – manufacturing and wholesale/retail – included in our sample. Results, reported in Table C.7, show that our findings are robust to limiting the sample to the latter, but do not find any significant effects of gender inequality in the former. This result should, however, be interpreted with caution as we observe only a small number of female start-ups in the sub-sample of manufacturing firms.

C.3 Tables for the Robustness Analysis in Section 4.3

The tables on the following pages show results for the robustness checks discussed in Section 4.3.

Table C.2: Gender Biases or Risk Attitudes?

	Export status		ln Exports		Import status		ln Imports	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: OECD Risk Measure								
Female * WBL index	0.0078***	0.0083***	-0.1750	0.3607	0.0038***	0.0097***	0.1813	-0.5246
	(5.965)	(2.826)	(-0.752)	(0.356)	(5.732)	(5.524)	(0.511)	(-0.553)
Female * OECD risk	-0.0000	0.0001	-0.0534*	-0.0723	0.0005***	0.0000	0.0537*	0.0280
	(-0.065)	(0.517)	(-1.720)	(-1.374)	(3.562)	(0.349)	(1.904)	(0.443)
Female * ln distance	-0.0003		-0.1337***		0.0013***		0.0319	
	(-0.456)		(-2.934)		(3.407)		(0.740)	
ln size * WBL index	0.0434***	0.0398***	0.8378***	0.6484***	0.0324***	0.0272***	-0.1654	-0.3557**
	(19.008)	(21.657)	(10.124)	(4.497)	(26.187)	(29.001)	(-1.330)	(-2.176)
Observations	13,053,363	13,013,746	113,733	97,915	20,332,263	20,226,135	165,907	138,198
R-squared	0.170	0.542	0.526	0.819	0.147	0.555	0.546	0.853
Mean of dep.var.	0.0102	0.0102	11.9667	12.1694	0.0097	0.0097	10.9659	11.3056
Panel B: GDP per capita								
Female * WBL index	0.0076***	0.0083***	-0.1384	0.5303	0.0034***	0.0093***	0.7045*	-0.5244
	(4.913)	(2.990)	(-0.610)	(0.547)	(4.501)	(5.879)	(1.932)	(-0.575)
Female * ln GDP pr. cap.	0.0002	-0.0027**	0.1405**	0.0095	-0.0008***	0.0000	-0.1376***	0.0588
	(0.472)	(-2.033)	(2.466)	(0.044)	(-5.103)	(0.055)	(-2.933)	(0.423)
Female * ln distance	-0.0002		-0.1161***		0.0012***		0.0090	
	(-0.235)		(-2.671)		(3.404)		(0.206)	
ln size * WBL index	0.0439***	0.0402***	0.8494***	0.6472***	0.0327***	0.0279***	-0.1511	-0.3168*
	(18.905)	(22.096)	(10.287)	(4.622)	(26.184)	(29.418)	(-1.226)	(-1.953)
Observations	14,652,381	14,618,061	114,297	98,413	22,462,120	22,362,699	167,548	139,608
R-squared	0.164	0.535	0.528	0.819	0.144	0.549	0.545	0.852
Mean of dep.var.	0.0092	0.0092	11.9677	12.1704	0.0089	0.0089	10.9703	11.3079
Fixed effects	firm#year country#year industry#country	firm#year country#year firm#country	firm#year country#year industry#country	firm#year country#year firm#country	firm#year country#year industry#country	firm#year country#year firm#country	firm#year country#year industry#country	firm#year country#year firm#country

Notes: The table reports the coefficient estimates and t-statistics from the regression of different dependent variables on a female dummy and its interaction with institutions in export destinations/import origins, additional interaction terms, and different sets of fixed effects. In Panel A, 'OECD risk measure' is a measure of country risk, retrieved from the OECD. Risk is measured on a 7-point scale, with higher values signalling higher risks. For Panel B, information on country's GDP per capita is retrieved from the World Bank's World Development Indicators. Robust t-statistics, clustered by firm, in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table C.3: Gender Differences in Growth Aspirations?

	Export status		ln Exports		Import status		ln Imports	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Sample of Start-ups with Positive Employment within 3 Years								
Female * WBL index	0.0086***	0.0077**	0.0587	0.3694	0.0008	0.0072***	-0.6341	-0.4628
	(3.068)	(2.233)	(0.231)	(0.347)	(0.516)	(3.302)	(-1.613)	(-0.443)
Female * Ln distance	-0.0006		-0.1870***		0.0020***		0.0214	
	(-0.482)		(-3.634)		(3.373)		(0.431)	
Ln size * WBL index	0.0503***	0.0422***	0.9749***	0.6822***	0.0382***	0.0306***	-0.0637	-0.3331*
	(17.223)	(21.527)	(10.542)	(4.431)	(23.386)	(28.748)	(-0.404)	(-1.844)
Observations	10,656,649	10,649,058	98,306	86,091	14,462,015	14,447,139	133,934	114,839
R-squared	0.174	0.543	0.528	0.815	0.155	0.554	0.530	0.844
Mean of dep.var.	0.0106	0.0106	12.0368	12.2279	0.0106	0.0106	11.1757	11.4789
Panel B: Sample of Limited Liability Companies								
Female * WBL index	0.0066***	0.0052	0.0858	0.4875	0.0004	0.0066***	-0.5601	-0.6055
	(2.761)	(1.629)	(0.362)	(0.496)	(0.317)	(3.000)	(-1.525)	(-0.588)
Female * Ln distance	-0.0003		-0.1488***		0.0019***		0.0249	
	(-0.281)		(-3.086)		(3.714)		(0.522)	
Ln size * WBL index	0.0452***	0.0403***	0.8191***	0.6618***	0.0355***	0.0297***	-0.0755	-0.3465**
	(18.060)	(21.689)	(9.763)	(4.671)	(25.247)	(29.154)	(-0.567)	(-2.027)
Observations	12,621,505	12,597,242	109,574	95,020	17,182,913	17,111,467	148,354	125,164
R-squared	0.168	0.540	0.527	0.818	0.152	0.556	0.535	0.847
Mean of dep.var.	0.0101	0.0101	12.0014	12.1978	0.0100	0.0100	11.1192	11.4440
Fixed effects	firm#year country#year industry#country	firm#year country#year firm#country	firm#year country#year industry#country	firm#year country#year firm#country	firm#year country#year industry#country	firm#year country#year firm#country	firm#year country#year industry#country	firm#year country#year firm#country

Notes: The table reports the coefficient estimates and t-statistics from the regression of different dependent variables on a female dummy and its interaction with institutions in export destinations/import origins, additional interaction terms, and different sets of fixed effects. In Panel A, the sample is restricted to start-ups which record positive employment within three years from the founding year. In Panel B, the sample includes only start-ups founded as limited liability companies. Robust t-statistics, clustered by firm, in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table C.4: Alternative Measures of Gender Inequality and Biases

	Export status		ln Exports		Import status		ln Imports	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Gender Attitudes Based on World Values Survey (WVS)								
Female * WVS index	0.0070***		0.4043***		-0.0015		-0.4837***	
	(3.835)		(2.662)		(-1.536)		(-2.838)	
Female * Ln distance	-0.0005		-0.1051**		0.0024***		-0.0434	
	(-0.509)		(-2.188)		(4.000)		(-0.864)	
Ln size * WVS index	0.0326***		0.5166***		0.0275***		-0.1046*	
	(22.479)		(10.423)		(28.476)		(-1.787)	
Observations	4,297,506		77,087		6,816,712		130,901	
R-squared	0.242		0.551		0.186		0.547	
Mean of dep.var.	0.0225		12.1989		0.0242		11.1133	
Panel B: Share of Women on the Board of Directors (EIGE)								
Female * EIGE index	0.0007***	0.0007***	0.0116**	0.0078	0.0002***	0.0001**	0.0173**	-0.0116
	(5.368)	(4.973)	(2.126)	(1.213)	(3.500)	(2.182)	(1.982)	(-1.183)
Female * Ln distance	0.0047***		-0.0093		0.0050***		0.4905***	
	(2.749)		(-0.100)		(4.486)		(3.004)	
Ln size * EIGE index	0.0017***	0.0013***	0.0109***	0.0043**	0.0013***	0.0008***	0.0105***	-0.0008
	(25.836)	(23.803)	(5.073)	(2.424)	(32.713)	(23.099)	(3.865)	(-0.225)
Observations	2,376,207	2,369,195	54,475	49,570	3,770,189	3,750,441	41,947	37,342
R-squared	0.383	0.655	0.538	0.841	0.225	0.576	0.492	0.842
Mean of dep.var.	0.0307	0.0308	12.4234	12.5674	0.0150	0.0150	12.5461	12.7448
Fixed effects	firm#year country#year industry#country	firm#year country#year firm#country	firm#year country#year industry#country	firm#year country#year firm#country	firm#year country#year industry#country	firm#year country#year firm#country	firm#year country#year industry#country	firm#year country#year firm#country

Notes: The table reports the coefficient estimates and t-statistics from the regression of different dependent variables on a female dummy and its interaction with institutions in export destinations/import origins, additional interaction terms, and different sets of fixed effects. In Panel A, we measure gender norms and institutions exploiting data from the World Values Survey (WVS). The variable WVS index is measured on a scale from 1–4, with higher values signalling fewer biases against women as business leaders. In Panel B, we measure gender equality using data from the European Institute for Gender Equality (EIGE). The variable 'EIGE index' reflects the share of women on the board of directors of the largest listed companies (measured on a scale from 0–100). Robust t-statistics, clustered by firm, in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table C.5: Further Robustness Checks

	Export status		ln Exports		Import status		ln Imports	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Controlling for Business Education								
Female * WBL index	0.0087***	0.0075***	0.1634	0.4860	0.0014	0.0088***	-0.5345	-0.3004
	(4.213)	(2.855)	(0.705)	(0.503)	(1.467)	(5.916)	(-1.625)	(-0.327)
WBL index * Business degree	0.0097***	-0.0011	0.6063***	-0.2917	0.0019	-0.0010	-1.2696***	0.9948
	(3.405)	(-0.487)	(3.175)	(-0.508)	(1.443)	(-0.672)	(-4.345)	(1.435)
Female * Ln distance	-0.0003		-0.1469***		0.0016***		0.0315	
	(-0.420)		(-3.135)		(4.274)		(0.731)	
Ln size * WBL index	0.0419***	0.0384***	0.8351***	0.6589***	0.0319***	0.0273***	-0.1152	-0.3320**
	(18.712)	(21.903)	(10.527)	(4.679)	(26.088)	(29.515)	(-0.934)	(-2.031)
Observations	14,953,216	14,923,462	112,940	97,219	22,808,289	22,717,349	166,045	138,453
R-squared	0.162	0.533	0.528	0.818	0.144	0.549	0.546	0.851
Mean of dep.var.	0.0089	0.0089	11.9669	12.1704	0.0087	0.0087	10.9690	11.3058
Panel B: Start-ups where the 'Entrepreneur' is the Founder								
Female * WBL index	0.0087***	0.0089***	0.3239	1.2008	0.0010	0.0085***	0.0488	0.0227
	(3.522)	(2.959)	(1.149)	(0.802)	(0.969)	(5.518)	(0.113)	(0.020)
Female * Ln distance	-0.0001		-0.0943		0.0014***		0.0312	
	(-0.123)		(-1.524)		(3.550)		(0.573)	
Ln size * WBL index	0.0388***	0.0371***	0.9004***	0.7279***	0.0266***	0.0232***	-0.5656***	-0.1154
	(13.966)	(15.630)	(7.103)	(2.632)	(18.030)	(20.612)	(-2.941)	(-0.418)
Observations	8,272,468	8,257,289	49,108	42,169	13,856,428	13,801,063	81,891	67,488
R-squared	0.152	0.518	0.558	0.827	0.134	0.539	0.578	0.858
Mean of dep.var.	0.0073	0.0073	11.8873	12.0860	0.0074	0.0073	10.8478	11.1951
Fixed effects	firm#year country#year industry#country	firm#year country#year firm#country	firm#year country#year industry#country	firm#year country#year firm#country	firm#year country#year industry#country	firm#year country#year firm#country	firm#year country#year industry#country	firm#year country#year firm#country

Notes: The table reports the coefficient estimates and t-statistics from the regression of different dependent variables on a female dummy and its interaction with institutions in export destinations/import origins, additional interaction terms, and different sets of fixed effects. In Panel A, 'business degree' is an indicator variable equal to one if the entrepreneur has a business degree. In Panel B, the sample is restricted to start-ups where the 'person behind the company' (= the entrepreneur) is also the founder. See Section A.1 for a discussion. Robust t-statistics, clustered by firm, in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table C.6: Sample Restrictions in Terms of Countries

	Export status		ln Exports		Import status		ln Imports	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Excluding MENA countries								
Female * WBL index	0.0100***	0.0098***	0.9814**	0.4187	0.0021*	0.0106***	-0.4186	-0.4508
	(3.764)	(3.365)	(2.321)	(0.428)	(1.740)	(6.520)	(-1.136)	(-0.487)
Female * Ln distance	-0.0002		-0.1222***		0.0015***		0.0256	
	(-0.302)		(-2.727)		(4.106)		(0.594)	
Ln size * WBL index	0.0594***	0.0524***	1.1103***	0.6400***	0.0408***	0.0323***	-0.3501**	-0.3920**
	(18.915)	(22.695)	(7.356)	(3.580)	(25.360)	(27.943)	(-2.422)	(-2.250)
Observations	13,358,711	13,332,241	106,224	91,821	20,544,379	20,462,014	161,311	134,435
R-squared	0.169	0.539	0.533	0.823	0.147	0.550	0.544	0.851
Mean of dep.var.	0.0094	0.0094	11.9853	12.1866	0.0094	0.0094	10.9324	11.2663
Panel B: Intra-EU trade only								
Female * WBL index	0.0247**	0.0031	2.3018	0.3169	0.0024	0.0187***	-0.4517	0.3205
	(2.537)	(0.300)	(1.526)	(0.215)	(0.454)	(3.520)	(-0.329)	(0.218)
Female * Ln distance	0.0044***		-0.0007		0.0052***		0.4513**	
	(2.653)		(-0.005)		(4.557)		(2.555)	
Ln size * WBL index	0.1040***	0.0430***	0.9356***	0.3642	0.1111***	0.0410***	1.1240**	0.1300
	(15.735)	(9.522)	(2.769)	(1.062)	(20.269)	(12.051)	(2.519)	(0.319)
Observations	2,193,966	2,189,700	46,869	43,272	3,480,030	3,466,260	42,122	38,025
R-squared	0.467	0.679	0.534	0.840	0.272	0.603	0.444	0.833
Mean of dep.var.	0.0223	0.0223	12.5428	12.6651	0.0131	0.0131	12.7698	12.9311
Panel C: Extra-EU trade only								
Female * WBL index	0.0069***	0.0023	-0.2011	0.8329	0.0010	0.0068***	-0.4427	-0.3492
	(3.966)	(1.136)	(-0.937)	(0.590)	(0.989)	(5.319)	(-1.286)	(-0.305)
Female * Ln distance	-0.0021***		-0.1441***		0.0006**		0.0505	
	(-3.383)		(-3.137)		(2.111)		(1.091)	
Ln size * WBL index	0.0204***	0.0213***	0.7332***	0.3760**	0.0188***	0.0193***	-0.2761**	-0.5425***
	(19.960)	(29.075)	(9.415)	(2.490)	(29.630)	(38.790)	(-2.198)	(-3.219)
Observations	12,952,421	12,926,741	65,464	53,473	19,642,149	19,563,354	122,170	98,576
R-squared	0.158	0.521	0.546	0.805	0.158	0.554	0.525	0.842
Mean of dep.var.	0.0066	0.0066	11.5496	11.7523	0.0079	0.0079	10.3279	10.6574
Fixed effects	firm#year country#year industry#country	firm#year country#year firm#country	firm#year country#year industry#country	firm#year country#year firm#country	firm#year country#year industry#country	firm#year country#year firm#country	firm#year country#year industry#country	firm#year country#year firm#country

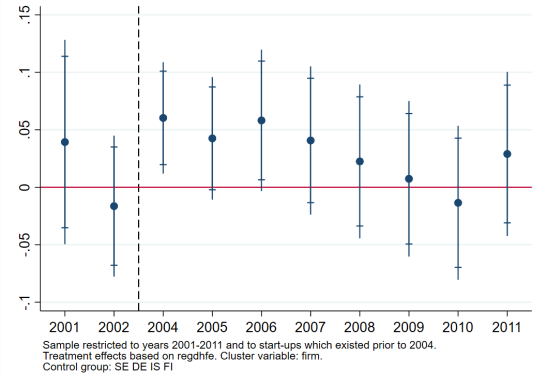
Notes: The table reports the coefficient estimates and t-statistics from the regression of different dependent variables on a female dummy and its interaction with institutions in export destinations/import origins, additional interaction terms, and different sets of fixed effects. In Panel A, the sample excludes countries from the Middle Eastern and Northern African Region. In Panels B and C, we report results for the sub-samples of EU and non-EU countries, respectively. Robust t-statistics, clustered by firm, in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table C.7: Results by Sector

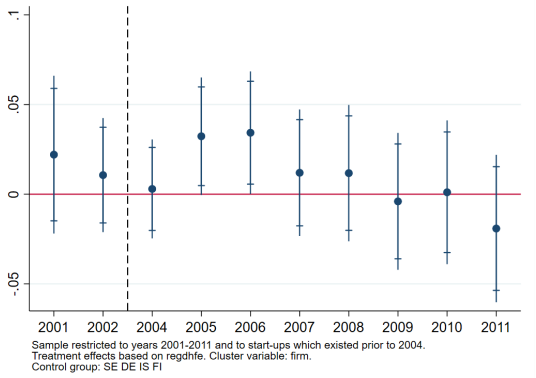
	Export status		ln Exports		Import status		ln Imports	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Wholesale/Retail Firms								
Female * WBL index	0.0080***	0.0087***	0.0161	0.3328	0.0018	0.0069***	-0.0490	-0.1360
	(3.508)	(2.855)	(0.062)	(0.293)	(1.624)	(4.094)	(-0.141)	(-0.134)
Female * Ln distance	-0.0004		-0.1509***		0.0015***		0.0123	
	(-0.483)		(-2.784)		(3.790)		(0.267)	
Ln size * WBL index	0.0421***	0.0398***	0.9554***	0.9048***	0.0352***	0.0307***	-0.3810***	-0.2830
	(15.230)	(19.660)	(9.952)	(5.791)	(23.201)	(26.370)	(-2.641)	(-1.443)
Observations	11,109,463	11,075,668	81,915	69,630	17,536,564	17,438,175	136,423	113,645
R-squared	0.158	0.541	0.511	0.825	0.141	0.562	0.524	0.852
Mean of dep.var.	0.0087	0.0087	11.9692	12.1881	0.0092	0.0092	11.1275	11.4727
Panel B: Manufacturing Firms								
Female * WBL index	0.0064	0.0037	0.2604	0.1735	0.0003	0.0121***	-1.9925**	-4.5624**
	(1.359)	(0.725)	(0.590)	(0.107)	(0.158)	(2.956)	(-2.221)	(-2.079)
Female * Ln distance	0.0007		-0.1285*		0.0023**		0.1619	
	(0.428)		(-1.691)		(2.552)		(1.383)	
Ln size * WBL index	0.0444***	0.0355***	0.5408***	-0.1125	0.0263***	0.0206***	0.5710***	-0.0768
	(12.139)	(11.250)	(4.048)	(-0.472)	(12.314)	(14.298)	(2.723)	(-0.220)
Observations	3,619,162	3,603,741	31,026	26,924	4,717,927	4,684,346	28,663	23,052
R-squared	0.171	0.547	0.580	0.821	0.158	0.535	0.614	0.860
Mean of dep.var.	0.0101	0.0101	11.9607	12.1458	0.0076	0.0076	10.2910	10.6163
Fixed effects	firm#year country#year industry#country	firm#year country#year firm#country	firm#year country#year industry#country	firm#year country#year firm#country	firm#year country#year industry#country	firm#year country#year firm#country	firm#year country#year industry#country	firm#year country#year firm#country

Notes: The table reports the coefficient estimates and t-statistics from the regression of different dependent variables on a female dummy and its interaction with institutions in export destinations/import origins, additional interaction terms, and different sets of fixed effects. In Panel A, the sample is restricted to firms within the wholesale/retail sector. In Panel B, the sample is restricted to firms within manufacturing. Robust t-statistics, clustered by firm, in parentheses. *** p<0.01, ** p<0.05, * p<0.1

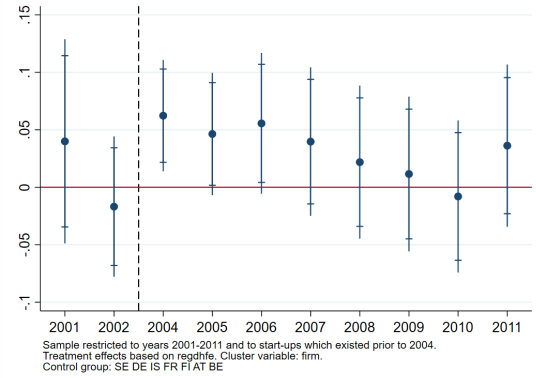
C.4 Results for the Robustness Analysis in Section 4.4



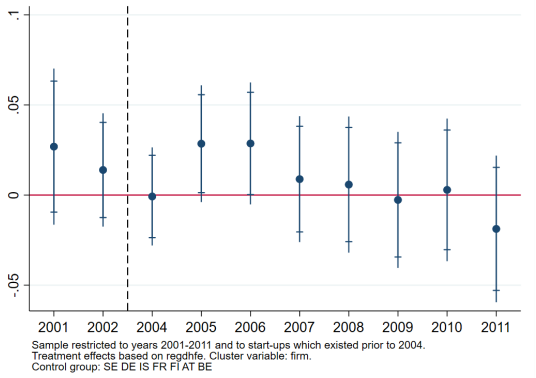
(a) Export, Control Group 1



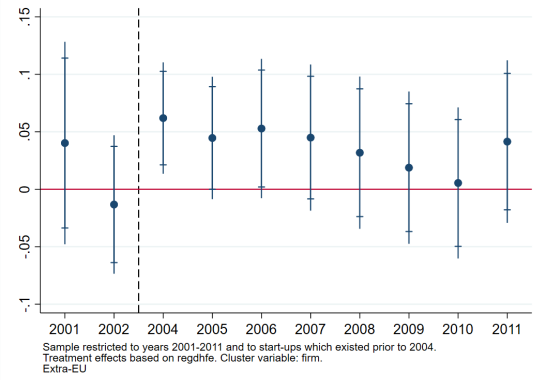
(b) Import, Control Group 1



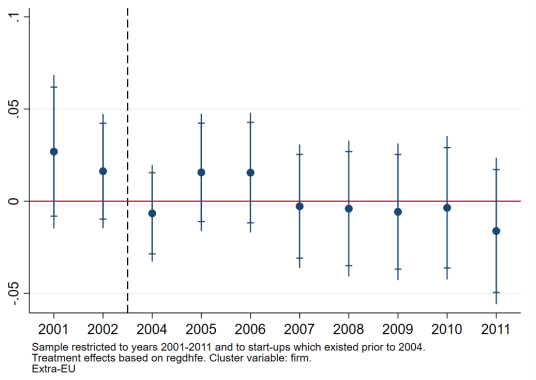
(c) Export, Control Group 2



(d) Import, Control Group 2



(e) Export, Control Group Extra-EU



(f) Import, Control Group Extra-EU

Figure C.1: Event Study of the Norwegian Gender Quota: Alternative Control Groups

Notes: The figures show coefficient estimates and confidence intervals from the event study regression with 2003 as the base year. For each year, vertical lines show the 95% confidence interval and brackets show the 90% confidence interval. 'Control Group 1' contains the following countries: Sweden, Germany, Iceland, Finland. 'Control Group 2' additionally includes France, Austria and Belgium. 'Control Group Extra-EU' contains all countries that are not members of the EU.