Women on Board and Firm Export Attitudes: Evidence from Italy

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Abstract

The literature evaluating the impact of gender quotas in the firm's governing bodies has not yet come to an established consensus on their effects on corporate performance. We contribute to the literature by exploiting firm level data to assess whether the reform that introduced a gender-balancing quota on the boards of directors of Italian listed firms has had any impact on a variety of measures related to exports. Combining a difference-in-differences approach with propensity score matching, we find that the reform has increased the probability of exporting and the value of exports. Moreover, the reform has increased the probability of exporting a new product, while it has not reduced the exposure to volatile sectors. These results suggest that previously excluded women from leadership positions can bring valuable resources for operating in international markets, and challenge the view that female directors are more cautious in their risk-taking behavior as compared to their male counterparts.

Keywords: gender quota, exports, risk, uncertainty, corporate boards, international trade

JEL: J54, L25, M51

1. Introduction

The role of women in business and management is the object of a flourishing research agenda. This relates, on the one hand, to the relaxation of social norms that prevent the presence of women in male-dominated occupations and, on the other hand, to policy interventions aimed at establishing more gender balance in several aspects of the business and working life.

A strand of research focuses on gender diversity in the board of directors (BoD), and in particular on the impact of mandatory gender quotas on a variety of performance indicators (profitability, Tobin's q, stock returns, and, to a lesser extent, productivity and innovation), with results that are still mixed. As stated by Ferreira (2015) "It's fair to say that we don't really know whether and how quotas affect the financial performance of firms" (p. 110). Notwithstanding policymakers all

over the world have implemented board gender diversity policies with the declared intention to improve corporate governance and company performance, it may be argued that the "business case" argument for justifying the introduction of quotas remains questionable (Adams, 2016; Adams et al., 2015; Eagly, 2016; Carter et al. 2020).

However, as suggested by Eagly (2016), "gains of profit and productivity are not the only or more appropriate place to look for diversity's benefits" (p. 208). Apart from obvious reasons of equal opportunities, fairness, and social justice, appointing more women on boards can help firms to shape their management styles and pay more attention to the interests of a broader range of stakeholders, including employees and the larger community. For example, Adams and Ferreira (2009) find that women directors are better monitors in general and are more likely to serve in monitoring committees as compared to their male counterparts. Several papers (see the recent review by Rao and Tilt, 2016) show a positive impact of more gender diverse boards on corporate social responsibility (and, in particular, on environmental sustainability and charitable giving). In firms hit by short-run adverse shocks, Matsa and Miller (2013) find that women directors are more prone to retain employment, even if this leads to higher labor costs and lower profitability. More recently, Foss et al. (2021) show that female managers have a leadership style more open to innovation, especially if the firms they manage operate in complex environments (where complexity is associated with the firm's organizational change, with the firm's decision to outsource a part of the production, and with the presence of a high level of international competition).

Some scholars point out other distinctive features of women such as lower overconfidence and, more importantly for the present paper, greater risk aversion. Levi et al (2014), for example, show evidence that female directors are more cautious, do not overestimate merger gains and are therefore less prone to make acquisitions and, when they do acquire, to overpay for target firms. Turning to the attitude toward risk, there exists a relevant bulk of evidence, pointing out that women are more risk averse than men in the population (Sapienza et al., 2009; Byrnes et al., 1999; Jianakoplos and Bernasek, 1998). However, some recent works find out that women that reach top corporate positions are not necessarily more risk-averse than male top managers or directors (Sila et al., 2016; Adams and Ragunathan, 2017; Adams and Funk, 2012).

This paper explores the link between female representation on the board of directors and a set of performance measures (financial performance, productivity, innovation, exports), among which we focus on the firm's presence on international markets, an issue that, quite surprisingly, has been completely neglected in the literature. In particular, we investigate if having more women on the board of directors affects the firm's attitude to undertake uncertain and risky strategies, such as becoming an exporter, increasing the export share, or changing the export mix (by selling new products abroad and/or by selling in new foreign markets).[1] Moreover, the availability of detailed firm-level information on exports allows us to measure the impact of female corporate board members on a range of indicators that proxy for economic uncertainty and, in particular, demand uncertainty, in foreign markets.

[1] Since is difficult to separate uncertain events from risky events, we follow Bloom (2014) and consider "uncertainty" and "risk" as interchangeable terms.

Our methodology exploits the introduction of a law in Italy, which imposed a gender-balancing quota for listed firms. We consider the set of listed firms as the treated group and we compare them with a matched sample of control firms using the propensity score method and difference-in-differences estimation techniques. This setting and the available data allow us to make progress in establishing a causal link from mandated gender quotas to export attitudes, as well as other performance indicators, at the firm level.

We find the following results. First, we do not find evidence that the gender quota affects firm performance when performance is measured in terms of standard indicators of productivity and profitability, similar to Bruno et al. (2018) and Ferrari et al. (2021). Second, the quota increases both the probability of exporting (extensive margin) and the value of exports (intensive margin). Third, it increases the probability of exporting a new product, and it is associated with an increase in the number of products exported. Fourth, we find no evidence that the gender quota reduces firms' overall exposure to high volatile sectors and high volatile countries. These results, beyond providing novel evidence on the impact of a higher representation of women on corporate boards on firm performance, are suggestive of the fact that women directors contribute to the management of the firm by providing a different leadership style. Moreover, they are in line with Adams and Ragunathan (2017) and Adams and Funk (2012) in challenging the view that female and male directors are endowed with different degrees of risk-aversion. Following Hofstede's cultural dimensions theory (Hofstede, 2001), we discuss how our results can be related to the distinctive characteristics of Italy's culture, a combination of high individualism, high masculinity, and high uncertainty avoidance.[2]

The paper proceeds as follows. In section 2 we provide a theoretical framework and review the relevant literature. In section 3 we illustrate the institutional background. In section 4 we explain the data source and the set of outcome variables. In section 5 we discuss the descriptive statistics and the methodology. Sections 6 and 7 present the results of the empirical analysis and the robustness checks. Section 8 concludes.

2. Theoretical framework and related literature

Boards of directors play at least four main roles. They provide useful advice, they monitor and control the top management of the company, they guarantee compliance with existing laws and regulations and they facilitate the link between the corporation and the external environment (Carter et al. 2010). The composition of the board, and in particular the gender composition, can influence the ways the above roles are performed and this, in turn, can affect a firm's strategies and, consequently, corporate performance.

2.1 Gender diversity and firm performance

According to the resource dependence theory (Pfeffer and Salancik, 1978), different types of

[2] We are indebted to an anonymous referee who suggested how our results can be interpreted in light of Hofstede's cultural dimensions.

directors can bring different resources to the firm. Therefore, gender diverse boards can activate new talent and provide better advice, potentially leading to better firm performance.[3]

The agency theory focuses instead on the monitoring role that board members perform on behalf of shareholders, in a context, such as that of the modern corporation, in which ownership is separated from control. Insider directors (current or former employees of the firm), or outsider directors who are not truly independent, may have low incentives to monitor the CEO and other top managers, while external directors should be in a better position to fulfill this role efficaciously. Since female directors are thought to be more often independent (Adams and Ferreira, 2009), board diversity can impose external discipline on managers and can help to reduce agency costs. If there is a variegated group of directors, it is less likely that managers (the agents) are not acting in the interest of shareholders (the principal).

The empirical evidence on the behavior of different board members is supporting the above theoretical arguments. Adams and Ferreira (2009) find that female directors are better monitors of management, while Kim and Starks (2016) show that women provide specific types of functional expertise, so that a more gender balanced board turns out to be enriched with a greater (and more diversified) degree of expertise and, consequently, can provide better advisory skills.

Neither the agency theory nor the resource dependence theory specifically predicts a clear link between board diversity and performance[4], but the arguments of the resource dependence theory are highly suggestive of the existence of a positive relationship (Hillman and Dalziel, 2003).

Given that women are insufficiently represented on boards all over the world, many countries implemented governance code amendments and passed legislation mandating gender quotas and other boardroom diversity policies. The empirical literature on gender quotas is quite rich. Evaluations of this policy intervention have been carried out for Norway (the first country to implement the gender quota in corporate boards in 2003), Spain (second in 2007), Belgium, France, Italy, the Netherlands (that followed in 2011), and Germany (in 2016).

The first evidence on this set of countries consists of several findings. First, without sanctions, the quota is weakly complied with. Second, quotas vary from 30 to 40 percent. Third, on average, the laws cause a statistically significant increase, ranging between 4 and 7 percentage points, in the share of women on boards. Fourth, gender quotas have heterogeneous impacts on firm performance, and the literature has identified positive, negative, or no performance effects (Ahern and Dittmar, 2012; Bertrand et al., 2019; Yang et al., 2019; Ferrari et al., 2021; Comi et. al, 2020;). The first three papers focus on Norway, and show a negative effect, while Ferrari et al. (2021) focus on Italy and find an insignificant effect of the legislative reform. Comi et al. (2020) focus on France (for which a negative effect emerges), Spain (insignificant effect), and Italy (the only country in which a positive effect is found).[5]

[3] In the authors' words: "When an organization appoints an individual to a board, it expects the individual will come to support the organization, will concern himself with its problems, will variably present it to others, and will try to aid it" (p. 163).

[4] For example, Carter et al. (2010) argue that the relationship between board diversity and firm financial performance may either be positive or negative and test the hypothesis of the presence of a null effect. In a similar vein, Comi et al. (2020) state that "Overall, economic theories predict a relationship between gender quotas and firm performance, but such relationship is not unambiguously determined" (p.774).

[5] The different results are partly related to the specific design of the law, which may differ across countries. In Spain, for example, there are not severe sanctions for non-compliers. Similarly, in Italy, the law applies only to the small

In a recent paper, Belaounia et al. (2020) conduct a cross-country study and find that the performance effect can be positive for gender equal countries (such as Scandinavian countries, Germany and France) and negative or null for gender unequal countries (such as Italy, Japan, the United States), casting doubts about the possibility to apply the same policy in different countries.[6] On the other hand, gender discriminating countries typically prevent many skilled and talented women from reaching leadership positions within the firm and in the economy at large. Accordingly, Comi et al. (2020) argue that gender quotas may be beneficial for performance by pushing firms to take advantage of the country-wide excess supply of talented women.

Our first empirical tests are in the wake of the above reviewed literature and directed to verify if the Italian reform has affected a variety of firm performance measures (firm's size, profitability, productivity, innovation). Since the theory is not clear cut about the effects of increasing the representation of women in the board of directors, and the existing empirical evidence is still mixed, following Carter et al. (2020) we are a priori open to the possibility of positive, negative or even null performance effects from the introduction of gender quotas.

2.2 Gender diversity and export

According to the resource dependence theory, board members do not only monitor the management but are actively involved in the definition of the firm's strategy. They give advice and counsel the CEO, they suggest valuable business alternatives, and they are proactively involved in taking important firm decisions.

Many works highlight that the export decision, both at the extensive and intensive margins, represents a critical corporate strategic choice. Exporting, as compared to selling in the domestic market, requires bearing additional costs, setting a wider distributional network, and obtaining detailed information on target markets (Minetti and Zhu, 2011). The availability of financial resources plays a crucial role, too (Niepmann and Schmidt-Eisenlohr, 2017).

Our second empirical test explores the link between the presence of women on the boards and the firm exporting strategy. To the best of our knowledge, the only related paper is Marques (2015), who investigates the relationship between female firm leaders (women as top managers or sole owners) and firm exporting activities, using a sample of small firms in 23 developing countries in Latin America, the Caribbean, Africa, and Asia. She finds that, while the gender of top managers or owners does not have a discernible direct impact on firm export behavior, it seems to operate indirectly through some of the factors influencing export propensity and intensity. The latter are: the firm's innovation and training activities, the presence of a cluster of domestic firms in the region in which the firm is located, and the institutional efficiency of the country (measured by the share of top management's time spent dealing with requirements imposed by government regulations).

The firm-level export literature focuses on the causal relationship between firm productivity, innovation, and the propensity to export. The self-selection theory argues that, due to the presence

group of listed companies (about 300), while in France and Spain it applies to all large companies.

[6] The country specific gender equality index, used as a moderator in the relation between female board representation and firm outcomes, accounts for the following aspects of differentiation between men and women: reproductive health, political empowerment, labor market participation, literacy, income, highly qualified jobs, and so on.

of sunk costs related to the exporting activity, only high productive firms start to export or increase the export intensity. Conversely, the learning-by-doing theory claims that, through exporting, firms can generate a certain level of knowledge, which results in an increase in their productivity levels (Greenaway and Kneller, 2007). The causal link between internationalization and innovation can run in both directions, too. Aghion et al. (2018) build a theoretical model according to which the export activity has two impacts on a firm's innovation: a market size effect, which stimulates innovation, and a competition effect, according to which firms may reduce their innovation activities. Using data on French firms, they find that the first effect dominates for high productivity firms, while the second effect prevails for less productive firms. Conversely, Rossi et al. (2021) analyze the impact of innovation on the probability to start exporting and find for a sample of European small and medium-sized enterprises evidence in support of the hypothesis that innovation (either product, process, or organizational) matters for the firm's internationalization process. Finally, Gkypali et al. (2021) find for a sample of small UK firms evidence in support of both links, suggesting that both learning-to-export, where innovation helps to build an export capability, and learning-by-exporting, where exports are spurring further the firm's innovation activity, can occur.

To our aims, a higher share of women in the firm's governing bodies can affect export activities through a combination of self-selection and learning-by-exporting mechanisms. Both agency and resource-dependence theories suggest that a firm may become more productive with more gender diversity in the board of directors; higher productivity leads, in turn, to more exports, according to the self-selection theory. On the other hand, gender diversity may have a direct impact on a firm's exporting activities, again according to both agency and resource-dependence theories. In such a case, any subsequent increase in productivity may arise out of learning-by-exporting mechanisms. By jointly analyzing the effect of gender quotas on both productivity and exports, our paper can provide some novel insights into this literature.

2.3 Gender diversity and attitude towards uncertainty and risk

An aspect that has received increasing attention in recent years relates to the potentially different attitudes between female and male board members towards uncertain and risky events. To the extent that women have a higher risk aversion as compared to men, more gender-balanced boards can re-shape firm-level risk profiles. For what concerns the general population, this gender-specific asymmetry in risk-taking behavior is generally accepted (Croson and Gneezy, 2009), and may be due to a natural attitude (i.e. a different general level of testosterone), as argued by Sapienza et al. (2009). However, if one considers the restricted category of top managers or female directors, the evidence is less clear-cut. Focusing on US listed firms and executive positions, Huang and Kisgen (2013) provide evidence that female executives are less likely to issue debt and to make acquisitions, and this behavior has a negative impact on growth. More recently, Faccio et al. (2016), analyzing a sample of European listed companies, find that the presence of female CEOs is related to lower leverage, more stable profits, and higher survival chances compared to the case of male CEOs.

However, some recent studies report some more mixed results on the relationship between female directors and risk attitudes. Adams and Funk (2012), for instance, find that female directors

are less conservative than both their male counterparts and the overall female population. Adams and Ragunathan (2017) investigate the relationship between board diversity and several measures of bank risk, finding instead that risk and board diversity are weakly associated. In a similar vein, Sila et al. (2016) find no evidence that female boardroom representation influences equity risk. Finally, Beloaunia et al. (2020) present cross-country evidence that female directors are associated with less excessive risk taking only in countries with greater gender equality. Their results are confirmed by Yang et al. (2019), who find for Norway a negative effect of female quotas on firm risk. The lower level of risk, coupled with the negative impact on performance, suggests that firms with more gender balanced boards perform differently, and not necessarily worse, than firms with male-dominated boards. Although low short-term profits can damage equity investors, a more cautious management style can be appreciated by stakeholders such as employees and debt holders and may lead to long-term success and a better chance of survival.

In the most recent years, the international trade literature has evolved towards a deeper understanding of global value chains (see Kano et al., 2020) and has addressed sources of heterogeneity related to the number and type of exported (and imported) products, as well as to the characteristics of the different countries of destination. In particular, the diversification of products and destinations has been increasingly explored, because it turns out to be tied to different levels of productivity and different export strategies (Bernard et al., 2019; Castellani et al., 2010; Bernard et al., 2007). In a very recent study, De Sousa et al. (2020) highlight that the volatility of the demand in destination countries and sectors influences both the decision of exporting and the value of exports.

Our third and last contribution to the debate on the effects of women's participation in corporate management focuses on the different attitudes of more gender diverse boards towards uncertain and risky strategies such as exporting a different set of products in a range of destination countries.

While one can argue that, in accordance with the standard diversification effect of portfolio theory, firms can spread their risk by exporting in several foreign markets, we follow Fillat and Garetto (2015), Vannoorenberghe et al. (2016), and Marques (2015), and consider exporting as a risky strategy, particularly at the extensive margin (i.e., the initial decision of whether or not to engage in export activities). In the words of Vannoorenberghe et al. (2016; p. 216): "Exporting is a risky business. Selling on foreign markets exposes a firm to sources of risk – such as exchange rate fluctuations or trade policy changes – that it does not face at home. Imperfect knowledge of local conditions may also leave exporters more vulnerable to cost or demand shocks in foreign markets."[7]

3. The reform and the Italian socio-economic context

We exploit the implementation of the "Golfo-Mosca" law (from the names of the two members of the Parliament who proposed it), which requires governing bodies of listed firms to provide at least

[7] Fillat and Garetto (2015) use similar arguments: "We argue that exporters and MNCs are actively engaged in risky strategies that make their profits more sensitive to the state of the global economy. We also argue that the risk of a global downturn is the main risk investors worry about, so diversification brings limited benefits" (p.2028)

20 percent of seats to the underrepresented gender.[8] Compared to other legislative interventions, the Italian law has been approved fast and has foreseen a gradual implementation. It is important to note that the law embeds non-trivial sanctions for listed firms that do not comply with the normative requirement.

Italy is a fertile ground for our analysis because the introduction of the law for listed firms generates the condition for a natural experiment. Moreover, the few studies available for Italy show contrasting results. While Comi et al. (2020) find a positive impact on performance, Ferrari et al. (2021) show no effect, and Bruno et al. (2018) present evidence that a positive effect emerges only when female directors reach the threshold share of 17-20%. Another reason to look at the Italian case is that the law applies to a relatively small pool of (large) firms, with the result of increasing the job opportunities in leadership positions for high-qualified women, which may be in excess supply in a notoriously conservative and gender-unequal country. In Norway, France, and Spain, instead, the law mandates the quota to a much larger set of firms. In such countries, typically characterized by a much higher degree of female inclusiveness in leadership positions, quota laws are more likely to generate an excess of demand of high-qualified female managers and to produce negative effects on a firm's performance. These factors might explain, at least partially, the different impacts of gender quotas on firm performance in different countries. Our paper may also contribute to the political debate, given that the legal provision has been recently renewed for another six mandates (Law n. 160/2020) with a binding share of at least 40%.

As pointed out by Belaounia et al. (2020), the specific characteristics of each country can have a role in explaining why a hypothesized link does not work or is stronger/weaker than expected. According to Hofstede's categorization of national cultures (Hofstede, 2001), there are six important cultural dimensions of citizens to take into account:

- Power distance (preference of equality and decentralization of power and decision making as opposed to hierarchy, control, and formal supervision);
- Individualism;
- Masculinity (importance of values such as competition, achievement, and material reward for success as opposed to cooperation, modesty, quality of life, and caring for others);
- Uncertainty avoidance (being uncomfortable in ambiguous situations, so that over detailed laws and clear guidelines are required, as opposed to acceptance of differing thoughts or ideas);
- Long-term orientation;
- Indulgence (freedom of citizens to fulfill their human desires, as opposed to tight controls, heavy regulation, and strict social norms).

According to this literature, Italy exhibits high indices of masculinity, individualism, and uncertainty avoidance.[9] The combination of high masculinity and high uncertainty avoidance makes life very difficult and stressful, while the high level of individualism reflects the fact that the typical Italian citizen emphasizes the "I" versus the "we". Given the above cultural context, imposing mandatory quotas of women on corporate boards could help Italian listed firms to break a resistant

[8] This applies to the first board mandate. For the second mandate, the share rises to 33%.
[9] See https://www.hofstede-insights.com/country-comparison/italy/.

wall, thereby shifting the balance in favor of a management style that gives more importance to shared decision making, that is more tolerant, and that accepts more ambiguous situations (something unexpected, unknown or away from the status quo).

4. Data

For our analysis, we combine information from two main sources. First, we retrieve information on economic and financial aspects (i.e. variables from balance sheets), firm size, sector, region, and management from the AIDA *(Analisi Informatizzata delle Aziende Italiane)* dataset provided by Bureau Van Dijk. All public limited Italian firms are included in the dataset, but banks and other financial firms are excluded.

Following Benfratello et al. (2001), we measure aggregate capital through the permanent inventory method (PIM), applying a depreciation rate of 5% on tangible fixed assets. Total factor productivity has been estimated using the methodology developed by Ackerberg et al. (2015), according to which the unobserved productivity is proxied with raw materials and services.

Since AIDA reports information on firm ownership and management, we know the identity of the *main directors* of each firm: the members of the board of directors, the president of the board, the CEO, and other top managers. We also have information on the owners of each company. For each individual, AIDA reports the name, some personal information, details on the position, and, starting from 2015, also the gender. To fill the lack of data on gender for the years 2009-2014, we use an external international dataset of names provided by the website Genderize.io.

Within the board members and top managers included in the AIDA database, we detect the following three leading positions: the President, the CEO, or the unique administrator. We consider the CEO, when present, as the top leader of the company. If the CEO is missing, the President is detected as the person ruling at the top. In some cases, there is a unique administrator, who is naturally identified as the most representative individual of the firm. To this purpose, we generate two dummy variables: *Leader_f*, which is equal to one when the company has a female leader (i.e., if one of the three above listed roles is filled by a woman), and zero otherwise, and *Share_f*, the share of women in the board of the directors. Similar variables have been used in the literature. While *Leader_f* accounts for the fact that there is a woman at the top of the company hierarchy, *Share_f* can be less effective as a measure of the "real" female leadership. Indeed, some seats can be given to women only as a sort of token, to satisfy the law requirements, and reflect an outside pressure for diversity, which may not be shared by the majority of male-dominated boards of directors.[10]

Second, concerning the information on exports, we rely on the COEWEB-Istat database that contains specific information on all import and export operations that occurred between 2008 and 2015, at both the product and the firm level. For each firm, identified by a unique tax code, the COEWEB data allow us to identify all exported or imported products, the country of origin or destination, and the monetary value of each cross-border transaction. Products are codified according

[10] See Smith and Parrotta (2018), for evidence in favor of the tokenism hypothesis.

to the NC8 classification (i.e., *Nomenclatura combinata*), an 8-digit disaggregation that permits a precise identification of traded products, which is subsequently matched to the Ateco 2007 classification (i.e., the Italian version of NACE Rev.2) at different levels of disaggregation (5-digit, 3-digit, and 2-digit). Using the tax code identifier, we merge the financial data and information on individuals from AIDA with the data on international trade from COEWEB, obtaining a balanced panel of firms operating in the years 2009-2015[11]. From the merge of AIDA and COEWEB, we obtain fine-grained information on the type of exported products and on the foreign destinations, which we can usefully match with the firm's characteristics.

To catch some relevant aspects concerning the attitude of firms on uncertainty and risk in the international markets, we build different variables combining the available information on export activities. First, we construct the variable *Newcountry*, a dummy taking the value of 1 if the firm is exporting in a new country in a certain year, and 0 otherwise. Specifically, the dummy turns on if a new destination country appears in the time series of all destinations for the given firm. We set up, in the same way, a dummy for the new products (at the 5-digit classification), *Newproduct*, where "new" in a certain year refers to a product that had not been exported in the previous years.[12] We build also two variables that account for the number of exported products (*N_products*) and the number of foreign destinations (*N_countries*).

Second, following De Sousa et al. (2020), we build two measures that reflect demand uncertainty in the destination sector or country. To this purpose, we use the World Input-Output Tables from WIOD to extract information at the industry level on the flows of goods traded around the world. WIOD contains data at the country-industry level on traded inputs and outputs for 28 EU countries and 15 other major countries for the period 2000-2014.[13] For each country and each sector, we compute, as a consumption expenditure variable, the difference between domestic production and net exports, a measure also known as apparent consumption or absorption.

As in De Sousa et al. (2020), we compute two moments of the demand distribution, the variance, and the skewness. While the variance (or its squared root, the standard deviation) is the classical measure of volatility, the skewness, by including the average value, the median, and the standard deviation, provides detailed information about the asymmetry of the demand distribution in each foreign country and each sector in which firms export, and allows to distinguish between upside and downside uncertainty. For the same variance, countries (sectors) with a demand distribution more skewed to the right provide better downside protection, that is, a smaller probability of large negative returns.[14] Firms will therefore play relatively safer in foreign markets when the variance is low and the skewness is high. Basically, for each country in WIOD, we

[11] Working with a balanced panel of firms is not a restrictive requirement in our application. This is because the treated group consists of listed firms, characterized by relatively stable firm dynamics (in terms of firm entry and exit); accordingly, the matched control group of firms is also characterized by relatively low entry and exit rates.

[12] Unfortunately, we are able to track exports only from 2008 onwards, therefore we cannot exclude that an observation that we codify as *Newcountry* or *Newproduct* is actually reflecting a temporary export stop (i.e., for example, the firm was ceasing to export that product, or in that country, in 2007, and started again to export in 2010 or 2011). However, we are confident that these events do not occur frequently in our sample of large and listed firms. We thank an anonymous referee for having raised this issue.

[13] Unfortunately, not all the countries that represent an export destination for Italy are included in the WIOD dataset. However, we are able to cover about 70% of the exports of Italian firms.

[14] As a matter of fact, managers can be more sensitive to downside losses than to upside gains.

compute the annual growth rate in consumption expenditure of each 2-digit sector j. The volatility of the sector, for a specific country, is simply the standard deviation of the annual growth rates of the sector demand in the last six years. The country's volatility is the average of all sectors' volatilities. In the same way, we compute the skewness of the annual growth rates of sectors in the last six years for each country and the corresponding average skewness at the country level. Such country-sector measures are then used to compute firm-level indices of exposure to foreign demand uncertainty.[15]

5. Descriptive statistics and empirical strategy

5.1 Descriptive statistics

Before showing the results of our main regressions, we provide some descriptive statistics. Given that the reform applies only to listed firms and we need to define a control group, we begin by restricting attention to large limited companies with sales of at least 10 million euros in at least one year between 2009 and 2016. We exclude firms in the agricultural sector as well as those in mining and quarrying. We end up with a total sample of more than 10,000 firms, of which 132 are listed on the Italian stock exchange.

At the beginning of the period under examination, listed firms exhibit a quite small share of women on the boards, around 8 percent. After 2012, for listed firms, the share raises to 17 percent. The quick approval of the law, and the fact that it applies only to listed companies, allows us to run a quasi-experiment, as discussed in detail by Comi et al. (2020). We use listed firms as a treated cluster and we select a pool of very similar firms from the group of non-listed limited companies to form a control group.

Specifically, we follow the recent literature on pre-treatment matching (Maida and Weber, 2021; Comi et al., 2020) and, for each treated firm, we select as control firms the closest five non-listed firms in terms of firm characteristics, degree of gender diversity, and export value in 2011. Furthermore, we impose a common support to the treated firms.[16]

Columns 1 to 3 of Table 1 show the average values in 2011 of our key variables, for the full sample, and for the sub-samples of treated and control firms. The two matched groups are virtually indistinguishable. If we consider the probability of having a woman as a firm leader, non-listed companies reveal a gender inclusion, which is slightly higher than listed companies. In columns 5 to 8 we consider only exporting firms, and also in this case matched and control firms turn out to be highly similar on average. The full sample of 10,026 firms (of which 6341 are exporters) exhibits a somewhat lower size, a lower degree of internationalization, and a greater initial level of female representation in top positions and on boards of directors.

[15] See the Appendix for more details about the computation of the above measures.

[16] The variables used for the propensity score matching are: (log) revenues, (log) total assets, (log) employees, (log) labor cost per capita, (log) labor productivity, (log) TFP, the share of women, (log) export value, the share of export value over revenues, as well as sector of activity and observation year.

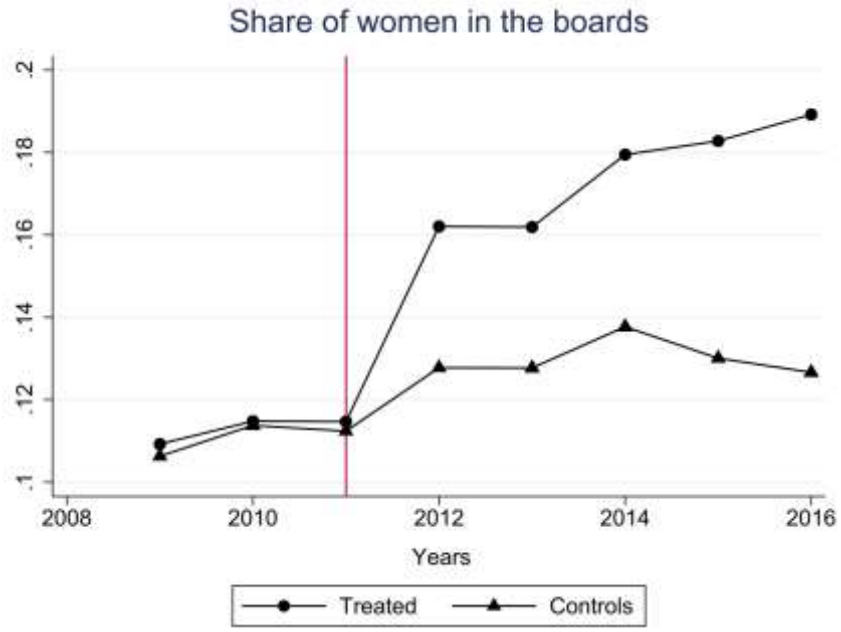
Table 1: Descriptive Statistics (year 2011)

Variable	All				Exporters			
	Pre-match	Treated	Control	Difference - pvalue	Pre-match	Treated	Control	Difference - pvalue
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
log sales	17.23	18.56	18.63	0.745	17.29	18.77	18.86	0.702
log total assets	17.28	19.46	19.49	0.848	17.25	19.55	19.37	0.398
log employees	4.46	5.97	5.96	0.993	4.46	6.19	6.06	0.529
log labour cost per capita	10.75	10.92	10.94	0.645	10.75	10.90	10.93	0.522
log labour productivity	2.18	1.87	1.97	0.804	2.22	1.89	2.06	0.239
TFP	8.71	8.68	8.78	0.365	8.68	8.61	8.76	0.238
Share_f	0.17	0.11	0.11	0.796	0.18	0.12	0.12	0.883
Leader_f	0.15	0.10	0.11	0.719	0.16	0.10	0.12	0.761
Share of exporters	0.61	0.74	0.73	0.726	---	---	---	---
log of export value	9.03	11.99	11.76	0.808	14.81	16.15	16.04	0.812
export share in revenues	0.22	0.28	0.32	0.681	0.33	0.37	0.43	0.641
N	10,026	132	466		6,341	98	353	

Mean values for the full sample, and for treated and control firms, weighted by the propensity score. Treated firms are those for which there are mandatory gender quotas in 2011. Control: non-listed firms matched to the treated ones. From the same matched pool, we select firms that are exporting. Significance levels: ∗, ∗∗, ∗∗∗ indicate significance at 0.10, 0.05 and 0.01 between mean values of treated firms and the control group.

Figure 1 shows the evolution of the share of women in the board of directors for listed and matched non-listed firms. For the two clusters, there is clear evidence of a parallel trend in the years before 2011, while listed firms display a visible increase in their female representation after the law came into force. Notice that control firms have also slightly increased their share of women on the board of directors. This can happen when some of them are planning to be listed soon or are suspecting a widening of the law application. However, after 2014, control firms revert to the pre-reform share.

Figure 1: Share of women in the board of directors, for treated and control firms.



Until 2014, AIDA provides information about the age of board members, too. Figure 2 plots the average age of the firm's female leader (the CEO, the President, or the unique administrator) together with the age of their male counterpart.

We consider separately treated and control firms. A striking fact is that the average age is particularly high, especially for men. In 2009, male leaders were on average older than 60 in the cluster of treated firms, and just below 60 in the control group. Female leaders were on average three years younger in both treated and control firms. Between 2009 and 2014, the average leader's age has declined, in both groups and for both genders. However, for treated firms, there appears to be a sharp drop in the age of female leaders, as compared to both their male colleagues and their female colleagues in the control group. We also find that the difference between male leaders in treated and control firms has reduced in 2014.

Figure 2: Age of firm leader, for men and women in treated and control firms.

5.2 Empirical Strategy

The approach we use to assess the impact of the reform on our outcome variables is a difference-in-difference (DiD henceforth) setting between 2009 and 2015. In particular, we estimate the following econometric model:

$$Y_{it} = \gamma_0 + \gamma_1 D_T \times TREATED_i + \gamma_2 X_{it} + D_i + D_t + u_{it}, \quad (1)$$

where $TREATED_i$ is a dummy denoting whether firm i is in the treated group, as opposed to the control group. D_T is a dummy that takes value 1 for the years after 2011 and 0 otherwise, and X_{it} is a set of time-varying control variables for firm i in year t. In the regression, we control for firm D_i and year D_t fixed effects. Y_{it} is the dependent variable that, alternatively, reflects one of the different aspects under investigation: standard measures of performance (productivity and

profitability), female representation (female leaders and shares of women on the board) and, most importantly for our goals, export behavior (value of exports, export share, exports in a new country, export of a new product, and so on) and attitude towards uncertainty (volatility and skewness in sectors and countries in which firms are exporting).

As usual for difference-in-difference approaches, we test for the presence of a parallel trend in the outcome variables of treated and control firms, before the treatment period. To do so, we interact the treated indicator with a linear trend variable, *trend*, and estimate a series of models using only the pre-reform years. We test the presence of a parallel trend for (log) labor productivity, (log) TFP, ROA, (log) export value, and the share of export value over revenues. Table 2 shows that all variables, except ROA, display an insignificant coefficient for the interaction term, hinting at the presence of parallel trends in the pre-reform period.

Table 2: Parallel trend for matched listed and non-listed firms.

	(log) TFP	(log) Labor productivity	ROA	Export propensity	(log) export value	% Export in revenues
	(1)	(2)	(3)	(4)	(5)	(6)
Treated x Trend	-0.036	-0.023	-1.388***	-0.003	0.042	-0.000
	(0.062)	(0.066)	(0.692)	(0.039)	(0.693)	(0.034)
Trend	0.022	0.011	0.740	-0.021*	-0.320*	-0.017
	(0.021)	(0.025)	(0.275)	(0.011)	(0.179)	(0.016)

Robust standard errors in parentheses. Controls: firm size, capital-labor ratio, firm and year fixed effects. Significance levels: ∗, ∗∗, ∗∗∗ indicate significance at 0.10, 0.05 and 0.01.

6. Results

6.1 The impact on standard performance indicators

In this section, we test the impact of gender quotas on female leadership, on the share of women, as well as on some standard performance indicators. Table 3 reports the results of our DiD approach with the following set of dependent variables Y_{it}: the share of women in the board, the probability of having at least one woman leader, (log) TFP, (log) labor productivity, ROA, and R&D expenditures.

We find that the reform has been successful in increasing the share of women within the board of directors. On average, after 2011, we estimate a 4.4 percentage point increase of the share of female directors in listed firms, as compared to similar firms that are out of the scope of the reform. The fact that, in the period 2009-2016, the majority of our listed firms are facing their first board renewal after the implementation of the law (when only a 20% target is mandated) might explain why we compute a small, although significant, impact.[17]

Column 2 estimates the impact of the reform on the probability of having at least a woman at

[17] According to Ferrari et al. (2021), in 2016, the firms at the first renewal after the reform are still the absolute majority (56%).

the top of the corporate ladder (*Leader_f*). The coefficient is positive but lacks statistical significance. This suggests that the reform has so far increased the female representation only at the lower level of the management, in accordance with the tokenism hypothesis (Smith and Parrotta, 2018; Maida and Weber, 2021). Columns 3 to 6 report the impact of the reform on labor productivity, TFP, profitability, and R&D expenditures. None of the coefficients is significant, a result in line with previous studies (Bruno et al., 2018; Ferrari et al., 2021). Comi et al. (2020) are the only ones finding a positive and significant coefficient for productivity, but their analysis focuses on the years 2004-2014, a period in which a tight minority of firms had to implement the first (small) quota.[18] It is also worth noticing that Bruno et al. (2018) find that the impact of women directors on firm profitability for Italian listed firms is not linear, following a U-shape and becoming positive when the share of women exceeds 17-20%. This result is, however, dependent on the econometric specification.[19]

Table 3: Difference-in-difference estimation with listed and matched non-listed firms. Impact of the reform on the share of women in the BoDs, the probability of having a female leader, (log) labor productivity, (log) TFP, ROA, and R&D expenditures.

	controls	% female directors	Female leader	(log) Labor productivity	(log) TFP	ROA	R & D
		(1)	(2)	(3)	(4)	(5)	(6)
Reform	No	0.042***	0.018	-0.032	-0.029	-0.023	-0.627
		(0.008)	(0.024)	(0.065)	(0.056)	(0.553)	(0.039)
	Yes	0.044***	0.019	-0.028	-0.026	-0.107	-0.537
		(0.008)	(0.024)	(0.062)	(0.056)	(0.551)	(0.389)
R-squared	No	0.160	0.010	0.008	0.007	0.008	0.005
	Yes	0.164	0.011	0.039	0.056	0.009	0.004

Robust standard errors in parentheses. Number of firms: 598. Controls: firm size, capital-labor ratio, firm and year fixed effects. Significance levels: ∗, ∗∗, ∗∗∗ indicate significance at 0.10, 0.05 and 0.01. Regression weighted by the propensity score.

6.2 The impact on exports: the intensive and extensive margin

In the previous section, we document evidence that the reform increased the presence of women on the board of directors, but we find no evidence that the reform affected firm performance. We focus now on the core analysis of the paper and assess whether the reform has had any impact on a wide set of variables related to the firms' export strategy. In the present section, we focus on the probability of exporting, the value of exports, the number of products exported, the number of foreign destination countries, and the probability of exporting a new product and to a new country. In section 6.3 we investigate whether the reform affected the firm's attitude towards uncertainty and risks in the international markets.

[18] Notice that Comi et al. (2020) find an insignificant effect on ROA, consistent with the results reported in Table 3, column 5.

[19] The result is absent in their static regressions and only emerges in models including lagged values of the dependent variables (dynamic models). Manello et al. (2020) find for a sample of Italian small and medium-sized companies that women in top positions no longer correlate negatively with the firm's efficiency, once female employment of the firm is above the sectoral mean. Both papers provide some suggestive evidence in support of the critical mass theory, according to which any positive impact of female directors on corporate performance is bound to a certain number of women in the working environment.

In Table 4, we use the same DiD approach as in Table 3. Column 1 reports the coefficient on export propensity, computed as a dummy variable that takes value 1 if the firm engages in export in a certain year, and 0 otherwise. We estimate a positive impact of the reform on export propensity. The probability of exporting increases by 4 percentage points and, after controlling for firm size, capital-labor ratio, and lagged productivity, which is our reference specification, the coefficient slightly decreases to 3.7 percentage points. The estimates closely reflect the change of (mean) export propensity of matched and control firms.[20]

As regards the value of exports (column 2), the impact of the reform is positive, significant, and quite substantial. This is driven by the fact that the new exporters start trading a large number of goods instead of adjusting at the margin. Therefore, we estimate the same specification as in column 2 with the subset of exporting firms (column 5). After the reform, listed firms have experienced an increase in their export value of about 34 log points compared to the matched non-listed firms. Although still large, the coefficient seems more in line with our expectations. In columns 3 and 6, we also assess whether the reform has changed the structure of the revenues, between export revenues and non-export-revenues. The two coefficients are positive but imprecisely estimated. Finally, in columns 4 and 7 we check if the reform has affected the sales of listed firms. The coefficients are positive but not significantly different from zero.

Table 4: Difference-in-difference estimation with listed and matched non-listed firms. Impact of the reform on export propensity, export value, and share of export in total revenues.

	Controls	Export propensity	(log) Export value	% Export in revenues	(log) Sales	(log) Export value (exporters)	% Export in revenues (exporters)	(log) Sales (exporters)
		(1)	(2)	(3)	(4)	(5)	(6)	(7)
Reform	No	0.040*	0.478	0.005	0.110	0.134	0.036	0.025
		(0.022)	(0.299)	(0.009)	(0.069)	(0.142)	(0.040)	(0.053)
	Yes	0.037*	0.565**	0.004	0.076	0.339**	0.029	0.044
		(0.021)	(0.149)	(0.010)	(0.059)	(0.149)	(0.058)	(0.051)
R-squared	No	0.009	0.010	0.014	0.013	0.008	0.020	0.012
	Yes	0.041	0.087	0.022	0.171	0.074	0.029	0.113

Robust standard errors in parentheses. Number of firms in columns 1, 2, 3 and 4: 598. Number of firms in columns 5, 6 and 7: 494. Controls: firm size, capital-labor ratio, lagged productivity, firm and year fixed effects. Significance levels: ∗, ∗∗, ∗∗∗ indicate significance at 0.10, 0.05 and 0.01. Regression weighted by the propensity score.

To summarize, it seems that the introduction of a gender-balancing quota in Italy has influenced substantially the value of exports of treated firms, while it does not emerge as a key driver for a firm's growth, productivity, and profitability. This is in line with the view that women, rather than performing worse or better than men, contribute to the firm's management by widening the set of opportunities and competencies while offering different views to the decision-making process,

[20] About 74% of listed firms were exporters before the reform, and 79% after the reform. For the control group, 71% of firms were exporters before the reform, and 72% after the reform. The difference in the increase corresponds to 4 percentage points.

which appear particularly valuable for operating in the international markets. In particular, the findings are consistent with the evidence that female directors are less attached to tradition, are more independent-minded, and give more weight to self-direction (Adams and Funk, 2012). It must be noted, moreover, that new female directors are younger and often more educated than the average male counterparts. This also plays a role in shaping the decision process (we provide further evidence on this in section 7).

Apart from the value of exports, the COEWEB dataset provides precious information on the type of product exported and the country of destination. We exploit this information to assess whether the reform and the related increase in female representation have extended the range of exported products and that of destination countries. Therefore, in what follows we use the subsample of exporting firms.

Table 5 shows that the reform has a positive impact on the probability of exporting a new product (with an estimated coefficient of 3.3, which corresponds to three percentage points difference between treated and control firms), and on the overall number of products exported (around two additional 5-digit products exported for listed firms, as compared to the control group of large Italian firms). If we use the two-digit level of aggregation, the coefficients on *Newsector* and *N_sectors* are still positive but lose statistical significance, suggesting that the new products exported after the reform are similar to the other products manufactured/exported by listed firms (i.e., they belong to the same 2-digit category).

The coefficients of *Newcountry* and *N_countries* are positive but not significantly different from zero. Therefore, the higher value of exports found in column 2 of Table 4 seems to be associated with a larger set of exported products, rather than with a wider range of destination countries.[21]

Table 5: Difference-in-difference estimation with listed and matched non-listed firms. Impact of the reform on the type and number of exported products/foreign destination countries.

	Controls	Newproduct	Newcountry	Newsector	N_products	N_countries	N_sectors
		(1)	(2)	(3)	(4)	(5)	(6)
Reform	No	0.031*	0.029	0.021	2.025**	1.393	0.296
		(0.018)	(0.030)	(0.051)	(0.973)	(0.907)	(0.258)
	Yes	0.033*	0.019	0.035	1.587*	0.340	1.193
		(0.018)	(0.051)	(0.030)	(0.869)	(0.244)	(0.942)
R-squared	No	0.015	0.030	0.092	0.058	0.050	0.032
	Yes	0.034	0.092	0.045	0.108	0.070	0.095

Robust standard errors in parentheses. Number of firms (only exporting firms): 474. Controls: firm size, capital-labor ratio, lagged productivity, firm and year fixed effects. Significance levels: ∗, ∗∗, ∗∗∗ indicate significance at 0.10, 0.05 and 0.01. Regression weighted by the propensity score.

In a recent paper, Foss et al. (2021) show for a sample of 1,777 manufacturing firms

[21] We assess whether the impact works at higher levels of aggregation of the product classification, for instance, class of products (textiles, paper) instead of product (t-shirts, shoes). However, we do not find evidence of significant effects.

operating in India, Germany, and ten transition economies that female managers are positively associated with firm innovation (measured by the introduction of a new product in the last three years). Even if we look at a reform that applies to Italian listed firms (typically, of a large size), we focus on women on the board of directors, and we use as regressors *Newproduct*, *Newsector* and *Newcountry*, which all refer to the firms' activities in foreign markets[22], our findings can somehow be compared to the results of Foss et al. (2021). In fact, we share a similar view that women in leading positions bring a different leadership style, which is more open to innovation (in the case of Foss et al., 2021) and more positively oriented towards innovative strategies aimed at expanding the firm's presence in foreign markets (in our paper).

6.3 The firm attitude toward uncertainty and risk

As argued in section 1, one of the interpretations of the negative impact of gender quotas on firm performance relies on the hypothesis that women are more risk averse than men. Firms often operate in an uncertain scenario, and a higher risk aversion in their governing bodies could prevent them from adopting strategies or undertaking investments that are crucial for their competitiveness.

While the relationship between board diversity and firm performance has been extensively analyzed in the literature, evidence of the link between board diversity and the uncertainty/risk attitude of firms is very scant. To that respect, one should also take into consideration that recent studies highlight that female directors may well exhibit different characteristics than the general female population (Adams and Funk, 2012; Adams and Ragunathan, 2017).

Following Fillat and Garetto (2015), Vannoorenberghe et al. (2016), and Marques (2015), who all consider exporting as a risky strategy, our novel approach consists of looking at the demand uncertainty of export destinations. For example, using a sample of Chinese firms, Vannoorenberghe et al. (2016) show that firms selling to a more diversified set of countries have more volatile exports, a result in sharp contrast with standard portfolio theory. They argue that the fact that more diversification of exports can be associated with more uncertainty and risk (as measured by the variance of the growth rate of firm exports) is to be traced back to the presence of fixed costs of exports for each foreign destination as well as to short-run destination-specific demand shocks.

While the evidence of section 6.2 points toward the presence of a higher export propensity for listed firms after the reform, we have not yet used information capturing the demand uncertainty of export destinations, as measured in terms of local demand volatility. For instance, newly appointed women may have contributed to increasing exports mainly towards less volatile countries, and this would be consistent with the risk-aversion argument.

[22] Unfortunately, since we do not have information on the product mix and on the number of sectors in which firms are active in the domestic market, we cannot interpret *Newproduct* and *Newsector* as proxies for innovation, as in Foss et al. (2021), but only as innovative behavior in international markets.

We build on these notions and compute the volatility of demand in destination sectors and destination countries for each firm. We also compute the skewness of the demand to capture the preference towards relatively safer sectors or countries, where for safer we mean sectors or countries with a smaller probability of obtaining large negative returns. We compute the average firm exposure to demand uncertainty at the sector and country level, using as weights the value of exports.

Table 6 reports our main findings. After the reform, the average exposure to volatile sectors in listed firms increased as compared to non-listed firms, while the exposure to volatile countries was reduced. While the size of the effects is rather similar, only sector exposure is significant at the 10% level. Therefore, the higher export propensity of firms found in section 6.2 seems to be associated with higher destination-sector volatility. Notice that the volatility of the country or the sector is largely independent of firm-level decisions. While a simple average is more likely to capture an exogenous change in firm exposure to risk, by weighting the volatility with the value of exports and by exploiting the panel dimension, we are capturing, more realistically, a variation in the firm decision to be exposed to demand uncertainty in foreign markets.

Turning to the average skewness of the demand, we find no evidence that listed firms behave differently from non-listed firms after the reform. More importantly, given the interpretation of the skewness, we do not find positive and significant coefficients, which would have been in support of the hypothesis of a more cautious exporting behavior by treated firms. Notice that the signs of the coefficients reported in columns 1 and 3 are just the opposite of the signs of the coefficients shown in columns 2 and 4, respectively. Even if we are aware of the low statistical significance, we interpret this with the possibility that exporting firms are more worried about the aggregate economic situation of destination countries, rather than being concerned with the worldwide economic uncertainty of sectors in which they are exporting.

Overall, then, we find no evidence that quota reform changed the exposure of listed firms to demand uncertainty or that it affected risk aversion with respect to the export decision.

Table 6: Difference-in-difference estimation with listed and matched non-listed firms. Impact of the reform on average firm exposure to sector/country volatility and skewness.

	controls	Volatile sectors	Volatile countries	Skewed sectors	Skewed countries
		(1)	(2)	(3)	(4)
Reform	No	0.024	-0.021	-0.012	0.026
		(0.015)	(0.015)	(0.017)	(0.022)
	Yes	0.025*	-0.020	-0.012	0.0029
		(0.015)	(0.015)	(0.017)	(0.022)
R-squared	No	0.147	0.094	0.789	0.487
	Yes	0.147	0.094	0.790	0.491

Robust standard errors in parentheses. Number of firms (only exporting firms): 484. Controls: firm size, capital-labor ratio, lagged productivity, firm and year fixed effects. Significance levels: *, **, *** indicate significance at 0.10, 0.05 and 0.01. Regression weighted by the propensity score.

7. Robustness

In this section, we present the results of additional econometric tests that take into account some potential confounding factors regarding the effect of the reform on our outcome variables.

First, we tested several specifications to assess to what extent the impacts found in Tables 4 and 5 relate to the absolute number of women on the board and the pre-reform share of women. We find that the higher number of female directors can explain only part of the positive impact on exports and that the share of women in the pre-reform period is poorly significant. This suggests that the reform does not have a different effect depending on the degree of gender diversity before its implementation, while it may have generated other adjustment mechanisms of the management style, which have in turn affected the export behavior. Such adjustments, besides the gender, can relate to the educational level and the age profile of the board (Bruno et al., 2018; Ferrari et al., 2021; Adams and Ferreira, 2009).

Second, the reform may have generated different mechanisms of adjustment of management teams. For instance, section 5 shows that the average age of female leaders has declined substantially, a result consistent with Bruno et al. (2018), who suggest that, after the implementation of the quota, boards are becoming younger and more educated, and with Ferrari et al. (2021), who find that the reform has increased the educational level of newly appointed men, too. Alternatively, Adams and Ferreira (2009) show that more diverse boards show a better attendance of male directors. All these indirect mechanisms can influence the export strategy of firms and leave low explanatory power to board (gender) diversity. While we do not have educational data for managers, we have information on their age, which is useful to explore whether the results on export propensity and on the attitude towards uncertainty and risk are driven by the inflow of younger directors.

Therefore, we include both the pre-reform share of women and the average age of the board to the set of control variables of our baseline specification. Table 7 shows that adding the above two variables does not bring to different conclusions concerning the impact on export propensity, export value, the share of exports in revenues, the probability of exporting a new product or to export in a new country. All the coefficients are close to the baseline version and the role of age seems to be quite weak. Conversely, as regards the exposure of firms to sector and country volatility/skewness, Table 8 delivers some important messages. The average age of the board absorbs the explanatory power of the reform in the first column, which measures the impact on sector volatility. Moreover, the coefficient of age is negative and statistically significant at the 5% level, which means that the younger the board, the higher the exposure to volatile sectors. Despite the weak statistical significance in the other columns, the coefficient of age is negative for volatility and positive for skewness. Given that risk-averse managers would prefer to export in markets characterized with high skewness, this implies that younger managers are also less interested in asymmetric returns in case of economic shocks in export destinations. This is consistent with the idea that young managers are more prone to undertake investments and business plans which exhibit relatively higher levels of risk (likely due to a combination of several factors, such as higher mind-freshness or lower experience).

Table 7: Difference-in-difference estimation with listed and matched non-listed firms. Impact of the reform on export propensity, export value/share, and product/destination country. Robustness: average age of the board and pre-reform share of women as control variables.

VARIABLES	Export propensity	(log) Export value	% Export in revenues	New products	New countries
	(1)	(2)	(3)	(4)	(5)
Reform	0.039*	0.317**	0.028	0.032*	0.034
	(0.022)	(0.153)	(0.066)	(0.018)	(0.033)
Average age	0.001	-0.01	0.009	-0.0004	0.0004
	(0.003)	(0.021)	(0.006)	(0.003)	(0.006)
Female share (pre-reform) interacted with years	Yes	Yes	Yes	Yes	Yes
R-squared	0.046	0.074	0.010	0.041	0.042

Robust standard errors in parentheses. Number of firms in columns 1, 2 and 4: 598. Number of firms in columns 3 and 5: 490. Controls: firm size, capital-labor ratio, lagged productivity, firm and year fixed effects. Significance levels: ∗, ∗∗, ∗∗∗ indicate significance at 0.10, 0.05 and 0.01. Regression weighted by the propensity score.

Table 8: Difference-in-difference estimation with listed and matched non-listed firms. Impact of the reform on sector/country volatility and skewness. Robustness: average age of the board and pre-reform share of women as control variables

VARIABLES	Volatile sectors	Volatile countries	Skewed sectors	Skewed countries
	(1)	(2)	(3)	(4)
Reform	0.023	-0.019	-0.010	0.028
	(0.015)	(0.015)	(0.017)	(0.022)
Average age	-0.006***	-0.003	0.001	0.001
	(0.002)	(0.003)	(0.002)	(0.003)
Female share (pre-reform) interacted with years	Yes	Yes	Yes	Yes
R-squared	0.150	0.098	0.793	0.505

Robust standard errors in parentheses. Number of firms (only exporting firms): 484. Controls: firm size, capital-labor ratio, lagged productivity, firm and year fixed effects. Significance levels: ∗, ∗∗, ∗∗∗ indicate significance at 0.10, 0.05 and 0.01. Regression weighted by the propensity score.

Third, one could well argue that the demand uncertainty in foreign markets does not fully describe the risk attitude of a firm. Decisions that embed a severe amount of uncertainty are numerous, also for firms that do not export at all. Therefore, we aim at comparing the impact of the reform on risks related to export with another indicator, which can also inform about the attitude of the firm to afford uncertain events. Among the financial data provided by AIDA, we consider the debt-to-equity ratio as a further outcome variable and we analyze two specifications, one controlling for the age of the board and another without this control. In Table 9, the insignificant coefficient on the reform variable provides no support for the view that the reform impacts the debt-to-equity ratio. Overall, consistent with the results of Table 6, we find no evidence that female directors are more risk-averse than their male colleagues.

Table 9: Difference-in-difference estimation with listed and matched non-listed firms. Impact of the reform on sector/country volatility and skewness. Robustness: average age of the board and pre-reform share of women as control variables

Variables	Debt-to-equity ratio (1)	Debt-to-equity ratio (2)
Reform	-0.027	-0.0207
	(0.208)	(0.210)
Average age	No	0.032
		(0.025)
Female share (pre-reform) interacted with years	No	Yes
R-squared	0.008	0.010

Robust standard errors in parentheses. Number of firms: 598. Controls: firm size, capital-labor ratio, lagged productivity, firm and year fixed effects. Significance levels: ∗, ∗∗, ∗∗∗ indicate significance at 0.10, 0.05 and 0.01. Regression weighted by the propensity score.

As a final robustness check, we test whether the positive effects of the reform on export propensity and export value are driven by gender characteristics across industries in the home country. In particular, the reform may have been more effective in those Italian industries where the workforce is structurally biased towards women (or men), with the underlying idea that the newly appointed female directors may be more influential in a work environment already characterized by a strong presence of women, at all levels of a firm's hierarchy. Therefore, we run separate regressions for the subsample of firms operating in "male intensive" industries, i.e. where the share of female employees – including blue-collar workers, white-collar workers, and managerial positions – is below the average in 2010, and for the group of firms active in "female intensive" industries, i.e. where the share of female employees is above the average in 2010.[23] Table 10 shows that both the significance and the magnitude of the coefficient of the reform for both export propensity and export value are much larger in female intensive industries than in male intensive industries. This is in line with the established evidence of a positive correlation between the share of female workers already operating in the work environment and the performance of female leaders (Flabbi et al., 2019; Manello et al., 2020).

[23] Due to data access, this subsampling is available for the manufacturing industries only. To compute the average female share of total employees for each three-digit NACE manufacturing industry, we resort to a dataset based on an Italian firm-level survey (the Employer and Employee Survey - RIL) conducted by the Institute for the Development of Workers' Vocational Training (ISFOL).

Table 10: Difference-in-difference estimation with listed and matched non-listed firms. Impact of the reform on male/female intensive sectors. Robustness: average age of the board and pre-reform share of women as control variables

Variables	Female intensive sectors			Male intensive sectors		
	Export propensity	(log) Export value	% Export in revenues	Export propensity	(log) Export value	% Export in revenues
	(1)	(2)	(3)	(1)	(2)	(3)
Reform	0.105**	1.387**	0.140	0.001	0.070	-0.034
	(0.047)	(0.630)	(0.143)	(0.021)	(0.263)	(0.023)
Average age	0.013	0.132	0.013	-0.001	-0.020	0.004
	(0.017)	(0.087)	(0.013)	(0.003)	(0.033)	(0.004)
Female share (pre-reform) interacted with years	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.085	0.139	0.024	0.028	0.068	0.018

Robust standard errors in parentheses. Number of firms: 598, 210 in female intensive sectors, 298 in male intensive. Controls: firm size, capital-labor ratio, lagged productivity, firm and year fixed effects. Significance levels: ∗, ∗∗, ∗∗∗ indicate significance at 0.10, 0.05 and 0.01. Regression weighted by the propensity score.

8. Conclusion

Several countries in the EU have adopted policies to improve gender equality in the business environment. In most cases, these policies focused on the introduction of gender quotas on the board of directors. The evidence, so far, reveals that these policies have been successful in increasing the share of women on the boards, but their effectiveness along other dimensions, such as profitability and firm value, has not yet been credibly established. One of the reasons for potential negative outcomes is a different attitude of women towards uncertain and risky events. However, the literature has not yet come up with clear evidence on the difference in risk aversion between male and female directors.

We exploit the reform on gender quota in Italy to assess whether it has had any impact on several performance measures and, most importantly, on the export strategy of firms and on their attitude concerning export risks. By making use of a difference-in-differences approach with propensity score matching, we compare listed and non-listed firms in the years across the reform using a novel dataset on exports with detailed information on the sector and country of destination.

We find no evidence that the reform affected firm performance. However, our tests indicate support for the view that the reform increased both the value of exports and the propensity to export. A possible interpretation of these results is that the increasing diversity within the board of directors helps firms in pursuing more diversified and open-minded strategies regarding their export behavior, influencing both the extensive and the intensive margin. Moreover, Italian listed firms subject to the gender-balancing quotas have also, compared to the control group of Italian large firms, increased the probability of exporting new products, as well as the number of exported products. Finally, treated firms are not found to be less exposed to volatile and risky sectors, a

result contrasting with the view that women in managerial positions are more cautious than men. The above results are instead in line with some recent contributions that bring into question the higher risk aversion of female top managers (like Adams and Ragunathan, 2017; Adams and Funk, 2012).

Our study focuses on Italian listed and very large firms, a context where mandatory quotas are pushing into the board women who are high profile managers or professionals, highly self-selected. This selection process might remove most of the differential between male and female top managers in terms of risk aversion.

Hofstede's cultural dimensions theory (Hofstede, 2001) could be of help in explaining why the introduction of mandatory quotas in Italy has a different impact on performance as compared to similar reforms in other countries. For example, there is robust evidence that the gender-balancing quota in Norway is associated with a reduction in corporate performance. While Italians are characterized with high masculinity (with a score of 70), high individualism (76), and high uncertainty avoidance (75), Norwegians rank much lower in all three indices (8, 69, and 50, respectively). This could suggest that countries characterized with a conservative southern European gender culture, like Italy, are more in need of such kind of reforms. Forcing firms to welcome more women in top corporate positions could help to break the glass ceiling that hinders the advancement of a large available pool of talented women up the corporate ladder, a barrier that in countries like Italy is more difficult to crack.

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References

Ackerberg, D. A., K. Caves and G. Frazer (2015). Identification properties of recent production function estimators. *Econometrica 83*(6), 2411–2451.

Adams, R. B. (2016) Women on boards: The superheroes of tomorrow? *The Leadership Quarterly 27*, 371-386.

Adams, R. B. and D. Ferreira (2009). Women in the boardroom and their impact on governance and performance. *Journal of Financial Economics 94*(2), 291–309.

Adams, R. B and P. Funk (2012). Beyond the glass ceiling: Does gender matter? *Management Science* 58 (2), 219-235.

Adams, R. B., J. de Haan, Terjeses S. and H. van Ees (2015). Editorial board diversity: Moving the field forward. *Corporate Governance, An International Review 23* (2), 77-82.

Adams, R. B. and V. Ragunathan (2017). Lehman sisters. *Available at SSRN, 3046451*.

Ahern, K. R. and A. K. Dittmar (2012). The changing of the boards: The impact on firm valuation of mandated female board representation. *The Quarterly Journal of Economics 127*

(1), 137–197.

Aghion P., A. Bergeraud, M. Lequien and M. Melitz (2018). The impact of exports on innovation: Theory and evidence. Banque de France Working Paper 678.

Belaounia, S., R. Tao and H. Zhao (2020). Gender equality's impact on female directors' efficacy: A multi-country study. *International Business Review* 29 (5), 101737.

Benfratello, L., D. Margon, L. Rondi, S. Alessandro, D. Vannoni, S. Zelli and M. Zittino (2001). The New CERIS Panel On Italian Firms 1977-1997. *CERIS-CNR Working Paper Number 5*.

Bernard, A. B., E. J. Blanchard, I. Van Beveren and H. Vandenbussche (2019). Carry-along trade. *The Review of Economic Studies 86* (2), 526–563.

Bernard, A. B., J. B. Jensen, S. J. Redding and P. K. Schott (2007). Firms in international trade. *Journal of Economic Perspectives 21* (3), 105–130.

Bertrand, M., S. E. Black, S. Jensen and A. Lleras-Muney (2019). Breaking the glass ceiling? The effect of board quotas on female labor market outcomes in Norway. *The Review of Economic Studies 86* (1), 191–239.

Bloom, N. (2014). Fluctuations in uncertainty. *Journal of Economic Perspectives* 28 (2), 153-176.

Bruno, G. S., A. Ciavarella and N. Linciano (2018). Boardroom gender diversity and performance of listed companies in Italy. *CONSOB Working Papers 87*.

Byrnes, J. P., D. C. Miller and W. D. Schafer (1999). Gender differences in risk taking: a meta-analysis. *Psychological Bulletin 125* (3), 367–83.

Carter, D. A., F. D'Souza, B. J. Simkins and W. G. Simpson (2010). *Corporate Governance: An International Review* 18 (5), 396-414.

Castellani, D., F. Serti and C. Tomasi (2010). Firms in international trade: Importers' and exporters' heterogeneity in Italian manufacturing industry. *World Economy 33* (3), 424–457.

Comi, S., M. Grasseni, F. Origo and L. Pagani (2020). Where women make a difference: gender quotas and firms' performance in three European countries. *ILR Review 73* (3), 768–93.

Croson, R. and U. Gneezy (2009). Gender differences in preferences. *Journal of Economic Literature 47* (2), 448–74.

De Sousa, J., A.-C. Disdier and C. Gaigné (2020). Export decision under risk. *European Economic Review 121*, 103342.

Eagly, A. H. (2016). When passionate advocates meet research on diversity, does the honest broker stand a chance? *Journal of Social Issues 72*, 1, 199-222.

Faccio, M., M.-T. Marchica and R. Mura (2016). Ceo gender, corporate risk-taking, and the efficiency of capital allocation. *Journal of Corporate Finance 39*, 193–209.

Ferreira, D. (2015). Board diversity: Should we trust research to inform policy? *Corporate Governance: An International Review 23* (2), 108-111.

Ferrari, G., V. Ferraro, P. Profeta and C. Pronzato (2021). Do board gender quotas matter? Selection, performance and stock market effects. *Management Science*, forthcoming.

Fillat, J. L. and S. Garetto (2015). Risk, returns, and multinational production, *The Quarterly Journal of Economics* 130 (4), 2027-2073.

Flabbi, L., M. Macis, A. Moro and F. Schivardi (2019). Do female executives make a difference? The impact of female leadership on gender gaps and firm performance. *The Economic Journal 129*(622), 2390–2423.

Foss, N., Lee, P. M., Murtinu, S. and V. G. Scalera (2021). The XX factor: Female managers and innovation in a cross-country setting. *The Leadership Quarterly*, 101537.

Gkypali, A., J. H. Love and S. Roper (2021). Export status and SME productivity: Learning-to-export versus learning-by-exporting, *Journal of Business Research*, 123, 486-498.

Greenaway, D. and R. Kneller (2007). Firm heterogeneity, exporting and foreign direct investment. *The Economic Journal 117* (517), F134–F161.

Hillman, A. J. and T. Dalziel (2003). Boards of directors and firm performance: Integrating agency and resource dependence theory. *Academy of Management Review*, 28, 3, 383-396.

Hofstede, G. (2001). Culture's consequences: Comparing values, behaviors, institutions, and organizations across nations. Thousand Oaks, CA: SAGE Publications.

Huang, J. and D. J. Kisgen (2013). Gender and corporate finance: Are male executives overconfident relative to female executives? *Journal of Financial Economics 108*(3), 822–839.

Jianakoplos, N. A. and A. Bernasek (1998). Are women more risk averse? *Economic Inquiry 36* (4), 620–630.

Kano, L., E. W. Tsang and H. W.-c. Yeung (2020). Global value chains: A review of the multi-disciplinary literature. *Journal of International Business Studies 51*, 577–622.

Kim, D. and L. T. Starks (2016). Gender diversity on corporate boards: Do women contribute unique skills? *American Economic Review: Papers & Proceedings 105* (5): 267-271.

Levi, M., L. Kai and F. Zhang (2014). Director Gender and mergers and acquisitions. *Journal of Corporate Finance 28*, 185-200.

Maida, A. and A. Weber (2021). Female Leadership and Gender Gap within Firms: Evidence from an Italian Board Reform. *ILR Review*, forthcoming.

Manello, A., M. Cisi, F. Devicienti and D. Vannoni (2020). Networking: a business for women. *Small Business Economics 55: 239-348*.

Marques, H. (2015). Does the gender of top managers and owners matter for firm exports? *Feminist Economics* 21 (4) 89-117.

Matsa, D. A. and A. R. Miller (2013). A female style in corporate leadership? Evidence from quotas. *American Economic Journal: Applied Economics 5*(3), 136–69.

Minetti, R. and S. C. Zhu (2011). Credit constraints and firm export: Microeconomic evidence from Italy. *Journal of International Economics 83*(2), 109–125.

Niepmann, F. and T. Schmidt-Eisenlohr (2017). International trade, risk and the role of banks. *Journal of International Economics 107*, 111–126.

Pfeffer, J. and G. R. Salancik (1978). *The external control of organizations: a resource dependency perspective*. New York: Harper & Row.

Rao, K. and C. Tilt (2016). Board composition and corporate social responsibility: the role of diversity, gender, strategy and decision making. *Journal of Business Ethics 138*, 327-347.

Rossi, S. P. S., G. Bonanno, M. Giansoldati and T. Gregori (2021). Export starters and exiters: Do innovation and finance matter? *Structural Change and Economic Dynamics* 56, 280-297.

Sapienza, P., L. Zingales and D. Maestripieri (2009). Gender differences in financial risk aversion and career choices are affected by testosterone. *Proceedings of the National Academy of Sciences 106*(36), 15268–15273.

Sila, V., A. Gonzalez and J. Hagendorff (2016). Women on board: Does boardroom gender diversity affect firm risk? *Journal of Corporate Finance 36*, 26-53.

Smith, N. and P. Parrotta (2018). Why so few women on boards of directors? Empirical evidence from Danish Companies in 1998-2010. *Journal of Business Ethics* 147, 445-467.

Vannoorenberrghe, G., Z. Wang and Z. Yu (2016). Volatility and diversification of exports: Firm-level theory and evidence. *European Economic Review* 89, 216-247.

Yang, P., J. Riepe, K. Moser, K. Pull and S. Terjesen (2019). Women directors, firm performance, and firm risk: A causal perspective. *The Leadership Quarterly 20*, 101297.

Appendix. Volatility and skewness for firms, sectors, and countries

For each destination country, the demand in the 2-digit sector j at time t corresponds to the apparent consumption d_{jt}, computed as

$$d_{jt} = production_{jt} + imports_{jt} - exports_{jt}.$$

Then, we compute the annual growth rate of consumption expenditure $g_{j[t,t-1]} = \Delta_{t,t-1} \ln d$ in each sector. Following De Sousa et al. (2020), we generate the volatility of the sector as (the log of) the standard deviation of the growth rates in the last six years:

$$vol_{jt} = \ln(SD(g_{j[t,t-1]}, g_{j[t-1,t-2]}, \ldots, g_{j[t-5,t-6]}))$$

with t=(2009,..., 2014).

In the same way, for each country, we compute the skewness of sector j in time t, as the skewness of the growth rates in the last six years

$$skew_{jt} = skewness(g_{j[t,t-1]}, g_{j[t-1,t-2]}, \ldots, g_{j[t-5,t-6]})$$

vol_t and $skew_t$ for each country are computed as the average value of sectoral volatilities and skewness, respectively.

Figures A1 and A2 show the median volatility and the median skewness of the demand across the destination countries. Since our window of observation covers the years 2009-2014, there are some differences with respect to the values computed for the years 2000-2009 by De Sousa et al. (2020). However, we find some similarities (among others, Spain, Germany, UK, Portugal, Austria - for the least volatile countries). In general, we have a less dispersed distribution compared to De Sousa et al. (2020), partly because our timespan does not include the worst year of the strong economic downturn (2008).

Volatility and skewness are then matched to all destination countries and sectors at the product-firm level. This allows generating a firm-level measure of exposure to volatility. It is important to disentangle the two dimensions, i.e. sector and country, because one can have firm A exporting to a highly volatile country i, but with exports being concentrated in a low volatile sector j.

To measure the exposure to demand uncertainty at the firm level, we computed a weighted average, using as weights the sales shares of each product.

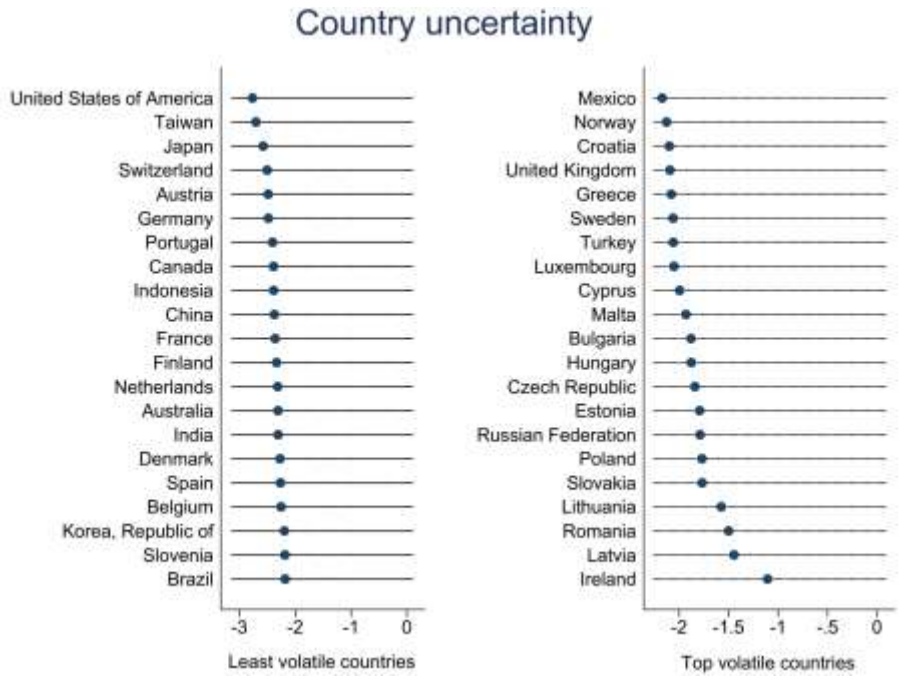

Figure A1: Median volatility across countries over the period 2009-2014. Low volatile countries (left panel) and high volatile countries (right panel), using the median as the threshold. Source: authors' calculations.

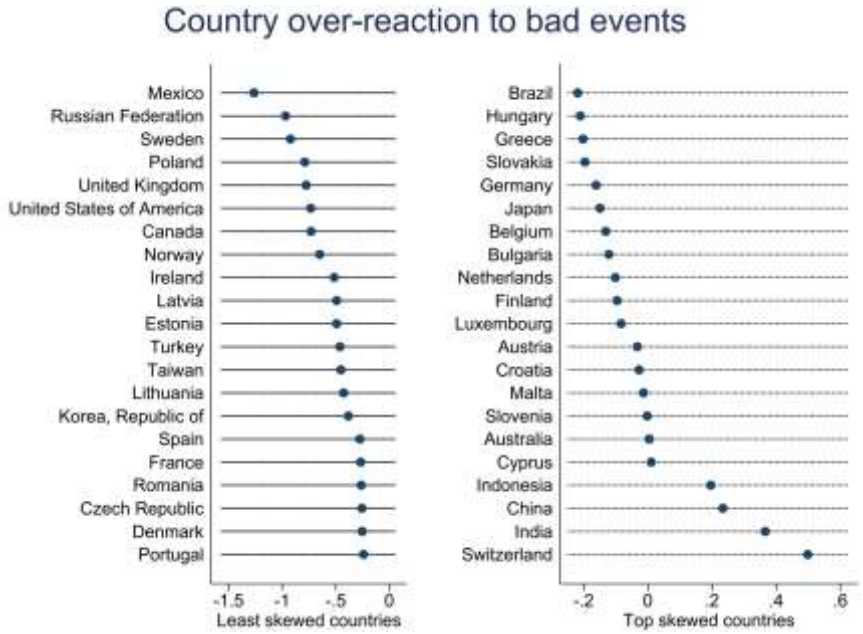

Figure A2: Median skewness across countries over the period 2009-2014. Low skewed countries (left panel) and high skewed countries (right panel), using the median as the threshold. Source: authors' calculations.