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# ABSTRACT

# The Gender Composition of Corporate Boards and Firm Performance: Evidence from Russia*

This paper studies economic effects of the gender composition of corporate boards, employing a new and unique longitudinal dataset of virtually all Russian companies whose shares were traded on the national stock market between 1998 and 2014. Using multiple identification approaches, alternative measures of gender diversity, and several performance indicators, we find some evidence that companies with gender-diverse boards have higher market values and better profitability. These effects are particularly pronounced when firms appoint several women directors, which is consistent with the critical mass theory. The effects appear to be stronger in bad economic times or for firms experiencing economic difficulties. Overall, the Russian data lend some support to "the business case" for more women on corporate boards.

**JEL Classification:** G34, J16

**Keywords:** board of directors, gender diversity, firm performance, Russia

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## 1. Introduction

The board of directors is regarded as a key mechanism of corporate governance that helps to mitigate conflicts of interest between managers and owners, as well as between different groups of owners of the firm. It is also instrumental in developing corporate strategy and facilitating the firm's access to key resources, such as finance and technology. Unsurprisingly, the composition of corporate boards is one of the central topics in corporate governance research (e.g. Linck et al. 2008, Adams et al. 2010). The issues of board structure and processes, defined in terms of board size, presence of non-executive independent directors, separation of posts of Chairman and CEO, and the establishment of various committees, etc., have been central to current corporate governance debates and reforms across the globe (Larcker and Tayan 2015).

Recently, particular attention has been drawn to the gender composition of corporate boards, with the explosive growth in the number of studies in the field (see Kirsch 2018). At least two factors explain this growing interest. First, despite the rapid increase of female participation in the labor force during the XX century, women remain underrepresented in the top tiers of management, including corporate boards of directors (e.g. Singh and Vinnicombe 2004). This is the well-known glass ceiling effect. Second, several countries have in the past couple of decades introduced regulatory interventions aimed at increasing board diversity, and the proportion of women directors in particular. For example, according to Regulation S-K of the Securities and Exchange Commission, which has been in effect since 2009, US companies are required to disclose the application of a diversity policy to board composition (albeit no definition of "diversity" is provided in this SEC rule). More importantly, starting with Norway in 2003, many European countries, including France, Italy, and more recently Germany, have introduced gender quotas, often at very high levels (see Gabaldon et al. 2017 for a review). Norway, for example, requires a public company's board to be at least 40% female by representation, while Germany stipulates a 30% threshold. While social justice arguments play a prominent role in promoting gender quotas, economic reasons (or "the business case for gender diversity") are also regularly cited (e.g. European Commission 2012).

Why should the gender diversity of corporate boards be economically important? The reasons are primarily seen in the gender differences in individual preferences and backgrounds, but also beyond individual characteristics, for example, in the potential team effects. Indeed, psychology studies find substantial differences between men and women in their values and preferences. For example, compared to women, men tend to attribute more importance to the values of power, hedonism, achievement, and self-direction, while women emphasize benevolence and universalism (Schwartz and Rubel 2005). Focusing on the individual characteristics that are relevant for the labor market, Groson and Gneezy (2009) find that women are more risk averse than men, that their social preferences are more situation-specific than those of men, and that women are neither more nor less socially oriented, but their social preferences are more compliant.[1]

Another argument linking board gender diversity to company performance refers to the gender differences in backgrounds. For example, Simpson et al. (2010) find that compared to men directors, women directors are less likely to have a background in business and more so in academia, consulting and health care. Hodigere and Billimoria (2015) show that women directors have less experience on other private company boards, and fewer ties in professional networks. Carter (2003), and Adams and Ferreira (2009), point out that women directors do not belong to the "old boys club", and therefore could be better suited to performing monitoring, controlling, and other tasks typical of independent directors.

Moreover, the literature suggests that gender diversity may have important behavioral effects on team performance. For example, according to Bear and Woolley (2011), team collaboration is greatly improved when the group includes female members. Using an experimental setup, Hoogendoorn et al. (2013) provide evidence that business teams which are more gender-balanced perform better than male-dominated teams, although the exact underlying mechanism remains unknown. Regarding corporate boards, Adams and Ferreira (2009) report that male directors have fewer attendance problems when the board includes female directors.

An important contribution to the gender diversity debate that has received much attention in recent years is that of Kanter (1977). She proposes a critical mass theory suggesting that the extent of representation of the minority gender matters. In particular, this theory states that a group reaching a critical mass of 20% to 40% of women will outperform either all-male groups or those with a smaller representation of women.

Despite the close attention and relatively long history of research into the effects of board gender diversity on corporate performance, the empirical evidence is far from conclusive. Most papers report no statistically significant relationship between the presence of women directors on corporate boards, and board effectiveness and company performance (Carter et al. 2010, Miller and del Carmen Triana 2009, Rose 2007, Marinova et al. 2016).

[1] However, it is not quite clear whether these differences – documented for the general population – apply to corporate directors and managers, which is a highly selected sub-population (e.g. Johnson and Powel 1994). For example, based on data from Sweden, Adams and Funk (2012) do not find any evidence that female directors are more risk-averse than their male counterparts. They argue that the degree of risk aversion in women disappears when they break the glass ceiling and start to operate in a male-dominated culture.

Some papers find a positive association (e.g. Carter et al. 2003, Campbell and Minguez-Vera 2008, Francoeur et al. 2008), while others report a negative relationship (Adams and Ferreira 2009, Bøhren and Strøm 2010, Haslam et al. 2010). With regard to potential non-linear effects, there is some, albeit scarce, evidence of the importance of critical mass (Joecks et al. 2013, Liu et al. 2014, Schwartz-Ziv 2017).[2] Given these contradictory findings, Adams et al. (2015) call for further investigation of board gender diversity and firm performance relationships.

Increasing attention in this debate has been given to the role of corporate risk. A number of recent studies suggest that companies with more female directors on the board have a lower exposure to risk. For example, Sila et al. (2016) find lower equity risk measured by total risk, systematic risk, and idiosyncratic risk (calculated using the daily stock returns) in companies with more gender-diverse boards. Similarly, Faccio et al. (2016) report that a higher share of female representatives on the board leads to lower leverage, lower earnings' volatility and a greater chance of firm survival. If this risk reduction effect is indeed present[3], the impact of board gender diversity on firm performance is likely to be more pronounced when risk-adjusted, rather than raw, measures of performance are employed.

The most critical problem that plagues empirical research on the economic effects of board gender diversity, and results in weak and inconclusive evidence, is endogeneity. Hermalin and Weisbach (2003) argue that the composition of the board of directors, including the matter of gender diversity, may be jointly determined with firm performance, which substantially complicates causal inference. This problem is traditionally addressed using instrumental variables, which help extract exogenous variation from endogenous variables. However, the approach remains highly problematic due to the difficulties in finding reliable instruments for board composition variables (Adams and Ferreira 2009). In this context, the focus on specific types of action and decision, such as board activity and CEO turnover, rather than firm performance in general, have been suggested for empirical studies (Bebchuk and Weisbach 2010). The difficulty, however, is that the board of directors is responsible for different actions and the vast majority of these actions remain unobservable to outsiders.[4]

[2] Reviews and meta-analyses of the relevant empirical literature can be found in Cabrera-Fernández et al. (2016), Pletzer et al. (2015), and Post and Byron (2015).

[3] The available evidence is inconclusive. For example, Matsa and Miller (2013) find no change in firm leverage after the introduction of a female boardroom representation quota in Norway. They suggest that "risk aversion may not be a distinctive part of women's approach to corporate decision-making" (p. 161).

[4] Studies that attempt to look inside the black box of corporate boards include Adams and Ferreira (2009), who find that female directors are more likely to attend board meetings and gender diversity increases the sensitivity of CEO turnover to stock performance, and Schwartz-Ziv (2017), who finds, using the minutes of board meetings in Israeli firms, that gender-balanced boards are more active and also more likely to replace underperforming CEOs.

A number of recent empirical studies interpret the introduction of gender quotas on corporate boards as natural experiments that provide the econometrician with exogenous variation in the gender variables (e.g. Matsa and Miller 2013). However, different analyses of the same policy interventions often produce conflicting results. In the much studied Norwegian case, Ahern and Dittmar (2012) find that the gender quota resulted in younger and less experienced boards, and also had a negative effect on the market value and operational performance of the firms affected whereas Eckbo et al. (2016) show the quota having no effect on either shareholder announcement returns or the long-run stock and accounting performance. Ferreira (2015) critically evaluates the available evidence from natural experiments of this kind, and finds it fragile due to timing problems, difficulties in choosing a control group, sample selection, and the presence of numerous confounding factors.[5] His overall conclusion is that "we don't really know whether and how quotas affect the financial performance of firms" (Ferreira 2015, p. 110).

In this paper, we provide new evidence on the economic consequences of gender diversity in corporate boards. The central question is rather traditional: What is the relation between the gender composition of corporate boards and company financial performance? However, in addressing it, we exploit a new rich panel dataset, use multiple identification approaches, and employ several measures of gender diversity and firm performance.

In particular, we use a unique hand-collected dataset of publicly-traded Russian companies that spans 17 years, from 1998 to 2014. The dataset is an unbalanced panel of more than 550 companies with some 3000 observations in total. It contains detailed information on the firms' corporate boards, ownership structure, and key financials and market capitalization**.** To the best of our knowledge, this is one of the largest panel datasets ever employed to analyze the performance effects of board gender diversity, at least in the context of emerging markets.[6]

The paper explores five complementary approaches to identify economic effects of the gender composition of corporate boards. First, we estimate standard panel data models with firm fixed and random effects. Second, we consider panel 2SLS regressions where potential supply-side constraints in the appointment of female directors serve as instrumental variables. We rely on several instruments defined at the level of industry and region, including those

[5] In particular, Bøhren and Staubo (2016) show that the extent of female representation on corporate boards is highly correlated with the fraction of independent directors, which makes it difficult to disentangle the effects of gender diversity and board independence.
[6] As in most other papers on this topic, our data are observational, as Russia has not yet introduced any mandatory or voluntary gender quotas. A draft law No. 172496-6 stipulating gender quotas in large companies, as well as in those with state participation, was rejected in 2013 by the State Duma (Russia's parliament) following a very brief discussion.

from national statistical sources. Third, we consider a dynamic panel data model that allows us to account for persistency of firm financial performance and, most importantly, to address potential endogeneity of the gender variables using instruments from within the main dataset. Fourth, we explore the role of the gender composition of corporate boards during the Great Recession. In particular, we test whether the presence of women directors helped companies mitigate industry-level shocks associated with this global crisis. As an industry-level shock may be trivially correlated with the performance of the sampled firms, especially in relatively monopolized industries with just a handful of large firms, we instrument it using industry-level output data from Ukraine, a country whose economy was until recently closely linked to that of Russia. Finally, with the help of quantile regressions, we study whether the gender composition of corporate boards has differential effects depending on the position of the firm in the conditional distribution of firm performance. This approach is instrumental in testing whether or not increasing the representation of women on the board is more valuable in bad economic times and/or for firms that experience difficulties.

Another strength of our paper stems from the use of multiple measures of gender diversity. These include a continuous variable for the share of women on the board, its quadratic, as well as dummy variables for one woman director, two, three, and four women on the board. This allows us to test for possible non-linearities in the association between board gender composition and firm performance, including Kanter's critical mass hypothesis.

Further, given our focus on publicly-traded firms, we consider multiple measures of firm performance, including ROE, ROA, Tobin's Q, and market-to-book ratio. As accounting-based performance measures might react to changes in the governance structure of the firm with substantial delays, as compared with market-based performance indicators (e.g. Carton and Hofer 2006), we consider, in addition to the contemporaneous effects of gender variables, their effects on accounting-based performance one year ahead. Overall, we believe that we extract from the data at hand the maximum amount of information on the effect of board gender diversity on firm performance.

Finally, our paper extends the international literature on the gender composition of corporate boards and its performance effects. While the effects of board gender diversity have been studied extensively in the context of mature market economies, the evidence from emerging markets remains thin (e.g. Liu et al. 2014). In particular, the survey of 310 articles published in 135 journals during the period 1981 to 2016 (Kirsch 2018) does not cite any study from Russia. For an important emerging economy, this is at least surprising.

The principal findings of our analysis are as follows. We find some evidence that appointing female directors to corporate boards is performance improving. This result seems not to apply to situations where firms appoint just one woman to the board. Our estimates suggest that for the positive effect of gender diversity to be realized, a firm should have several, typically three, women on the board. This pattern is visible not only in the standard fixed- and random-effects regressions, which can only address a particular form of endogeneity, i.e. that caused by omitted variables, but also in the 2SLS estimation, which tackles potential reversed causation. Importantly, the data seem to support the hypothesis that gender-diverse corporate boards are more valuable in bad economic times, associated with industry-level or general macroeconomic shocks. Overall, our estimation results suggest positive performance effects of board gender diversity, and are broadly consistent with Kanter's critical mass theory.

The rest of the paper is organized as follows. Section 2 describes the dataset used in our study. Section 3 discusses the methodology. The results of our empirical analysis are presented in Section 4. Finally, Section 5 draws a number of conclusions.

## 2. Data

This study takes advantage of a novel hand-collected panel dataset of Russian publicly-traded companies from 1998-2014. It covers all firms whose shares were listed/traded on the RTS and/or MICEX, as well as on the MOEX since 2011[7,8]. A company entered the sample if its shares were traded/listed on the last working day of each calendar year, so that its year-end market capitalization can (at least theoretically) be computed. We restrict our attention to non-financial firms, dropping banks and other financial institutions from the sample.

The total number of firms satisfying the selection criteria exceeds 550, and the number of observations (firm*years) approaches 3000, implying an unbalanced panel. The principal sources of company-level data are the SKRIN and SPARK databases, https://skrin.ru/ and http://www.spark-interfax.ru/, which for each observation (firm*year) in our panel provide multiple files with highly disaggregated raw information.[9] An in-depth description of the dataset can be found in Muravyev (2017), while here we offer only a brief overview.

The dataset contains basic information on the firms, such as postal addresses and industry affiliations, details regarding corporate boards, management bodies, and ownership

[7] RTS stands for the Russian Trading System, which was created as an over-the-counter market in 1995 and subsequently transformed into a stock exchange with the largest coverage of Russian stocks. MICEX denotes the Moscow Interbank Stock Exchange, the largest (in terms of volumes of trades) Russian stock market in the 2000s. MOEX stands for the Moscow Exchange created as a result of the merger between the RTS and MICEX in December 2011.

[8] The dataset excludes companies whose operations were mostly in Russia but whose shares were only traded abroad, e.g. in London or Frankfurt (examples being Globaltrans, Integra Group, and Rambler Media Limited).

[9] For example, there are separate files for ownership and board composition for each firm and each year of observation. We have carefully processed and assembled these numerous files into a single dataset.

structures. In particular, we have information on the distribution of ownership among large shareholders (the reporting threshold in Russia is 5%), ownership stakes of affiliated persons (including the CEO and other directors, regardless of the size of their equity stakes), and the composition of corporate boards (including directors' names, year of birth, and positions held during the previous five years). The information on corporate boards, management bodies and ownership is extracted from the second quarter reports to the regulator.[10] These reports are usually prepared in early July and contain data as of June 30 each year. Therefore, the data collected reflect the results of the general shareholder meetings held in the spring, usually April or May, capturing the appointment of both new CEOs and new boards of directors that typically run the firms for most of the calendar year.

The dataset includes a large array of variables characterizing corporate boards.[11] While the construction of most of the variables is straightforward (e.g. the number of directors, their average age, total ownership stake, etc.), some require extra work. In particular, the gender of board members is not explicitly marked in our data sources, leaving us with the task of assigning gender to more than 25,000 directors. Here, we took advantage of a specific structure of Russian full names, which contain patronymics with gender-specific endings (typically "-vich" for men and "-vna" for women).[12] This feature enabled us to run a simple machine code to identify male and female directors. Where patronymic names are not available (e.g. for foreign nationals that constitute about 7% of the directors), gender was identified based on first names, and in some cases by consulting extra sources on the Internet (e.g. company websites). Thus, the computer processing of the data was supplemented by manual checks where necessary. Overall, exploiting the specific structure of Russian full names ensured a fast and efficient identification of male and female directors, where measurement error is of no or little concern.

The data contain key financials and market capitalization for each sampled firm. There is also information on the liquidity of company shares (number of transactions and bid-ask

[10] The Federal Commission on Securities Market (1996-2004), the Federal Financial Markets Service (2004-2013) and the Central Bank of Russia (since 2013).

[11] Russia belongs to the group of countries allowing both one- and two-tier corporate boards (Ferreira and Kirchmaier 2013). In either case, companies have to establish a supervisory board (often simply called "board of directors" in Russian) and an executive body, which may be represented by a unitary CEO (typically called "general director" in Russian) or a collective executive body (management board) that includes the CEO. In the latter case, the law explicitly requires companies to define the authority of the collective executive body in their corporate charters. Hereinafter, following the letter of the law and most of the literature, we will associate the term "board of directors" with the supervisory board. Further details on corporate boards in Russia are available in Iwasaki (2008) and Muravyev (2017).

[12] For example, Aleksey (name) Anatolye<u>vich</u> (patronymic) Ivanov (surname) and Irina (name) Aleksandro<u>vna</u> (patronymic) Kapustina (surname).

spreads) on the Russian stock market. In addition, a dummy variable indicates cross-listing of the company's shares on foreign stock markets (typically New York, London or Frankfurt).

We excluded firms in financial distress, identified as observations with negative equity. We then cleaned firm performance measures (market-to-book ratio, Tobin's Q, ROE, ROA) as well as leverage of outliers by winsorizing 1% of observations in each tail of the relevant distribution.[13] Finally, observations with missing values in any of the important variables were dropped.

The descriptive statistics of the resulting estimation sample are reported in Table 1. It shows the definitions of the variables used in the analysis, their means, standard deviations, medians, and minimum and maximum values. There are 2830 observations in total. The distribution of the observations over time is fairly even, notwithstanding a drop in the early 2000s and a subsequent increase in 2005-2006.[14] The panel is heavily unbalanced: only 46 firms (corresponding to 782 observations) form a balanced sub-panel.

The average number of directors in the sampled companies (variable *no_directors*) is close to nine, while the range is considerable, from five to twenty-three. Twenty-one percent of directors are insiders (managers of the firm), and an additional five percent are government representatives (variables *dir_insiders* and *dir_governm*). Directors hold, on average, just 0.02% of equity in the sampled firms (variable *dir_stake*). Their average age is just above 45 years (variable *dir_age*).

The share of women on the boards of directors is close to 12% (variable *share_women*). However, there are considerable differences across the companies. Some 40% of firms do not have any woman on the board. One female director is present in 33% of companies, two female directors sit on the board of 17% of companies, three female directors in 7% of firms, and four or more in only 3% of firms (variables *one_woman*, *two_women*, *three_women* and *least_four_women*).

Descriptive statistics on the other variables (see Table 1) show that 47% of the companies sampled have a unitary executive body, while 53% have created a management board (variable *unitary_CEO*). The ownership structure is concentrated, with the largest shareholder holding 52% of shares, on average, and the second largest shareholder 16% of shares (variables *owner1_stake* and *owner2_stake*). This confirms the pattern documented in most previous studies (see e.g. Iwasaki et al. 2018). Slightly more than 11% of the companies cross-list abroad, issuing ADRs and GDRs (variable *adr*). The sampled firms' financial

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[13] The results of the analysis change little if these observations are deleted instead of winsorized.

[14] These fluctuations are largely driven by the reorganization of two sectors, telecommunications and power utilities, that was initiated by government. Further details regarding the sample are available in Muravyev (2017).

indicators (variables *MtB*, *Tobin's Q, ROE, ROA*) lie within the usual ranges. For example, Tobin's Q is just above 1, on average, and ROE is just above 10%. The dynamics of the financial variables follow the macroeconomic trends as well as the dynamics of the Russian stock market (in particular, we observe growth of Tobin's Q in the 2000s, a fall in 2008/9, and a recovery thereafter).[15] The medians of the performance variables show similar patterns, consistent with the macroeconomic trends.

Table 2 shows correlations between the key variables of interest. The share of female directors is most strongly (negatively) correlated with company size, stock liquidity, board size, the average age of directors, and the number of managers on the management board. Somewhat surprisingly, the share is positively correlated with financial leverage, implying greater indebtedness (and riskiness) of companies that have women directors. Weaker, but still significant, correlations are observed between the gender variables and the shares of insider and government-related directors. Correlations between the gender variables and company performance indicators are small and mostly insignificant, except for a few cases involving the market-to-book ratio and ROE.

The dynamics of the gender variables are remarkable. The percentage of female directors, as well as the percentage of companies with at least one, two, three, and four or more female directors on their boards, exhibit long-term upward trends (see Figures 1 and 2). Specifically, while the percentage of female directors was close to 8% in 1998, it exceeded 14% in 2014. The percentage of companies with at least three women directors was typically below 5% at the turn of the century; since 2006, it has exceeded 10% and reached 15% in 2014. These data are fully consistent with the global trend of greater involvement of women in corporate boards (Lee et al. 2015). Interestingly, the dynamics depicted in Figures 1 and 2 are at odds with the finding by Sun et al. (2105) that firms are more likely to appoint female directors during economic crises than during periods of robust economic growth. In the Russian data, we observe a decline in female directorship at the time of the Great Recession.

Importantly, there is considerable within variation in the gender variables (not reported). In particular, the variation in the share of female directors within a firm over time (within variation) approaches two-thirds of the variation in the share of female directors across firms (between variation). For binary gender variables, the within and between variations are almost equal.

Table 3, which compares key characteristics of male and female directors, provides a further insight into the gender aspect of Russian corporate boards. Some of the gender differences reported in the table are large and statistically significant. In particular, male

[15] These data are not shown but available from the authors on request.

directors are, on average, five years older than their female counterparts, which is consistent with the evidence from other countries (e.g. Terjesen et al. 2009). Compared to male directors, of which seven percent are foreigners, almost all the female directors are Russian nationals, with only a few exceptions. Female directors are less likely to be insiders, that is, managers and senior employees of the firm. This is in line with the international evidence suggesting that women are more likely to be non-executive and independent directors (e.g. Bøhren and Staubo 2016). At the same time, the fractions of government representatives among men directors and women directors are fairly similar.[16]

Overall, the gender diversity variables show substantial variation both across firms and over time, which is important for econometric identification. They are also correlated with a number of key variables describing the firm's governance structure. The latter fact emphasizes the necessity of including an extended set of control variables in regression models that link gender diversity and firm financial performance.

## 3. Methodology

To study economic effects of board gender composition, we employ a series of complementary approaches: fixed- and random-effects (FE/RE) panel data models, 2SLS models with multiple instrumental variables, a dynamic panel data (DPD) model, cross-sectional models with industry-level shocks at the time of the Great Recession, and quantile regressions.

**3.1. Fixed- and random-effects panel data models.** First, we consider a standard panel data setup in which different measures of gender diversity (variable *share_women* measuring the fraction of women on the board, its quadratic, variables *one_woman*, *two_women*, *three_women*, *least_four_women* which are dummies for one, two, three and at least four women on the board) are related to the traditional measures of firm performance. The model can be written as follows:

$$Perf_{it} = \alpha_i + \boldsymbol{X}_{it}\boldsymbol{\delta} + \boldsymbol{W}_{it}\boldsymbol{\beta} + \gamma_t + \varepsilon_{it},\ i=1,\dots,N;\ t=1,\dots,T. \quad (1)$$

where $Perf_{it}$ stands for the performances of firm $i$ in year $t$ (the market-to-book ratio, Tobin's Q, ROE or ROA, and one-year ahead ROE and ROA[17]), $\alpha_i$ is a firm-specific effect, vector $\boldsymbol{X}_{it}$

[16] Some additional information on Russian corporate boards, including a case study of ten largest companies, can be found in Garanina and Muravyev (2018).

[17] The rationale for using one-year-ahead variables is that accounting-based performance measures might react to changes in the board structure with substantial delays, as compared with market-based performance indicators (e.g. Carton and Hofer 2006). Using one-year-ahead accounting-based measures also makes our board variables

includes variables characterizing the gender composition of the corporate board of firm *i* in year *t*, vector $\boldsymbol{W}_{it}$ denotes a set of control variables used in similar analyses (e.g. other essential characteristics of corporate boards, firm size, leverage and ownership[18]), and $\gamma_t$ is a time effect. The firm-specific effects $\alpha_i$ help to control for unobserved time-invariant characteristics of firms that may affect firm performance. The set of control variables $\boldsymbol{W}_{it}$ (as well as firm- and time fixed effects) aim to ensure that *ceteris paribus* conditions, which are central to interpreting the link between board structure and firm performance in a causal sense, hold. We estimate model (1) using both fixed- and random-effects estimators with a cluster robust estimator of variance, which addresses potential heteroskedasticity and within-cluster correlation of the error terms. We subsequently rely on the robust version of the Hausman test to check the consistency of the random-effects model.

**3.2. 2SLS models.** A critical issue in the analysis of how board characteristics affect firm performance is endogeneity (Hermalin and Weisbach 2003). While some sources of endogeneity (in particular, omitted variables) are eliminated in the fixed-effects regression setting, some (in particular, reverse causation) may remain. The standard approach to tackle the problem is to employ 2SLS estimation with instrumental variables satisfying the properties of relevance and exogeneity. Such instruments are often derived from exogenous shocks to corporate governance variables (e.g. Ahern and Dittmar 2012).[19]

As Russian data do not offer any exogenous shocks to the gender variables, we resort to more traditional instruments. In particular, we explore both the original dataset and external data sources to define four instruments characterizing potential supply-side constraints on the appointment of female directors. Using the original dataset, we construct two variables that measure the average share of female directors in other companies, (a) in the same industry (defined at the two-digit level) in a given year, variable *fem_board_ind*, and (b) in the same region in a given year, variable *fem_board_reg*. Based on the Rosstat data[20] on employment by industry and region, we construct two additional instruments that measure (c) the share of female workers in a given industry in a given year, variable *fem_empl_ind*, and (d) the female to male employment ratio in a given region in a given year, variable *fem_male_ratio*.[21] The

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predetermined with respect to performance, which is not true in the case of contemporaneous performance measures.

[18] The basic set of controls includes the following variables: *no_directors*, *dir_insiders*, *dir_governm*, *dir_stake*, *dir_age*, *unitary_CEO*, *no_managers*, *CEO_stake*, *owner1_stake*, *owner2_stake*, *leverage*, *liquidity*, *adr*, *size*, *state_support_08 and state_support_09*.

[19] Indeed, the reliance on exogenous shocks has recently become the gold standard in causal inference in corporate finance and governance studies, despite the as yet small number of well-executed analyses, because such exogenous shocks are relatively rare (Atanasov and Black 2016).

[20] Rosstat stands for the Russian statistical agency, www.gks.ru.

[21] This is the ratio of the female employment rate (number of women in work to the total number of women of working age) to the male employment rate.

instruments derived from the data at hand, namely instruments (a) and (b), are common in the literature; for example, Liu et al. (2014) use both the percentage of women directors and that of female employment in the relevant industry (defined at the two-digit level), while Marinova et al. (2016) rely on the industry share of women (with industries defined at the one-digit level). The instruments based on national statistical data or other external sources, such as instruments (c) and (d) above, are employed much less frequently.[22] We take advantage of a large country setting where publicly-traded companies are present in many industries and located in a large number of highly heterogeneous regions.[23]

All of these instruments are likely to be relevant: a particular firm has a larger pool of potential female directors when the respective industry/region features a higher fraction of female directors or a higher fraction of female employees (for example, compare the oil extraction vs. apparel industries). This is confirmed in a formal test: all four instrumental variables are positively and statistically significantly correlated with the gender variables. In particular, the share of female directors has raw correlation coefficients 0.26, 0.17, 0.16, and 0.11 with instruments (a), (b), (c), and (d), respectively. The instruments are exogenous as they are unlikely to be influenced by the firms' policies regarding the appointment of female directors.

Using the above-mentioned instruments, we re-estimate model (1) with the help of the panel 2SLS estimator with random and fixed effects available in Stata 14 (commands xtivreg and xtivreg2, see Schaffer 2015). As in the benchmark case, we rely on a cluster-robust estimator of variance. In addition, we test for instrument relevance, weak instruments, and instrument exogeneity (the latter is possible as we have an overidentified case). We also test for endogeneity of the gender variables in our model.

**3.3. Dynamic panel data models.** When reliable instruments or exogenous shocks to the corporate board variables are not available, it is common to rely, for identification purposes, on complimentary approaches. One approach available in the presence of panel data involves the specification of a dynamic panel data model, which accounts for both potential persistency of firm financial performance and potential endogeneity of right-hand size variables. Importantly, endogeneity can be tackled with the help of instruments obtained from within the panel dataset.

To implement this approach, we consider dynamic panel data of the following form:

[22] For example, Huang and Kisgen (2013) instrument the presence of a female executive in US firms using a state's level of gender status equality.

[23] Regarding the instruments derived from the dataset, we aggregate industries (defined at the two-digit level) and regions (there are 83 provinces in Russia), if there are less than four observations for a particular industry/region in a given year. This leaves us with more than 20 regions and industries observed over 17 years, which ensures sufficient variation in the instruments constructed, both within and between.

$$Perf_{it} = \alpha_i + \eta Perf_{it-1} + \boldsymbol{X}_{it}\boldsymbol{\delta} + \boldsymbol{W}_{it}\boldsymbol{\beta} + \gamma_t + \varepsilon_{it},\ i=1,\dots,N;\ t=2,\dots,T. \quad (2)$$

where $Perf_{it-1}$ denotes the lagged performance of firm *i*. Compared to model (1), the list of regressors is augmented by the first lag of the dependent variable. We estimate (2) using the dynamic panel data (DPD) estimator, in particular its two-step system GMM version (Blundell and Bond 1998, Roodman 2009). It combines equations in differences of the variables (instrumented by lagged levels) with equations in levels of the variables (instrumented by lagged differences). We treat the gender variables ($\boldsymbol{X}_{it}$) as endogenous and use their second and third lags as instruments.[24]

**3.4. Cross-sectional models with the industry-level shock of 2008.** Another approach to achieve identification, in the absence of instruments and/or exogenous shocks to the corporate board variables, is to explore exogenous shocks that disrupt the relation between the endogenous right-hand side variables of interest and the outcome variable (e.g. Yang and Zhao 2014).[25] We follow this route and explore the shock associated with the Great Recession to gain an additional insight into the role of corporate board gender diversity in the recovery of Russian firms. In particular, we relate firms' pre-shock characteristics to their post-shock performance (such as in Mitton 2002, and Lemmon and Lins 2003). The respective specification takes the following form:

$$Perf_{i2009} = \lambda + \eta Perf_{i2007} + \alpha \cdot gender_{i2008} + \beta \cdot gender_{i2008} \cdot shock_j + \gamma \cdot shock_j + \boldsymbol{W}_{i2008}\boldsymbol{\delta} + \varepsilon_i,$$
$$i=1,\dots,N. \quad (3)$$

where $gender_{i2008}$ is a variable characterizing the gender composition of the corporate board of firm *i* (e.g. the share of women directors) in the pre-crisis period (e.g. the second quarter of 2008), $shock_j$ indicates the magnitude of the shock in industry *j* to which firm *i* belongs (this is the ratio of industry *j* output in Q3 2009 to industry *j* output in Q3 2008, the respective data available from Rosstat), and $gender_{i2008} \cdot shock_j$ is the interaction term. The coefficient on this interaction term tells us whether the presence of women on the board mitigates (or, on the contrary, amplifies) the effect of the external shock on firm performance. Since this is a cross-

[24] Instrumenting the other firm-level variables (those included in $\boldsymbol{W}_{it}$) or using more lags as instruments turns out to be problematic given the many time periods and relatively few units (firms). In our setting, it is easy to get the number of instruments well above the number of units, which violates the usual rule of thumb for the system GMM estimator (Roodman 2009).

[25] In particular, Yang and Zhao (2014) use the exogenous shock of the 1989 Canada – United States Free Trade Agreement to investigate the effect of CEO duality on firm performance. They find that duality firms outperform non-duality firms by 3–4% when their competitive environments change.

sectional model, it is essential to augment it with a lagged performance variable, $Perf_{i2007}$, which helps control for unobserved heterogeneity across firms.

The intuition behind this model is as follows. Firm performance should be positively related to the shock variable defined above (firms in industries facing smaller shocks are likely to perform better). Next, if the null hypothesis that board gender diversity is associated with improved performance of firms holds, the coefficient on the gender variable should be positive, too. What about the interaction term $gender_{i2008} \cdot shock_j$? The coefficient on this interaction shows whether gender diversity amplifies or mitigates the effect of the shock. In particular, if the coefficient is negative, gender diversity reduces the sensitivity of firm performance to industry shocks. In fact, this is one of the hypotheses discussed in the literature on board gender diversity (e.g. Adams and Funk 2012, Sun et al. 2015).

A caveat to this approach is that the industry shock variable, taken from the official Rosstat data, can itself be endogenous. Consider a concentrated industry dominated by a few large firms, such as the oil and gas extraction and processing sector. Obviously, the performance of the industry will be heavily influenced by that of large companies such as Gazprom and Lukoil. Since these and other large firms are included in our sample, their performance can be trivially correlated with the industry-level shock. To solve this problem, we instrument industry-level shocks in Russia using similar data from Ukraine (available from the country's statistical office, http://www.ukrstat.gov.ua/). At the time of the Great Recession, the two economies were closely linked, with similar industry dynamics, which suggests the instrument chosen should be strong enough. Indeed, the correlation of the industry-level shocks across the two countries is close to 0.76. Finally, the instrument is likely to be exogenous because it is based on data from a different country.

**3.5. Quantile regressions.** To complement the latter approach with additional evidence, we resort to quantile regressions. In the context of board gender diversity, they have been employed in only a few studies, for example, Conyon and He (2017). Quantile regressions help to reveal whether the relationship between gender diversity and firm performance varies depending on the position of the company in the conditional distribution of firm performance.[26] Again, if gender diversity is particularly important in bad economic times/for firms experiencing difficulties, we could expect positive and significant coefficients on the gender variables at lower quantiles of the conditional distribution of firm performance.

[26] The standard regression methods (OLS, RE, FE) estimate the response of the mean of the dependent variable to one or more independent variables. They cannot account for the possibility that the impact of explanatory variables can be different across the conditional distribution of the dependent variable. As a result, focusing on the mean may overstate, understate, or fail to reveal the true change in the distribution. The quantile regression is a primary means to estimate such differential effects.

That is, increasing the gender diversity is associated with the improved performance of firms in distress. In contrast, a finding that gender diversity has positive and significant effects at upper quantiles and negative or zero effects at lower quantiles would be inconsistent with the above hypothesis.

The general formulation of the quantile regression is as follows:

$$Q_{Perf_{it}}(\tau|\boldsymbol{X}_{it}, \boldsymbol{W}_{it}) = \alpha(\tau) + \boldsymbol{X}_{it}\boldsymbol{\delta}(\tau) + \boldsymbol{W}_{it}\boldsymbol{\beta}(\tau), \tag{4}$$

where $Q_{Perf_{it}}(\tau|\boldsymbol{X}_{it}, \boldsymbol{W}_{it})$ denotes the $\tau$-quantile of the dependent variable $Perf_{it}$ conditional on the covariates represented by vectors $\boldsymbol{X}_{it}$ and $\boldsymbol{W}_{it}$. The sign $\tau$ denotes quantile ($0< \tau <1$). Note that the effects of the covariates are allowed to vary across the quantiles of interest, as is the intercept $\alpha$, which is common to all firms.

The longitudinal nature of the data calls for the use of clustered standard errors. We compute them using the approach suggested by Machado et al. (2014) and available in Stata (command "qreg2").

## 4. Empirical results

This section summarizes the main results of our empirical analysis. They are presented and discussed sequentially, in accordance with the order in Section 3.

**4.1. Fixed- and random-effects panel data models.** The first set of estimates obtained using the standard fixed-effects regressions is reported in Table 4. The results are differentiated by the gender variable employed, starting with a linear specification in the share of women directors (Panel A), proceeding with a quadratic specification in the same variable (Panel B), and then turning to a non-linear specification with dummies for one, two, three, and at least four women on the board (Panel C). For each specification, we report results pertaining to the market-to-book ratio, Tobin's Q, ROA, ROE, as well as ROE(t+1) and ROA(t+1), which appear in columns 1 to 6, respectively. Here and later, the results are reported in a compact form that displays only the coefficients of interest.[27]

The first specification with the share of women directors (Panel A) shows a positive and statistically significant effect of female directorship on the market-based performance measures (at the 5% significance level), as well as on ROE (at the 10% significance level). A straightforward interpretation of the coefficients suggests, for example, that increasing the share of female directors on the corporate board by 10% leads to an increase in the market-to-

[27] Some of the full estimation results are available in Appendix.

book ratio of around 0.07, Tobin's Q of around 0.03, and ROE of around 0.01. The coefficients in the regressions with the other three accounting-based performance measures, including those one-year-ahead (columns 5 and 6), are statistically insignificant.

In the specifications with the quadratic in the share of women directors (Panel B), the gender variables are jointly statistically significant only in columns 1 and 2, which report results for the market-to-book ratio and Tobin's Q, at the 10% and 5% levels, respectively. In particular, the model with the market-to-book ratio suggests that firm performance declines in the share of female directors until the fraction of females reaches 0.04, and then starts rising (the turning point is 0.182/(2*2.108)=0.043). For Tobin's Q, the turning point is around 0.06. Given that the boards have, on average, nine directors, the results essentially say that boards with no women or one woman perform the worst, and adding a second, third, etc. woman is associated with an improvement in company performance. Again, this is only valid for the market-based performance measures and not for the accounting-based measures.

The specification with different gender dummies also suggests a non-linear pattern in the association between board gender diversity and firm performance. In particular, the coefficients on the dummies for one and two female directors are statistically insignificant in all the regressions reported, irrespective of the firm performance measure. This implies companies with boards that have one or two female directors are not different – in terms of financial performance – from companies with no women directors. However, the coefficients on the dummies for three women directors and at least four women directors are positive and statistically significant in columns 1, 2 and 3, corresponding to the market-to-book ratio, Tobin's Q, and ROE as the dependent variables. Importantly, in each specification, the coefficients on the dummies for three female directors and at least four female directors are not statistically different from each other. This implies significant increments in company performance are associated with adding a third female director. Overall, based on the results in Table 4, we can tentatively conclude there is some positive association between female directorship and firm performance, and that the effect is non-linear. We also note that the spike in performance of firms that have three women directors is broadly consistent with the critical mass theory advanced in the literature (e.g. Joecks et al. 2013).[28]

Estimating the random-effect models reveals a positive and statistically significant coefficient on the gender variables in a number of specifications, typically those for which the fixed-effects estimates were significant, too. However, the Hausman test rejects in the

[28] Importantly, the coefficients on the control variables generally make sense; for example, firm performance typically declines in the share of insider directors and increases in the directors' ownership stake.

overwhelming majority of cases, implying the inconsistency of the random-effects estimator. Therefore, our subsequent analysis emphasizes the fixed-effects estimation results.

**4.2. Instrumental variables models.** As noted in the methodology section, the results reported above do not necessarily have causal interpretation, due to possible endogeneity of the gender variables. This may be true despite our effort to control for various characteristics of the firms, including those unobserved by the researcher (via the firm fixed effects). An extensive list of controls, while addressing endogeneity caused by omitted variables, does not handle reverse causation. To tackle the latter problem, we resort to instrumental variables methods.

Table 5 summarizes the 2SLS regression results obtained with the help of instruments that characterize supply-side constraints on female directors.[29] We report two principal specifications: one for the share of female directors (Panel A) and the other for the dummy variable *least_three_women*, which equals one if a firm appoints at least three female directors and zero otherwise (Panel B). Essentially, in the latter specification we merge the dummies for three female directors (*three_women*), and at least four female directors (*least_four_women*), into a single variable. This approach is motivated by the earlier fixed-effects results, suggesting a jump in the performance of firms with at least three women directors, as well as by difficulties in instrumenting the other non-linear specifications with the available instruments.[30] The results in Table 5 are obtained using the 2SLS fixed-effects estimator.

The estimation results show positive coefficients on most of the gender variables. However, of the 12 estimates reported, only five are statistically significant at the 10% level. These are the coefficients on the share of female directors in the specifications with Tobin's Q, ROA and one-year-ahead ROA as well as the coefficients on the dummy for at least three women directors in the specification with ROA, and one-year-ahead ROA. The coefficients are very imprecisely estimated: compared with the first set of results reported in Table 4, the standard errors increase by some five to seven times. This is hardly surprising as IV estimators, although consistent, are bound to be inefficient.

The instruments employed seem to be valid. The first stage t-statistics and the associated F-test for the instruments indicate that the latter are relevant and strong enough in the model with the share of women directors (the underidentification test, test for weak

[29] We use three out of four candidate instruments – the instrumental variable *fem_board_reg* (share of women directors in the other sampled firms from the same region) is dropped because it causes the test for instrument exogeneity (Hansen J test) to reject in most specifications.

[30] In particular, the quadratic specification and specifications with several gender dummy variables suffer from severe multicollinearity leading to statistically insignificant coefficients.

instruments, and for overidentifying restrictions are all passed). The model with the dummy for at least three women directors passes the underidentification test, but faces the problem of weak instruments.[31] The test for endogeneity of the gender variables delivers mixed results, as there is evidence of endogeneity in five out of 12 specifications reported.

The random-effects IV regressions (not reported) show some statistically significant positive coefficients on the gender variables, at least for some performance measures. The first stage regressions – now exploiting not only within but also between variation in the instruments – are considerably stronger than in the fixed-effects case. However, the robust version of the Hausman test rejects the consistency of the random-effects model in most cases.

**4.3. Dynamic panel data models.** In order to tackle endogeneity from a different angle, we resort to dynamic panel data models where we account for potential persistency in firm financial performance as well as potential endogeneity of the key variables of interest. Some of the key results from this part of our analysis are shown in Table 6.

The main findings are as follows. First, the models generally pass the standard tests (Hansen test of overidentifying restrictions, Arrellano-Bond test for second-order autocorrelation of the residuals). Second, the coefficients on the lagged dependent variables are positive (usually below 0.5) and statistically significant, confirming the persistent nature of firm financial performance. Third, when we attempt to address endogeneity in the dynamic panel data setting, most of the previously reported results (in particular, those shown in Table 4) become statistically insignificant (this is similar to the findings in Wintoki et al. 2012). However, the model with the dummy for at least three women directors as the key regressor (Panel B) delivers positive and statistically significant coefficients in the specifications with the market-to-book ratio and Tobin's Q. Similarly, there is some evidence that board gender composition matters in the models with the quadratic in the share of female directors and two performance measures, the market-to-book ratio and one-year-ahead ROE. All in all, controlling for possible endogeneity of the appointment of female directors to corporate boards with the help of the system DPD estimator lends some support to the performance-improving effect of board gender diversity.[32]

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[31] This is hardly surprising as the fixed-effects 2SLS regressions exploit only the within variation in the instruments, for example, changes (rather than levels) in the share of women in industry, and these within-industry changes are rather small, especially on a year-to-year basis. In general, the instruments at hand that characterize the supply side of women directors do a good job of predicting the share of female directors, but are less good at predicting the choice of a specific number of female directors – one, two, three or more – by the firm.

[32] There is an as yet unsettled debate concerning the applicability of dynamic panel data models and the relevant GMM estimators in corporate finance and governance studies. For example, while Wintoki et al. (2012) strongly argue in favor of these models and estimators, Dang et al. (2015) show that they are unreliable, as well as quite

**4.4. Cross-sectional models with the industry-level shock.** How does the effect of gender diversity vary depending on the economic environment? Several scholars advance and test the hypothesis that female directors may be particularly valuable in bad economic times (Liu et al. 2014). Following this literature, in the regressions reported in Tables 7 and 8 we explore the effect of the shock associated with the Great Recession on the performance of firms with different gender compositions on their corporate boards, as outlined in model (3) in the methodology section. Table 7 shows the OLS estimates for the industry-level shock in Russia, while Table 8 instruments the shock in Russia with a corresponding shock in Ukraine.

The results show that the shock variable is positively – and sometimes statistically significantly – correlated with the performance of firms in 2009, that the direct effect of the gender variables is either positive and statistically significant or statistically insignificant, and that the interaction terms of the shock and gender variables are mostly negative, and statistically significant in some cases. The negative sign of the interaction terms is consistent with the hypothesis that women on the board help mitigate the effect of the negative economic shock. Since the models are non-linear, none of the coefficients discussed has a straightforward interpretation in terms of magnitude. To illustrate the effects estimated, Figures 3 and 4 plot the predictive margins for the share of female directors (corresponding to the results in Table 7 Panel A and Table 8 Panel A, respectively). For example, Panel B of Figure 3 suggests that in the absence of shocks (value 1 on the horizontal axis "shock"), the effect of female directors is essentially nil. Considering two similar firms from an industry that faced a substantial shock, say a 20% decline in output in 2008-2009 (corresponding to value 0.8 on the horizontal axis), a firm that had a higher share of female directors, say by 10%, would have a higher Tobin's Q by 0.043 (one-tenth of the difference in the predictions for shock=1 and shock=0.8) compared to the other firm. Such statistically significant effects are visible in Figure 3 (Panels A and B) and Figure 4 (Panels B and C).

**4.5. Quantile regressions.** As discussed in Section 3, quantile regressions may be instrumental in providing additional insights into the role of women directors during bad economic times. Some of the key results pertaining to our quantile regression analysis are reported in Tables 9 and 10. In contrast to the previously reported estimates, each table now shows the effects of a particular measure of gender diversity, the panels correspond to various performance measures, while the columns indicate the quantiles at which we estimate the effects of interest (we consider seven percentiles: 0.05, 0.10, 0.25, 0.50, 0.75, 0.90, 0.95).

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sensitive to the presence of unobserved heterogeneity, residual serial correlation, and changes in control parameters.

According to the results shown in Table 9, statistically significant coefficients on the share of women directors are found only in the regressions with ROE, ROE(t+1), and ROA(t+1). They are positive and located at lower quantiles of the conditional distribution of firm performance, suggesting that increasing the share of women directors is beneficial to firms experiencing economic difficulties.

Table 10 shows the results for the variable *least_three_women* and is perhaps the most interesting in this part of our analysis. As in the case of the share of female directors, there is a positive and statistically significant effect of appointing at least three women directors on accounting-based performance measures at their lower quantiles. In fact, the effect is the strongest and most robust for this measure of gender diversity on corporate boards. Again, these results are in line with the idea that appointing more female directors is beneficial to firms experiencing economic problems. Note, however, the large magnitudes of the statistically insignificant coefficients at upper quantiles in the regressions with accounting-based performance measures. Also, there is a positive effect of the dummy for at least three women on the market-based performance measures, but at the middle and upper quantiles. Overall, while the evidence is mixed, it does provide some support for the idea that appointing more female directors is beneficial to poorly performing companies.

In sum, based on multiple identification approaches, alternative measures of gender diversity, and several performance measures, we find some evidence that the gender composition of corporate boards in Russian companies is economically important. In particular, most regressions hint at the positive performance effects of having three or more women on the board. These results can be viewed as a new piece of evidence, from an important emerging market, complementing a number of recent studies, such as Joecks et al. (2013) and Schwartz-Ziv (2017) that find support for Kanter's critical mass theory.

There are two caveats to consider here.[33] One stems from our limited attention to the issue of corporate risk. In general, if women directors can reduce the firm's exposure to risk, the impact of board gender diversity on risk-adjusted measures of performance can be greater than on raw measures of performance. While data limitations do not allow us to address this conjecture properly, there is some indirect evidence in its support. In particular, regressions with leverage as the dependent variable show that leverage declines with the fraction of female directors on the board, at least until the latter reaches the 33% point.[34] This indicates that greater gender diversity in Russian companies may be associated with lower corporate risk and, as a consequence, higher risk-adjusted corporate performance. In other words, our

[33] We thank the anonymous reviewer for pointing out these important issues.
[34] These results are available from the authors on request.

results could have been stronger, if the data permitted the addition of appropriate controls for corporate risk.

The other caveat concerns the interpretation of non-linearity in the relationship between board gender diversity and firm performance, especially the absence of any effect of appointing one woman to the board. Given the concentrated ownership structure of Russian listed firms, it is plausible that a woman director added to the board may be related to insiders controlling large stakes of the firm. Therefore, a single woman director (when related to insiders) may be ineffective not because she is a woman, but simply because she is related to insiders. While the data at hand prevent us from running a convincing test for this hypothesis, several facts seem to support it. In particular, while the appointment of one female director does not affect board independence (more precisely, "outsiderness"), appointing two, three or more female directors is strongly associated with greater board independence. Moreover, employing a more detailed taxonomy of directors (distinguishing between outside vs. inside female directors) in the baseline specification shows that only outside female directors (and not inside ones) improve firm performance.[35] It may indeed be the case that a single female director is ineffective because she is related to large shareholders.

## 5. Conclusion

This paper studies economic effects of gender diversity on corporate boards in publicly-traded companies in Russia. While the main research question – What is the relation between the gender composition of corporate boards and company performance? – is not new, the paper adds to the existing literature by using a novel and rich panel dataset, exploring multiple identification approaches, employing various measures of gender diversity on corporate boards, and relying on multiple indicators of firm performance.

We first document a steady increase in the proportion of female directors on the boards of Russian publicly-traded companies, from 8% to 14% between 1998 and 2014. Yet, even in 2014, some 35% of the companies had no women on the board. We also document substantial differences between key characteristics of male and female directors. In particular, male directors are, on average, five years older than their female counterparts, more likely to be insiders in their companies, and occupy more posts (have multiple directorships) in the sampled firms. Moreover, we show that gender diversity variables are strongly correlated with a number of key variables describing the firm's governance structure, stressing the importance of control variables in econometric analysis.

[35] These results are available from the authors on request.

Regarding the performance effects of gender diversity, there is some evidence that appointing female directors to corporate boards improves firm performance. This finding seems not to apply to situations where firms appoint just one woman to the board. Our results suggest that for the positive effect of gender diversity to be realized, firms must have at least three women on the board. In addition, the data lend some support to the hypothesis that gender-diverse corporate boards are particularly valuable in bad economic times, associated with industry-level or general macro shocks. Although the results from any of the models taken separately can hardly be viewed as fully convincing, the big picture arising from the whole analysis implies a positive role for corporate board gender diversity and the importance of critical mass.

Our analysis has several limitations. We acknowledge the limits of interpreting our findings in the causal sense, even though we controlled for various important firm characteristics, including those unobserved by the researcher (via fixed- and random-effects), relied on instrumental variables methods, and resorted to a dynamic panel data analysis tackling endogeneity with the help of instruments from within the panel dataset. There is ample room for further research tackling endogeneity with the help of either exogenous shocks to corporate governance variables or more conventional (and convincing) instrumental variables.

Next, while providing thorough evidence on the performance effect of the gender composition of corporate boards, our study cannot be categorical about the channels propagating the effect. This is left for future research based on more detailed and comprehensive data.

Further, due to data limitations, we have not addressed the issue of corporate risk. If women directors reduce the firm's risk exposure, the impact of board gender diversity on firm performance is likely to be more pronounced when risk-adjusted rather than raw measures of firm performance are employed. In other words, the use of risk-adjusted performance measures could have strengthened our key results.

Finally, there are some limitations on the generalization of our findings to other countries and settings. Most Russian companies have a two-tier board system, and our results pertain to the supervisory board (as opposed to the management board). The literature has long pointed out that women directors may be particularly well-suited to performing monitoring, controlling and other tasks typically assigned to supervisory boards (Adams and Ferreira 2009). In this context, it is not surprising to find that gender-diverse supervisory boards are associated with improved performance. Whether and to what extent this result holds for one-tier boards remains an open question. More evidence is needed on the potentially differential effects of women directors sitting on the supervisory and management boards, especially from countries that allow both one- and two- tier boards.

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**FIGURES**

**Figure 1. Percentage of women directors in the companies sampled.**

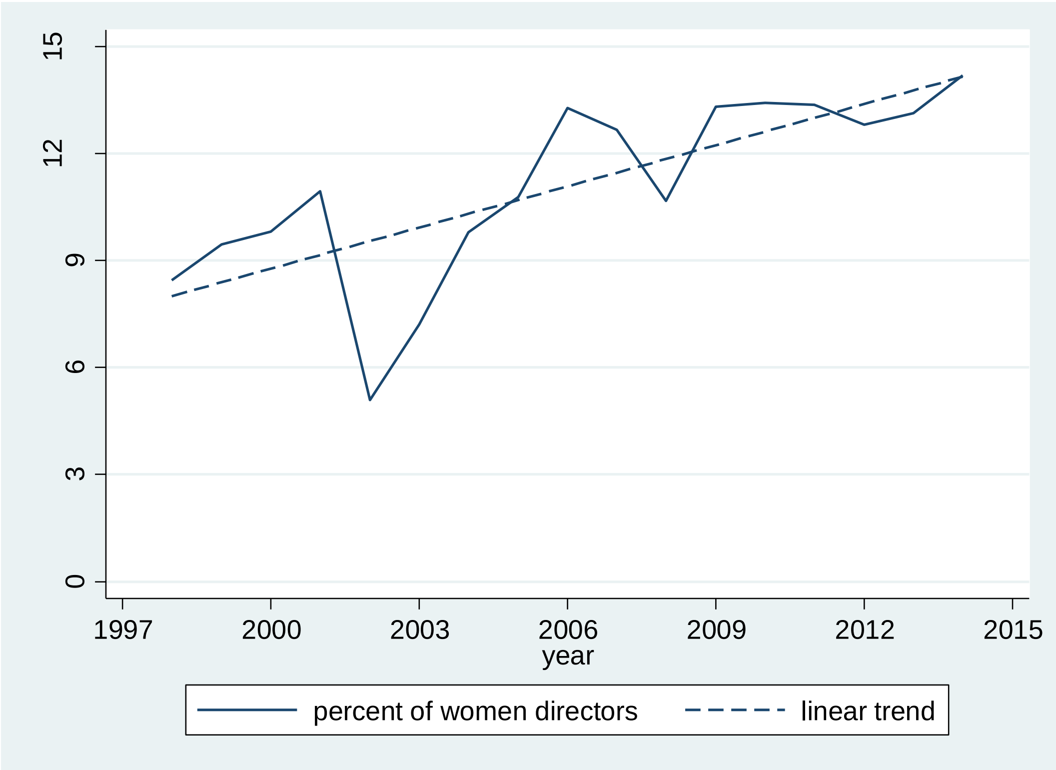


**Figure 2. Percentage of companies with different numbers of women directors on the board.**

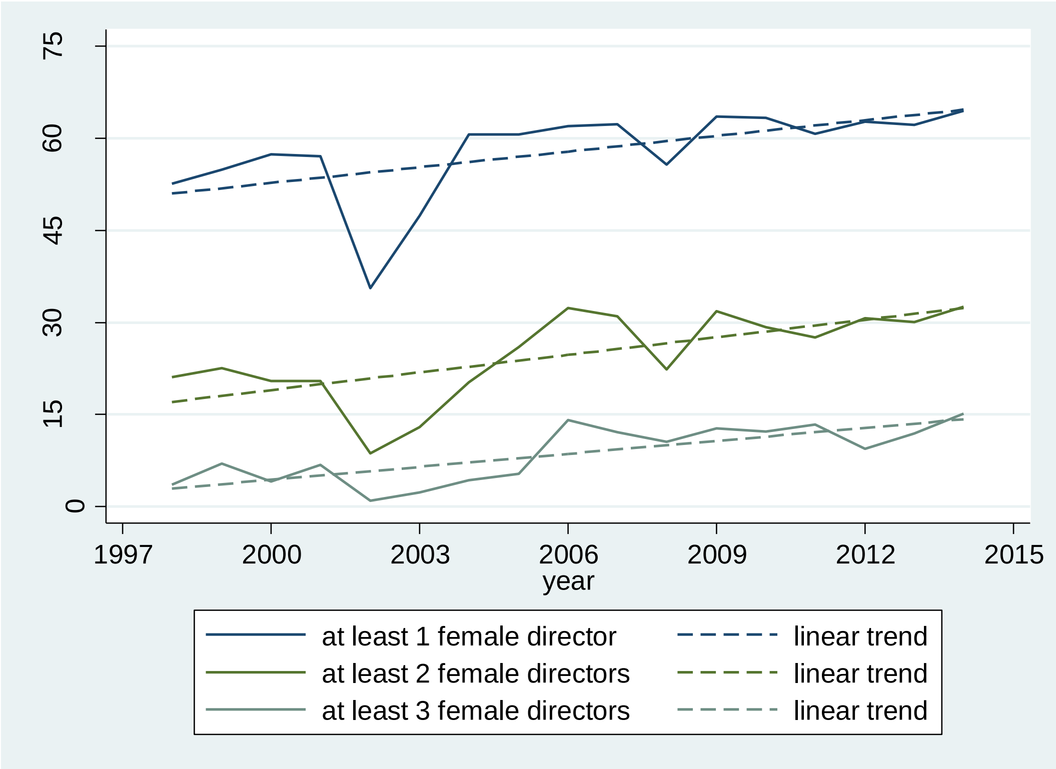
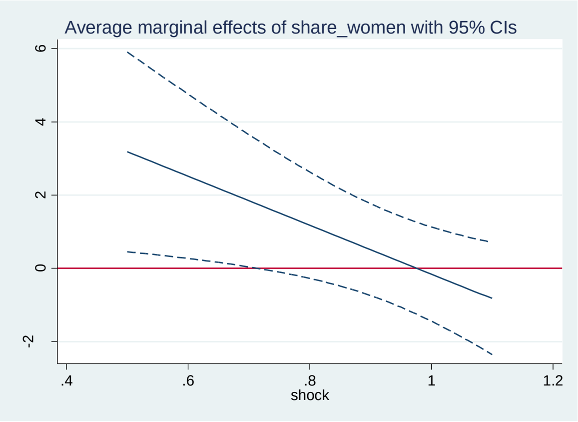
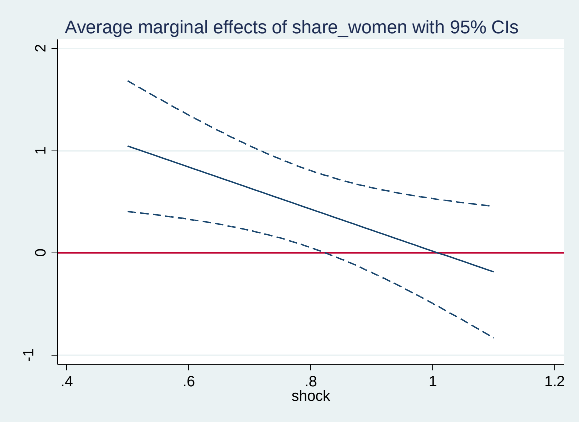


**Figure 3. Predictive margins for the share of women directors and different performance measures.**

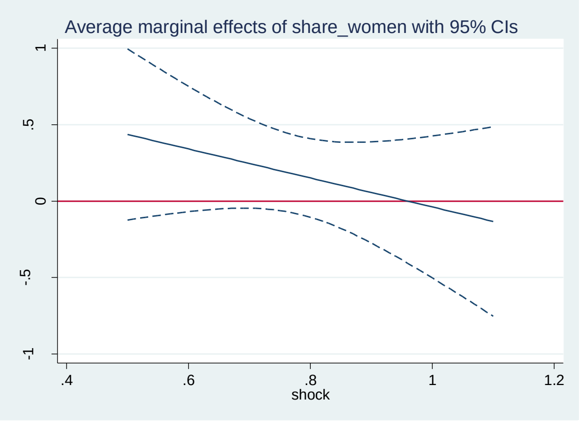
**Panel A. Market-to-book ratio.**




**Panel B. Tobin's Q.**




**Panel C. ROE.**




**Panel D. ROA.**

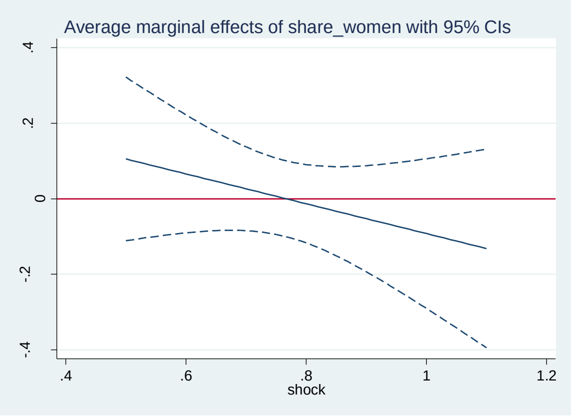
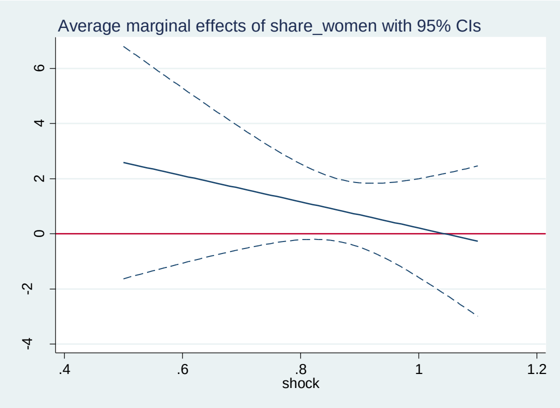
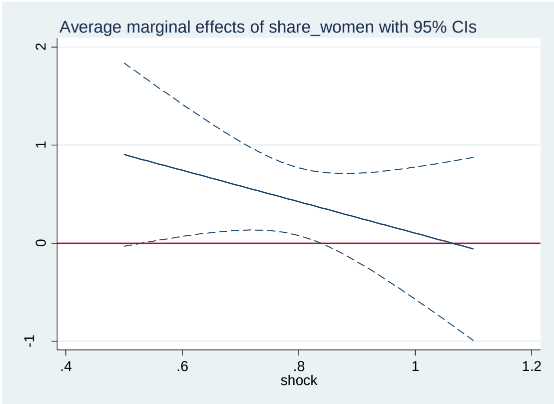


**Figure 4. Predictive margins for the share of women directors and different performance measures, IV estimation.**

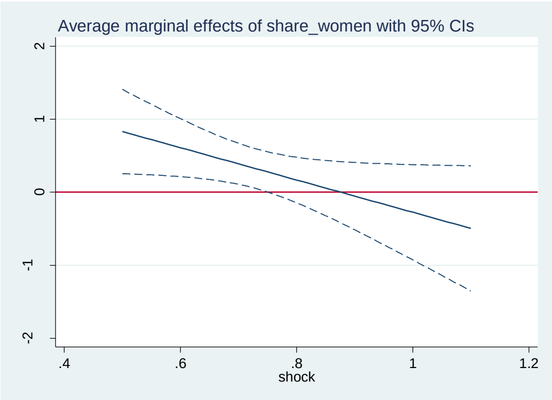
**Panel A. Market-to-book ratio.**



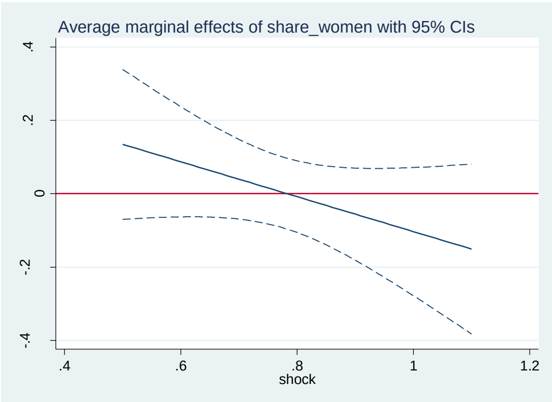

**Panel B. Tobin's Q.**




**Panel C. ROE.**




**Panel D. ROA.**



## TABLES

### Table 1. Descriptive statistics for the variables used in regression analysis.

| variable | definition | mean | sd | min | p50 | max |
|---|---|---|---|---|---|---|
| share_women | Share of female directors in the firm | 0.117 | 0.134 | 0 | 0.091 | 1 |
| one_woman | Dummy for 1 female director | 0.331 | 0.471 | 0 | 0 | 1 |
| two_women | Dummy for 2 female directors | 0.165 | 0.371 | 0 | 0 | 1 |
| three_women | Dummy for 3 female directors | 0.065 | 0.247 | 0 | 0 | 1 |
| least_four_women | Dummy for 4 or more female directors | 0.032 | 0.176 | 0 | 0 | 1 |
| no_directors | Number of directors in the firm | 8.973 | 2.318 | 5 | 9 | 23 |
| dir_insiders | Share of director-insiders | 0.213 | 0.188 | 0 | 0.143 | 1 |
| dir_governm | Share of directors who are government representatives | 0.048 | 0.089 | 0 | 0 | 0.667 |
| dir_stake | Total ownership stake of the board members | 0.023 | 0.094 | 0 | 0 | 0.895 |
| dir_age | Average age of the board members | 45.436 | 6.139 | 27.400 | 45.333 | 68.091 |
| CEO_stake | Ownership stake of the CEO | 0.009 | 0.050 | 0 | 0 | 0.560 |
| unitary_CEO | Dummy for a unitary CEO (no management board) | 0.473 | 0.499 | 0 | 0 | 1 |
| no_managers | Number of managers in the management board | 5.512 | 5.507 | 1 | 4 | 49 |
| owner1_stake | Ownership stake of the largest shareholder | 0.519 | 0.208 | 0.068 | 0.490 | 1 |
| owner2_stake | Ownership stake of the second largest shareholder | 0.164 | 0.109 | 0 | 0.160 | 0.500 |
| state_support_08 | Dummy for companies eligible for state support in 2008 | 0.027 | 0.162 | 0 | 0 | 1 |
| state_support_09 | Dummy for companies eligible for state support in 2009 | 0.027 | 0.163 | 0 | 0 | 1 |
| leverage | Financial leverage, debt to total assets | 0.453 | 0.244 | 0.035 | 0.429 | 1.209 |
| liquidity | Measure of liquidity, 1-(bid-ask) | 0.852 | 0.220 | 0 | 0.953 | 1 |
| adr | Dummy for companies with ADRs | 0.114 | 0.318 | 0 | 0 | 1 |
| size | Size of the firm, natural logarithm of sales | 14.275 | 2.196 | 0.242 | 14.337 | 23.670 |
| MtB | Market value of equity to book value of equity | 1.403 | 1.574 | 0.051 | 0.866 | 7.514 |
| Tobin's Q | Tobin's Q: Market value of equity plus book value of debt to book value of assets | 1.099 | 0.678 | 0.259 | 0.947 | 3.682 |
| ROE | Net profit to year-average book value of equity | 0.101 | 0.226 | -0.701 | 0.065 | 0.839 |
| ROA | EBIT to year-average book value of assets | 0.092 | 0.116 | -0.143 | 0.066 | 0.502 |
| shock | Output in industry j in Q3 2009 divided by output in industry j in Q3 2008, Russia | 0.813 | 0.217 | 0.137 | 0.862 | 1.028 |
| shock_Ukraine | Output in industry j in Q3 2009 divided by output in industry j in Q3 2008, Ukraine | 0.815 | 0.142 | 0.192 | 0.863 | 1.016 |
| fem_empl_ind | Share of women employed in an industry | 0.436 | 0.139 | 0.167 | 0.387 | 0.831 |
| fem_male_ratio | Female to male employment ratio in a region | 0.860 | 0.029 | 0.758 | 0.859 | 1.007 |
| fem_board_ind | Share of women-directors in the other sampled firms of the same industry | 0.129 | 0.064 | 0 | 0.132 | 0.800 |
| fem_board_reg | Share of women-directors in the other sampled firms of the same region | 0.127 | 0.052 | 0 | 0.119 | 0.519 |

Note: N=2830.

**Table 2. Correlation table for the key variables.**

| No. | variable | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) | (16) | (17) | (18) | (19) | (20) | (21) | (22) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (1) | share_women | 1.00 | | | | | | | | | | | | | | | | | | | | | |
| (2) | one_woman | 0.01 | 1.00 | | | | | | | | | | | | | | | | | | | | |
| (3) | two_women | 0.40* | -0.31* | 1.00 | | | | | | | | | | | | | | | | | | | |
| (4) | three_women | 0.46* | -0.19* | -0.12* | 1.00 | | | | | | | | | | | | | | | | | | |
| (5) | least_four_women | 0.51* | -0.13* | -0.08* | -0.05 | 1.00 | | | | | | | | | | | | | | | | | |
| (6) | no_directors | -0.18* | 0.01 | -0.02 | 0.01 | 0.03 | 1.00 | | | | | | | | | | | | | | | | |
| (7) | dir_insiders | -0.08* | 0.02 | -0.05* | -0.05* | -0.07* | -0.08* | 1.00 | | | | | | | | | | | | | | | |
| (8) | dir_governm | -0.09* | 0.03 | 0.00 | -0.04 | -0.07* | 0.26* | 0.02 | 1.00 | | | | | | | | | | | | | | |
| (9) | dir_stake | 0.02 | 0.02 | 0.01 | -0.02 | -0.02 | -0.13* | 0.17* | -0.09* | 1.00 | | | | | | | | | | | | | |
| (10) | dir_age | -0.32* | -0.01 | -0.17* | -0.15* | -0.15* | 0.09* | 0.34* | 0.13* | 0.08* | 1.00 | | | | | | | | | | | | |
| (11) | CEO_stake | -0.02 | -0.02 | -0.02 | -0.02 | -0.02 | -0.14* | 0.11* | -0.07* | 0.62* | 0.03 | 1.00 | | | | | | | | | | | |
| (12) | unitary_CEO | 0.14* | -0.07* | 0.03 | 0.07* | 0.07* | -0.31* | 0.02 | -0.21* | 0.06* | -0.17* | 0.06* | 1.00 | | | | | | | | | | |
| (13) | no_managers | -0.18* | 0.06* | -0.05 | -0.07* | -0.10* | 0.40* | 0.05* | 0.30* | -0.07* | 0.24* | -0.06* | -0.78* | 1.00 | | | | | | | | | |
| (14) | owner1_stake | 0.04 | -0.00 | -0.01 | -0.02 | 0.03 | -0.22* | -0.14* | -0.12* | -0.17* | -0.06* | -0.10* | 0.21* | -0.25* | 1.00 | | | | | | | | |
| (15) | owner2_stake | 0.03 | 0.01 | 0.04 | 0.05* | -0.01 | 0.08* | -0.09* | 0.02 | 0.09 | -0.14* | 0.06* | -0.14* | 0.09* | -0.35* | 1.00 | | | | | | | |
| (16) | leverage | 0.11* | -0.08* | 0.04 | 0.08* | 0.07* | -0.03 | -0.02 | -0.01 | 0.05 | -0.08* | 0.01 | 0.20* | -0.13* | 0.00 | 0.02 | 1.00 | | | | | | |
| (17) | liquidity | -0.14* | 0.01 | -0.06* | -0.04 | -0.04 | 0.15* | -0.02 | 0.04 | -0.01 | 0.09* | 0.04 | -0.13* | 0.10* | 0.06* | 0.01 | -0.06* | 1.00 | | | | | |
| (18) | adr | -0.03 | 0.03 | -0.01 | -0.03 | 0.04 | 0.19* | -0.02 | 0.09* | -0.02 | 0.13* | -0.01 | -0.19* | 0.22* | -0.10* | 0.02 | -0.09* | 0.16* | 1.00 | | | | |
| (19) | size | -0.28* | -0.03 | -0.09* | -0.07* | -0.10* | 0.39* | 0.01 | 0.17* | -0.14* | 0.18* | -0.10* | -0.24* | 0.29* | 0.01 | -0.02 | 0.11* | 0.35* | 0.17* | 1.00 | | | |
| (20) | MtB | 0.07* | -0.04 | -0.00 | 0.06* | 0.06* | -0.09* | -0.06* | -0.06* | 0.10* | -0.10* | 0.08* | 0.10* | -0.13* | 0.04 | 0.09* | 0.29* | 0.14* | 0.03 | 0.00 | 1.00 | | |
| (21) | Tobin's Q | 0.01 | -0.03 | -0.02 | 0.03 | 0.02 | -0.06* | -0.04 | -0.07* | 0.10* | -0.05 | 0.09* | 0.07* | -0.10* | 0.07* | 0.07* | 0.13* | 0.19* | 0.08* | 0.02 | 0.84* | 1.00 | |
| (22) | ROE | 0.06* | 0.01 | -0.00 | 0.04 | 0.05 | -0.04 | 0.03 | -0.00 | 0.02 | -0.02 | -0.00 | 0.05 | -0.04 | 0.02 | -0.01 | 0.03 | 0.06* | -0.00 | 0.14* | 0.20* | 0.20* | 1.00 |
| (23) | ROA | -0.03 | 0.01 | -0.02 | -0.02 | 0.00 | -0.03 | 0.08* | 0.01 | 0.00 | 0.06* | -0.01 | 0.01 | -0.01 | 0.02 | -0.06* | -0.11* | 0.07* | 0.01 | 0.17* | 0.15* | 0.25* | 0.80* |

Note: N=2830. Asterisks mark correlations that are statistically significant at the 0.1% level.

**Table 3. Comparison between key characteristics of male and female directors.**

**Panel A. Female directors.**

| variable | mean | sd | min | p50 | max | N |
|---|---|---|---|---|---|---|
| age | 41.32 | 10.29 | 22 | 40 | 83 | 2704 |
| equity stake | 0.209 | 2.236 | 0 | 0 | 51 | 2816 |
| Russian | 0.991 | 0.092 | 0 | 1 | 1 | 2819 |
| insider | 0.143 | 0.350 | 0 | 0 | 1 | 2819 |
| government-related | 0.056 | 0.231 | 0 | 0 | 1 | 2819 |
| no. of posts held | 1.896 | 1.927 | 1 | 1 | 16 | 2819 |

**Panel B. Male directors.**

| variable | mean | sd | min | p50 | max | N |
|---|---|---|---|---|---|---|
| age | 46.13 | 11.03 | 21 | 46 | 85 | 22037 |
| equity stake | 0.265 | 2.448 | 0 | 0 | 56 | 22530 |
| Russian | 0.936 | 0.245 | 0 | 1 | 1 | 22549 |
| insider | 0.217 | 0.412 | 0 | 0 | 1 | 22549 |
| government-related | 0.053 | 0.225 | 0 | 0 | 1 | 22549 |
| no. of posts held | 1.988 | 2.483 | 1 | 1 | 35 | 22549 |

Note. Statistically significant: differences between male and female directors in age, nationality, insider status (at the 1% level in a two-sided test), and the number of posts held (at the 10% level in a two-sided test).

**Table 4. Fixed-effects regressions with different gender variables and different performance indicators.**

**Panel A. Share of women directors.**

| | (1) MtB | (2) Tobin's Q | (3) ROE | (4) ROA | (5) ROE(t+1) | (6) ROA(t+1) |
|---|---|---|---|---|---|---|
| share_women | 0.687** | 0.302** | 0.090* | -0.001 | 0.086 | -0.008 |
| | (0.325) | (0.140) | (0.050) | (0.026) | (0.058) | (0.029) |
| $R^2$ | 0.218 | 0.300 | 0.088 | 0.159 | 0.072 | 0.100 |

**Panel B. Quadratic in the share of women directors.**

| | (1) MtB | (2) Tobin's Q | (3) ROE | (4) ROA | (5) ROE(t+1) | (6) ROA(t+1) |
|---|---|---|---|---|---|---|
| share_women | -0.182 | -0.119 | 0.099 | -0.001 | 0.115 | -0.029 |
| | (0.579) | (0.258) | (0.108) | (0.046) | (0.123) | (0.054) |
| share_women2 | 2.108 | 1.020* | -0.021 | -0.002 | -0.072 | 0.052 |
| | (1.462) | (0.575) | (0.216) | (0.106) | (0.240) | (0.114) |
| $R^2$ | 0.219 | 0.302 | 0.088 | 0.159 | 0.072 | 0.100 |
| Test: share_women=0, share_women2=0 | | | | | | |
| Chi2 | 2.518 | 3.442 | 1.604 | 0.001 | 1.105 | 0.143 |
| p-value | 0.082 | 0.033 | 0.202 | 0.999 | 0.332 | 0.867 |

**Panel C. Regressions with dummies for one, two, three, and at least four women directors.**

| | (1) MtB | (2) Tobin's Q | (3) ROE | (4) ROA | (5) ROE(t+1) | (6) ROA(t+1) |
|---|---|---|---|---|---|---|
| one_woman | 0.046 | 0.007 | 0.006 | -0.000 | 0.003 | -0.004 |
| | (0.067) | (0.031) | (0.012) | (0.006) | (0.014) | (0.007) |
| two_women | -0.034 | -0.008 | 0.020 | 0.002 | 0.025 | -0.001 |
| | (0.082) | (0.039) | (0.018) | (0.007) | (0.021) | (0.009) |
| three_women | 0.402*** | 0.154** | 0.043* | -0.002 | 0.031 | -0.010 |
| | (0.145) | (0.061) | (0.022) | (0.009) | (0.025) | (0.011) |
| least_four_women | 0.363* | 0.145* | 0.052* | 0.004 | 0.051 | 0.011 |
| | (0.214) | (0.082) | (0.031) | (0.018) | (0.032) | (0.020) |
| $R^2$ | 0.222 | 0.303 | 0.089 | 0.159 | 0.073 | 0.101 |
| Test: three_women=least_four_women | | | | | | |
| Chi2 | 0.035 | 0.012 | 0.086 | 0.129 | 0.325 | 1.283 |
| p-value | 0.851 | 0.911 | 0.769 | 0.720 | 0.569 | 0.258 |

Note: The reported results are obtained using the fixed-effects estimator with cluster-robust standard errors (clustering on firms). All regressions include an extended set of control variables (no_directors, dir_insiders, dir_governm, dir_stake, dir_age, unitary_CEO, no_managers, CEO_stake, owner1_stake, owner2_stake, leverage, liquidity, adr, size, st_supp08, st_supp09) and time dummies. Standard errors are in parentheses. The within-$R^2$ is reported. Asterisks indicate significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The number of observations is 2830 in columns 1-4 and 2524 in columns 5 and 6.

**Table 5. Panel instrumental variables fixed-effects regressions with different performance indicators.**

**Panel A. Share of women directors as key regressor.**

| | (1) MtB | (2) Tobin's Q | (3) ROE | (4) ROA | (5) ROE(t+1) | (6) ROA(t+1) |
|---|---|---|---|---|---|---|
| share_women | 0.500 | 1.889* | 0.250 | 0.513** | 0.310 | 0.334* |
| | (2.134) | (1.089) | (0.406) | (0.208) | (0.331) | (0.180) |
| Underident. test, Chi2 | 26.450 | 26.450 | 26.450 | 26.450 | 27.312 | 27.300 |
| p-value | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Weak ident. test, F-stat | 10.452 | 10.452 | 10.452 | 10.452 | 11.788 | 11.650 |
| Overid. restrictions, Chi2 | 1.348 | 1.353 | 3.864 | 1.526 | 0.511 | 0.551 |
| p-value | 0.510 | 0.508 | 0.145 | 0.466 | 0.774 | 0.759 |
| Endogeneity test, Chi2 | 0.019 | 2.793 | 0.019 | 5.267 | 0.492 | 3.269 |
| p-value | 0.890 | 0.095 | 0.891 | 0.022 | 0.483 | 0.071 |

**Panel B. Dummy for at least three women directors as key regressor.**

| | (1) MtB | (2) Tobin's Q | (3) ROE | (4) ROA | (5) ROE(t+1) | (6) ROA(t+1) |
|---|---|---|---|---|---|---|
| least_three_women | -0.307 | 3.331 | 0.191 | 0.342** | 0.328 | 0.250* |
| | (4.436) | (4.055) | (0.345) | (0.168) | (0.398) | (0.149) |
| Underident. test, Chi2 | 8.884 | 8.884 | 8.884 | 8.884 | 11.242 | 11.573 |
| p-value | 0.064 | 0.064 | 0.064 | 0.064 | 0.024 | 0.021 |
| Weak ident. test, F-stat | 2.372 | 2.372 | 2.372 | 2.372 | 3.293 | 3.377 |
| Overid. restrictions, Chi2 | 5.709 | 3.624 | 4.014 | 1.559 | 5.157 | 3.699 |
| p-value | 0.127 | 0.305 | 0.260 | 0.669 | 0.161 | 0.296 |
| Endogeneity test, Chi2 | 0.180 | 1.918 | 0.047 | 4.741 | 0.686 | 2.818 |
| p-value | 0.671 | 0.166 | 0.828 | 0.029 | 0.407 | 0.093 |

Note: The reported results are obtained using the 2SLS fixed-effects estimator with cluster-robust standard errors. All regressions include an extended set of control variables (no_directors, dir_insiders, dir_governm, dir_stake, dir_age, unitary_CEO, no_managers, CEO_stake, owner1_stake, owner2_stake, leverage, liquidity, adr, size, st_supp08, st_supp09) and time dummies. Standard errors in parentheses. Asterisks indicate significance levels: $^{*}$ $p < 0.10$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$. The number of observations is 2830 in columns 1-4 and 2524 in columns 5 and 6. The excluded instruments are: fem_empl_ind, fem_male_ratio and fem_board_ind. The underidentification test reports Kleibergen-Paap rk LM statistic, the weak identification test - Kleibergen-Paap rk Wald F statistic. The test for overidentifying restrictions (test for instrument exogeneity) reports Hansen J-statistic.

**Table 6. System-GMM (dynamic panel data) regressions with different gender variables and different performance indicators.**

**Panel A. Share of women directors.**

| | (1)<br>MtB | (2)<br>Tobin's Q | (3)<br>ROE | (4)<br>ROA | (5)<br>ROE(t+1) | (6)<br>ROA(t+1) |
|---|---|---|---|---|---|---|
| Performance(t-1) | 0.453*** | 0.480*** | 0.291*** | 0.354*** | 0.317*** | 0.399*** |
| | (0.068) | (0.056) | (0.048) | (0.043) | (0.060) | (0.049) |
| share_women | 0.402 | 0.084 | 0.040 | -0.004 | 0.102 | 0.010 |
| | (0.723) | (0.319) | (0.125) | (0.058) | (0.134) | (0.055) |
| AB test for AR(2), z | -1.56 | -1.69 | -1.46 | -2.63 | -1.90 | -2.36 |
| p-value | 0.119 | 0.092 | 0.143 | 0.009 | 0.058 | |
| Hansen test, Chi2 | 92.48 | 91.57 | 79.48 | 91.02 | 79.11 | 69.82 |
| p-value | 0.052 | 0.060 | 0.255 | 0.065 | 0.112 | 0.319 |

**Panel B. Dummy for at least three women directors.**

| | (1)<br>MtB | (2)<br>Tobin's Q | (3)<br>ROE | (4)<br>ROA | (5)<br>ROE(t+1) | (6)<br>ROA(t+1) |
|---|---|---|---|---|---|---|
| Performance(t-1) | 0.478*** | 0.515*** | 0.290*** | 0.342*** | 0.318*** | 0.418*** |
| | (0.069) | (0.061) | (0.048) | (0.047) | (0.061) | (0.048) |
| least_three_women | 0.617** | 0.207** | -0.044 | -0.029 | 0.010 | -0.013 |
| | (0.304) | (0.097) | (0.069) | (0.024) | (0.084) | (0.018) |
| AB test for AR(2), z | -1.61 | -1.59 | -1.35 | -2.58 | -1.83 | -2.26 |
| p-value | 0.107 | 0.111 | 0.178 | 0.010 | 0.067 | 0.024 |
| Hansen test, Chi2 | 91.58 | 79.65 | 66.58 | 75.64 | 70.67 | 68.84 |
| p-value | 0.051 | 0.225 | 0.627 | 0.331 | 0.265 | 0.317 |

**Panel C. Quadratic in the share of female directors.**

| | (1)<br>MtB | (2)<br>Tobin's Q | (3)<br>ROE | (4)<br>ROA | (5)<br>ROE(t+1) | (6)<br>ROA(t+1) |
|---|---|---|---|---|---|---|
| Performance(t-1) | 0.454*** | 0.504*** | 0.308*** | 0.379*** | 0.338*** | 0.438*** |
| | (0.066) | (0.055) | (0.054) | (0.044) | (0.064) | (0.046) |
| share_women | -2.779 | -0.187 | 0.150 | -0.047 | 0.579* | 0.137 |
| | (1.846) | (0.731) | (0.251) | (0.144) | (0.311) | (0.152) |
| share_women2 | 6.360** | 0.544 | -0.414 | -0.003 | -0.817 | -0.206 |
| | (3.050) | (1.205) | (0.444) | (0.250) | (0.600) | (0.311) |
| Test: share_women=0, share_women2=0 | | | | | | |
| Chi2 | 5.70 | 0.59 | 1.38 | 1.20 | 4.78 | 1.15 |
| p-value | 0.0579 | 0.7459 | 0.5007 | 0.5489 | 0.0916 | 0.5639 |
| AB test for AR(2), z | -1.60 | -1.63 | -1.33 | -2.47 | -1.43 | -2.16 |
| p-value | 0.109 | 0.103 | 0.185 | 0.013 | 0.154 | 0.031 |
| Hansen test, Chi2 | 116.42 | 119.82 | 107.95 | 109.33 | 100.97 | 98.47 |
| p-value | 0.140 | 0.098 | 0.300 | 0.268 | 0.245 | 0.303 |

Note: The reported results are obtained using the two-step system GMM estimator for dynamic panel data (DPD) with the second and third lags of the dependent variable and the second lag of the gender variables playing the role of instruments. All regressions include an extended set of control variables (no_directors, dir_insiders, dir_governm, dir_stake, dir_age, unitary_CEO, no_managers, CEO_stake, owner1_stake, owner2_stake, leverage, liquidity, adr, size, st_supp08, st_supp09) and time dummies. Robust standard errors are in parentheses. Asterisks indicate significance levels: $^{*}$ $p < 0.10$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$. The number of observations is 2215 in columns 1-4 and 1955 in columns 5 and 6. The tables report the Arellano-Bond (AB) test statistic for second-order autocorrelation in the residuals as well as the Hansen test of overidentifying restrictions (test for instrument exogeneity).

**Table 7. Regressions with different gender variables and different performance indicators, the 2008 shock in Russia.**

**Panel A. Regressions with share of female directors.**

| | (1) MtB(2009) | (2) Tobin's Q (2009) | (3) ROE(2009) | (4) ROA(2009) |
|---|---|---|---|---|
| Performance(2007) | 0.411*** | 0.451*** | 0.003 | 0.060 |
| | (0.118) | (0.061) | (0.085) | (0.080) |
| share_women | 6.516** | 2.072*** | 0.910 | 0.303 |
| | (2.622) | (0.701) | (0.689) | (0.276) |
| shock | 1.061** | 0.242** | 0.183 | 0.081 |
| | (0.502) | (0.117) | (0.161) | (0.063) |
| shock X share_women | -6.673** | -2.052** | -0.948 | -0.395 |
| | (2.722) | (0.847) | (0.868) | (0.355) |
| $R^2$ | 0.432 | 0.552 | 0.202 | 0.199 |

**Panel B. Regressions with the dummy for at least three female directors.**

| | (1) MtB(2009) | (2) Tobin's Q (2009) | (3) ROE(2009) | (4) ROA(2009) |
|---|---|---|---|---|
| Performance(2007) | 0.415*** | 0.454*** | 0.014 | 0.062 |
| | (0.111) | (0.056) | (0.083) | (0.081) |
| least_three_women | 3.783*** | 0.979** | 0.033 | -0.032 |
| | (1.297) | (0.408) | (0.178) | (0.080) |
| shock | 0.879** | 0.164 | 0.097 | 0.044 |
| | (0.392) | (0.126) | (0.139) | (0.065) |
| shock X least_three_women | -4.089*** | -1.044** | 0.046 | 0.055 |
| | (1.486) | (0.432) | (0.229) | (0.100) |
| $R^2$ | 0.443 | 0.553 | 0.199 | 0.195 |

Note: All regressions include an extended set of control variables (no_directors, dir_insiders, dir_governm, dir_stake, dir_age, unitary_CEO, no_managers, CEO_stake, owner1_stake, owner2_stake, leverage, liquidity, adr, size, st_supp09). Robust standard errors in parentheses. $^{*}$ $p < 0.10$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$. The number of observations is 189 in all regressions.

**Table 8. IV regressions with different gender variables and different performance indicators, the 2008 industry-level shock instrumented with data from Ukraine.**

**Panel A. Regressions with share of female directors.**

| | (1) MtB(2009) | (2) Tobin's Q (2009) | (3) ROE(2009) | (4) ROA(2009) |
|---|---|---|---|---|
| Performance(2007) | 0.409*** | 0.451*** | -0.005 | 0.059 |
| | (0.072) | (0.060) | (0.085) | (0.083) |
| share_women | 4.963 | 1.704 | 1.936* | 0.372 |
| | (4.997) | (1.381) | (1.015) | (0.373) |
| shock | 0.967 | 0.158 | 0.336* | 0.148*** |
| | (0.601) | (0.180) | (0.173) | (0.055) |
| shock X share_women | -4.753 | -1.603 | -2.210* | -0.476 |
| | (6.269) | (1.696) | (1.252) | (0.454) |
| Underident. test, Chi2 | 14.624 | 14.404 | 14.842 | 14.791 |
| p-value | 0.0001 | 0.0001 | 0.0001 | 0.0001 |

**Panel B. Regressions with the dummy for at least three female directors.**

| | (1) MtB(2009) | (2) Tobin's Q (2009) | (3) ROE(2009) | (4) ROA(2009) |
|---|---|---|---|---|
| Performance(2007) | 0.425*** | 0.458*** | 0.015 | 0.062 |
| | (0.069) | (0.059) | (0.085) | (0.083) |
| least_three_women | 6.039* | 1.302** | 0.263 | 0.068 |
| | (3.487) | (0.614) | (0.468) | (0.211) |
| shock | 0.731* | 0.055 | 0.166 | 0.114** |
| | (0.435) | (0.193) | (0.133) | (0.045) |
| shock X least_three_women | -6.811* | -1.433* | -0.231 | -0.066 |
| | (4.069) | (0.743) | (0.551) | (0.241) |
| Underident. test, Chi2 | 6.765 | 6.741 | 6.779 | 6.810 |
| p-value | 0.0093 | 0.0094 | 0.0092 | 0.0091 |

Note: All regressions include an extended set of control variables (no_directors, dir_insiders, dir_governm, dir_stake, dir_age, unitary_CEO, no_managers, CEO_stake, owner1_stake, owner2_stake, leverage, liquidity, adr, size, st_supp09). Robust standard errors in parentheses. $^{*}$ $p < 0.10$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$. The number of observations is 189 in all regressions. The excluded instruments are: shock_Ukraine and its interaction with the gender variable. The underidentification test reports Kleibergen-Paap rk LM statistic.

**Table 9. Quantile regressions with the share of women directors as the key regressor and various performance measures.**

**Panel A. Market-to-book ratio.**

| | (1) p5 | (2) p10 | (3) p25 | (4) p50 | (5) p75 | (6) p90 | (7) p95 |
|---|---|---|---|---|---|---|---|
| share_women | -0.055 | -0.145 | 0.017 | 0.214 | 0.040 | 0.373 | 1.243 |
| | (0.077) | (0.096) | (0.141) | (0.214) | (0.416) | (0.768) | (0.963) |
| $R^2$ | 0.120 | 0.130 | 0.176 | 0.218 | 0.238 | 0.223 | 0.200 |

**Panel B. Tobin's Q.**

| | (1) p5 | (2) p10 | (3) p25 | (4) p50 | (5) p75 | (6) p90 | (7) p95 |
|---|---|---|---|---|---|---|---|
| share_women | -0.003 | -0.056 | -0.014 | 0.067 | 0.092 | 0.018 | 0.057 |
| | (0.042) | (0.043) | (0.061) | (0.108) | (0.160) | (0.246) | (0.270) |
| $R^2$ | 0.106 | 0.136 | 0.190 | 0.234 | 0.253 | 0.221 | 0.205 |

**Panel C. ROE.**

| | (1) p5 | (2) p10 | (3) p25 | (4) p50 | (5) p75 | (6) p90 | (7) p95 |
|---|---|---|---|---|---|---|---|
| share_women | 0.141* | 0.103** | 0.016 | 0.027 | 0.007 | 0.104 | 0.105 |
| | (0.078) | (0.047) | (0.023) | (0.027) | (0.062) | (0.102) | (0.118) |
| $R^2$ | 0.017 | 0.033 | 0.073 | 0.091 | 0.079 | 0.043 | 0.036 |

**Panel D. ROA.**

| | (1) p5 | (2) p10 | (3) p25 | (4) p50 | (5) p75 | (6) p90 | (7) p95 |
|---|---|---|---|---|---|---|---|
| share_women | 0.054 | 0.037 | 0.002 | 0.010 | 0.034 | 0.018 | 0.083 |
| | (0.041) | (0.026) | (0.017) | (0.019) | (0.034) | (0.052) | (0.077) |
| $R^2$ | 0.125 | 0.125 | 0.182 | 0.206 | 0.211 | 0.189 | 0.165 |

**Panel E. ROE(t+1).**

| | (1) p5 | (2) p10 | (3) p25 | (4) p50 | (5) p75 | (6) p90 | (7) p95 |
|---|---|---|---|---|---|---|---|
| share_women | 0.116 | 0.142** | 0.027 | 0.007 | -0.009 | 0.014 | -0.001 |
| | (0.084) | (0.064) | (0.030) | (0.034) | (0.056) | (0.119) | (0.162) |
| $R^2$ | 0.021 | 0.028 | 0.075 | 0.085 | 0.070 | 0.045 | 0.030 |

**Panel F. ROA(t+1).**

| | (1) p5 | (2) p10 | (3) p25 | (4) p50 | (5) p75 | (6) p90 | (7) p95 |
|---|---|---|---|---|---|---|---|
| share_women | 0.077** | 0.033 | -0.009 | -0.003 | 0.019 | 0.001 | -0.061 |
| | (0.030) | (0.031) | (0.018) | (0.020) | (0.037) | (0.069) | (0.072) |
| $R^2$ | 0.084 | 0.099 | 0.153 | 0.176 | 0.189 | 0.169 | 0.149 |

Note: The reported results are obtained using quantile regressions with cluster-robust standard errors (clustering on firms). Estimates in columns 1, 2, … 7 correspond to the 5th, 10th, … , 95th percentile of the distribution of the dependent variables (denoted p5, p10, … p95), respectively. All regressions include an extended set of control variables (no_directors, dir_insiders, dir_governm, dir_stake, dir_age, unitary_CEO, no_managers, CEO_stake, owner1_stake, owner2_stake, leverage, liquidity, adr, size, st_supp09) as well as year, regional, and industry dummies. Standard errors in parentheses. Asterisks indicate significance levels: $^{*}$ $p < 0.10$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$. The number of observations is 2830 in Panels A-D and 2524 in Panels E and F.

**Table 10. Quantile regressions with the dummy for at least three female directors as the key regressor and various performance measures.**

**Panel A. Market-to-book ratio.**

| | (1)<br>p5 | (2)<br>p10 | (3)<br>p25 | (4)<br>p50 | (5)<br>p75 | (6)<br>p90 | (7)<br>p95 |
|---|---|---|---|---|---|---|---|
| least_three_women | -0.009 | -0.020 | 0.071 | 0.186** | 0.245 | 0.614 | 0.607 |
| | (0.033) | (0.043) | (0.066) | (0.083) | (0.173) | (0.518) | (0.457) |
| $R^2$ | 0.120 | 0.130 | 0.178 | 0.217 | 0.241 | 0.221 | 0.203 |

**Panel B. Tobin's Q.**

| | (1)<br>p5 | (2)<br>p10 | (3)<br>p25 | (4)<br>p50 | (5)<br>p75 | (6)<br>p90 | (7)<br>p95 |
|---|---|---|---|---|---|---|---|
| least_three_women | 0.005 | -0.022 | 0.006 | 0.086** | 0.144*** | 0.160 | 0.141 |
| | (0.016) | (0.017) | (0.026) | (0.036) | (0.055) | (0.136) | (0.136) |
| $R^2$ | 0.105 | 0.133 | 0.189 | 0.234 | 0.253 | 0.223 | 0.203 |

**Panel C. ROE.**

| | (1)<br>p5 | (2)<br>p10 | (3)<br>p25 | (4)<br>p50 | (5)<br>p75 | (6)<br>p90 | (7)<br>p95 |
|---|---|---|---|---|---|---|---|
| least_three_women | 0.054** | 0.043*** | 0.010 | 0.010 | 0.019 | 0.086 | 0.081* |
| | (0.026) | (0.014) | (0.009) | (0.011) | (0.036) | (0.063) | (0.046) |
| $R^2$ | 0.017 | 0.033 | 0.073 | 0.091 | 0.080 | 0.047 | 0.038 |

**Panel D. ROA.**

| | (1)<br>p5 | (2)<br>p10 | (3)<br>p25 | (4)<br>p50 | (5)<br>p75 | (6)<br>p90 | (7)<br>p95 |
|---|---|---|---|---|---|---|---|
| least_three_women | 0.032*** | 0.023*** | 0.005 | 0.001 | 0.009 | 0.015 | 0.038 |
| | (0.011) | (0.008) | (0.006) | (0.008) | (0.014) | (0.035) | (0.027) |
| $R^2$ | 0.123 | 0.131 | 0.183 | 0.204 | 0.211 | 0.190 | 0.165 |

**Panel E. ROE(t+1).**

| | (1)<br>p5 | (2)<br>p10 | (3)<br>p25 | (4)<br>p50 | (5)<br>p75 | (6)<br>p90 | (7)<br>p95 |
|---|---|---|---|---|---|---|---|
| least_three_women | 0.049 | 0.049* | 0.013 | 0.006 | 0.009 | 0.063 | 0.039 |
| | (0.047) | (0.026) | (0.009) | (0.013) | (0.021) | (0.066) | (0.076) |
| $R^2$ | 0.021 | 0.027 | 0.075 | 0.086 | 0.071 | 0.047 | 0.030 |

**Panel F. ROA(t+1).**

| | (1)<br>p5 | (2)<br>p10 | (3)<br>p25 | (4)<br>p50 | (5)<br>p75 | (6)<br>p90 | (7)<br>p95 |
|---|---|---|---|---|---|---|---|
| least_three_women | 0.030** | 0.017 | -0.000 | -0.006 | 0.007 | 0.024 | 0.002 |
| | (0.015) | (0.011) | (0.007) | (0.010) | (0.017) | (0.024) | (0.024) |
| $R^2$ | 0.084 | 0.095 | 0.152 | 0.175 | 0.189 | 0.170 | 0.149 |

Note: The reported results are obtained using quantile regressions with cluster-robust standard errors (clustering on firms). Estimates in columns 1, 2, … 7 correspond to the 5$^{th}$, 10$^{th}$, … , 95$^{th}$ percentile of the distribution of the dependent variables (denoted p5, p10, … p95), respectively. All regressions include an extended set of control variables (no_directors, dir_insiders, dir_governm, dir_stake, dir_age, unitary_CEO, no_managers, CEO_stake, owner1_stake, owner2_stake, leverage, liquidity, adr, size, st_supp09) as well as year, regional, and industry dummies. Standard errors in parentheses. Asterisks indicate significance levels: $^{*}$ $p < 0.10$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$. The number of observations is 2830 in Panels A-D and 2524 in Panels E and F.

# APPENDIX

**Table A1. Fixed-effects regressions with dummies for one, two, three and at least four women directors and different performance indicators. Full estimation results.**

| | (1)<br>MtB | (2)<br>Tobin's Q | (3)<br>ROE | (4)<br>ROA | (5)<br>ROE(t+1) | (6)<br>ROA(t+1) |
|---|---|---|---|---|---|---|
| one_woman | 0.046 | 0.007 | 0.006 | -0.000 | 0.003 | -0.004 |
| | (0.067) | (0.031) | (0.012) | (0.006) | (0.014) | (0.007) |
| two_women | -0.034 | -0.008 | 0.020 | 0.002 | 0.025 | -0.001 |
| | (0.082) | (0.039) | (0.018) | (0.007) | (0.021) | (0.009) |
| three_women | $0.402^{***}$ | $0.154^{**}$ | $0.043^{*}$ | -0.002 | 0.031 | -0.010 |
| | (0.145) | (0.061) | (0.022) | (0.009) | (0.025) | (0.011) |
| least_four_women | $0.363^{*}$ | $0.145^{*}$ | $0.052^{*}$ | 0.004 | 0.051 | 0.011 |
| | (0.214) | (0.082) | (0.031) | (0.018) | (0.032) | (0.020) |
| no_directors | 0.007 | 0.007 | -0.005 | -0.001 | 0.005 | 0.003 |
| | (0.029) | (0.015) | (0.006) | (0.003) | (0.005) | (0.003) |
| dir_insiders | -0.219 | -0.057 | -0.059 | $-0.039^{*}$ | $-0.156^{***}$ | $-0.067^{***}$ |
| | (0.217) | (0.103) | (0.044) | (0.023) | (0.049) | (0.022) |
| dir_governm | 0.551 | 0.101 | 0.029 | -0.024 | 0.010 | -0.043 |
| | (0.558) | (0.259) | (0.064) | (0.034) | (0.072) | (0.039) |
| dir_stake | $1.127^{**}$ | 0.388 | $0.304^{***}$ | $0.118^{**}$ | $0.223^{*}$ | $0.116^{*}$ |
| | (0.487) | (0.237) | (0.116) | (0.058) | (0.120) | (0.064) |
| dir_age | 0.004 | -0.000 | 0.000 | -0.001 | 0.001 | 0.000 |
| | (0.007) | (0.004) | (0.001) | (0.001) | (0.001) | (0.001) |
| unitary_CEO | -0.146 | -0.067 | -0.026 | -0.003 | $-0.045^{**}$ | -0.018 |
| | (0.128) | (0.058) | (0.023) | (0.012) | (0.022) | (0.013) |
| no_managers | $-0.016^{*}$ | -0.001 | 0.001 | 0.001 | 0.001 | 0.001 |
| | (0.009) | (0.004) | (0.002) | (0.001) | (0.002) | (0.001) |
| CEO_stake | $-2.705^{**}$ | -0.679 | -0.105 | -0.022 | $-0.259^{*}$ | $-0.185^{*}$ |
| | (1.077) | (0.486) | (0.136) | (0.078) | (0.140) | (0.098) |
| owner1_stake | 0.386 | 0.135 | 0.015 | 0.007 | -0.014 | 0.012 |
| | (0.240) | (0.093) | (0.034) | (0.018) | (0.038) | (0.020) |
| owner2_stake | $0.572^{*}$ | $0.245^{*}$ | $-0.083^{*}$ | -0.030 | 0.019 | 0.010 |
| | (0.308) | (0.135) | (0.047) | (0.025) | (0.061) | (0.031) |
| leverage | $2.122^{***}$ | $0.541^{***}$ | $-0.209^{***}$ | $-0.157^{***}$ | $0.101^{*}$ | -0.015 |
| | (0.321) | (0.120) | (0.045) | (0.023) | (0.054) | (0.028) |
| liquidity | $1.059^{***}$ | $0.486^{***}$ | 0.028 | $0.023^{*}$ | 0.040 | 0.015 |
| | (0.215) | (0.079) | (0.033) | (0.013) | (0.034) | (0.014) |
| adr | -0.151 | -0.005 | $-0.057^{***}$ | $-0.038^{***}$ | $-0.060^{***}$ | $-0.028^{**}$ |
| | (0.165) | (0.082) | (0.020) | (0.011) | (0.022) | (0.014) |
| size | $-0.179^{***}$ | $-0.071^{***}$ | $0.031^{***}$ | $0.021^{***}$ | -0.003 | -0.005 |
| | (0.049) | (0.026) | (0.006) | (0.003) | (0.005) | (0.004) |
| st_supp08 | $-0.486^{***}$ | $-0.325^{***}$ | 0.004 | -0.001 | -0.013 | -0.011 |
| | (0.185) | (0.071) | (0.037) | (0.016) | (0.030) | (0.013) |
| st_supp09 | 0.159 | 0.030 | -0.006 | -0.011 | $-0.100^{***}$ | $-0.040^{***}$ |
| | (0.135) | (0.059) | (0.030) | (0.013) | (0.028) | (0.012) |
| Test: three_women=least_four_women | | | | | | |
| Chi2 | 0.035 | 0.012 | 0.086 | 0.129 | 0.325 | 1.283 |
| p-value | 0.851 | 0.911 | 0.769 | 0.720 | 0.569 | 0.258 |
| $R^2$ | 0.222 | 0.303 | 0.089 | 0.159 | 0.073 | 0.101 |

Note: The reported results are obtained using the fixed effects estimator with cluster-robust standard errors (clustering on firms). All regressions include time dummies (not reported). Standard errors are in parentheses. The within-R2 is reported. Asterisks indicate significance levels: $^{*}$ $p < 0.10$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$. The number of observations is 2830 in Columns 1-4 and 2524 in Columns 5 and 6.

**Table A2. Random-effects regressions with the share of women directors on the board and different performance indicators. Full estimation results.**

| | (1) MtB | (2) Tobin's Q | (3) ROE | (4) ROA | (5) ROE(t+1) | (6) ROA(t+1) |
|---|---|---|---|---|---|---|
| share_women | 0.362 | 0.107 | 0.115** | 0.009 | 0.072 | -0.013 |
| | (0.294) | (0.125) | (0.046) | (0.023) | (0.048) | (0.026) |
| no_directors | -0.002 | 0.004 | -0.006* | -0.003 | -0.001 | 0.000 |
| | (0.024) | (0.013) | (0.004) | (0.002) | (0.004) | (0.002) |
| dir_insiders | -0.094 | 0.038 | 0.010 | 0.003 | -0.058 | -0.022 |
| | (0.194) | (0.092) | (0.035) | (0.019) | (0.038) | (0.018) |
| dir_governm | 0.337 | 0.042 | 0.066 | 0.010 | 0.034 | -0.015 |
| | (0.535) | (0.244) | (0.057) | (0.033) | (0.065) | (0.036) |
| dir_stake | 1.309** | 0.462* | 0.185** | 0.088** | 0.125* | 0.086* |
| | (0.598) | (0.249) | (0.079) | (0.042) | (0.075) | (0.045) |
| dir_age | -0.001 | 0.000 | -0.000 | -0.000 | 0.001 | 0.000 |
| | (0.007) | (0.003) | (0.001) | (0.001) | (0.001) | (0.001) |
| single_man | -0.039 | -0.018 | 0.009 | 0.009 | -0.009 | -0.003 |
| | (0.109) | (0.049) | (0.018) | (0.010) | (0.018) | (0.010) |
| no_managers | -0.012 | -0.001 | 0.000 | 0.001 | 0.001 | 0.001 |
| | (0.008) | (0.004) | (0.002) | (0.001) | (0.002) | (0.001) |
| CEO_stake | -1.163 | -0.144 | -0.078 | -0.017 | -0.077 | -0.092 |
| | (1.014) | (0.485) | (0.105) | (0.055) | (0.107) | (0.068) |
| owner1_stake | 0.343 | 0.145* | -0.011 | -0.005 | -0.021 | 0.006 |
| | (0.220) | (0.086) | (0.031) | (0.016) | (0.036) | (0.018) |
| owner2_stake | 0.610** | 0.240* | -0.052 | -0.035 | 0.043 | 0.003 |
| | (0.292) | (0.130) | (0.047) | (0.024) | (0.058) | (0.029) |
| leverage | 2.141*** | 0.506*** | -0.061* | -0.100*** | 0.055 | -0.027 |
| | (0.253) | (0.087) | (0.033) | (0.015) | (0.035) | (0.017) |
| liquidity | 1.246*** | 0.584*** | 0.030 | 0.018 | 0.054* | 0.023* |
| | (0.192) | (0.071) | (0.029) | (0.012) | (0.031) | (0.013) |
| adr | -0.027 | 0.046 | -0.038** | -0.029*** | -0.022 | -0.013 |
| | (0.145) | (0.080) | (0.016) | (0.010) | (0.015) | (0.010) |
| size | -0.120*** | -0.046*** | 0.024*** | 0.016*** | 0.011** | 0.004 |
| | (0.033) | (0.016) | (0.004) | (0.002) | (0.005) | (0.003) |
| st_supp08 | -0.455** | -0.309*** | -0.007 | -0.007 | -0.013 | -0.011 |
| | (0.186) | (0.071) | (0.035) | (0.015) | (0.029) | (0.013) |
| st_supp09 | 0.216 | 0.060 | -0.019 | -0.017 | -0.096*** | -0.038*** |
| | (0.137) | (0.059) | (0.029) | (0.013) | (0.027) | (0.012) |
| $R^2$ | 0.194 | 0.197 | 0.061 | 0.106 | 0.044 | 0.055 |
| Hausman test Chi2 | 79.9 | 120.4 | 103.9 | 119.4 | 91.5 | 132.0 |
| p-value | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

Note: The reported results are obtained using the random effects estimator with cluster-robust standard errors (clustering on firms). All regressions include time dummies (not reported). Standard errors are in parentheses. The overall-R2 is reported. Asterisks indicate significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The number of observations is 2830 in Columns 1-4 and 2524 in Columns 5 and 6.

**Table A3. Quantile regressions with the share of women directors on the board and ROE as performance indicator. Full estimation results.**

| | (1) p5 | (2) p10 | (3) p25 | (4) p50 | (5) p75 | (6) p90 | (7) p95 |
|---|---|---|---|---|---|---|---|
| share_women | 0.141* | 0.103** | 0.016 | 0.027 | 0.007 | 0.104 | 0.105 |
| | (0.078) | (0.047) | (0.023) | (0.027) | (0.062) | (0.102) | (0.118) |
| no_directors | -0.007 | -0.005 | -0.004*** | -0.004** | -0.003 | -0.005 | -0.008 |
| | (0.006) | (0.004) | (0.002) | (0.002) | (0.004) | (0.006) | (0.006) |
| dir_insiders | 0.006 | 0.017 | -0.001 | 0.010 | -0.040 | -0.062 | -0.014 |
| | (0.061) | (0.038) | (0.023) | (0.026) | (0.033) | (0.052) | (0.095) |
| dir_governm | 0.241*** | 0.140** | 0.028 | 0.006 | -0.050 | 0.035 | 0.057 |
| | (0.090) | (0.055) | (0.024) | (0.043) | (0.054) | (0.111) | (0.106) |
| dir_stake | 0.150 | 0.027 | 0.026 | 0.021 | 0.145 | 0.009 | 0.018 |
| | (0.136) | (0.087) | (0.055) | (0.051) | (0.094) | (0.121) | (0.622) |
| dir_age | 0.002 | 0.001 | 0.000 | -0.000 | -0.002* | -0.005** | -0.006*** |
| | (0.002) | (0.001) | (0.001) | (0.001) | (0.001) | (0.002) | (0.002) |
| unitary_CEO | 0.002 | 0.010 | 0.003 | -0.004 | 0.002 | 0.040 | 0.029 |
| | (0.037) | (0.018) | (0.012) | (0.012) | (0.017) | (0.035) | (0.032) |
| no_managers | 0.003 | 0.002 | -0.000 | -0.001 | -0.002** | -0.002 | -0.002 |
| | (0.003) | (0.002) | (0.001) | (0.001) | (0.001) | (0.001) | (0.003) |
| CEO_stake | -0.002 | 0.177 | 0.083 | 0.047 | -0.081 | -0.093 | -0.153 |
| | (0.396) | (0.146) | (0.092) | (0.093) | (0.198) | (0.253) | (0.612) |
| owner1_stake | -0.015 | -0.011 | -0.030* | 0.018 | 0.020 | 0.112* | 0.111* |
| | (0.059) | (0.037) | (0.017) | (0.020) | (0.034) | (0.061) | (0.058) |
| owner2_stake | -0.019 | -0.032 | -0.011 | 0.010 | 0.027 | -0.001 | 0.068 |
| | (0.079) | (0.040) | (0.025) | (0.031) | (0.055) | (0.086) | (0.133) |
| leveragew | -0.481*** | -0.290*** | -0.091*** | -0.016 | 0.083*** | 0.374*** | 0.530*** |
| | (0.074) | (0.056) | (0.018) | (0.022) | (0.031) | (0.087) | (0.068) |
| liquidity | 0.028 | -0.006 | 0.006 | 0.039** | 0.042 | 0.010 | 0.089 |
| | (0.080) | (0.031) | (0.013) | (0.017) | (0.028) | (0.068) | (0.063) |
| adr | -0.007 | -0.029 | -0.018* | -0.020 | -0.026* | -0.049* | -0.083** |
| | (0.029) | (0.024) | (0.011) | (0.013) | (0.015) | (0.026) | (0.036) |
| size | 0.027*** | 0.025*** | 0.018*** | 0.016*** | 0.021*** | 0.022*** | 0.016 |
| | (0.009) | (0.006) | (0.003) | (0.003) | (0.005) | (0.006) | (0.012) |
| st_supp08 | 0.073 | -0.031 | -0.019 | -0.023 | -0.007 | -0.002 | -0.046 |
| | (0.197) | (0.049) | (0.020) | (0.018) | (0.032) | (0.048) | (0.088) |
| st_supp09 | -0.015 | -0.007 | -0.023 | -0.014 | -0.012 | 0.002 | 0.018 |
| | (0.062) | (0.078) | (0.022) | (0.020) | (0.024) | (0.066) | (0.053) |
| $R^2$ | 0.017 | 0.033 | 0.073 | 0.091 | 0.079 | 0.043 | 0.036 |

Note: The reported results are obtained using quantile regressions with cluster-robust standard errors (clustering on firms). Estimates in Columns 1, 2, … 7 correspond to the 5$^{th}$, 10$^{th}$, … , 95$^{th}$ percentile of the distribution of the dependent variable (denoted p5, p10, … p95), respectively. All regressions include year, regional and industry dummies (not reported). Standard errors in parentheses. Asterisks indicate significance levels: $^{*}$ $p < 0.10$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$. The number of observations is 2830.