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STATE-BUSINESS RELATIONS AND FINANCIAL ACCESSIBILITY: EXPLAINING FIRM PERFORMANCE IN THE MENA REGION

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Working Paper No. 1279

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Abstract

This study investigates the triangular relationship among state-business relations, financial access and economic performance using firm-level data for selected Middle East and North African countries. We hypothesize that financial intermediation acts as a mediating factor in the relationship between state-business relations and firm performance. Employing a causal mediation analysis, our results show that inefficient ties with the state is a cause of poor firm performance. Depending on the performance measure, inefficient state-business relations reduce firm performance by about 2.3-4.4 percent through access to finance and by about 12 to 40 percent via its direct effect. About 3 to 16 percent of the total effect is mediated through financial access while the remaining is the direct effect of inefficient state-business relations on firm performance. Our results highlight that financial intermediation is a significant mediating factor in the mechanism between state-business relations and firm performance.

Keywords: Financial intermediation, causal mediation analysis, MENA, state-business relations

JEL Classifications: F65, O43

ملخص

تبحث هذه الدراسة في العلاقة الثلاثية بين علاقات الدولة والقطاع المالي؛ والإتاحة المالية ؛ والأداء الاقتصادي . باستخدام بيانات مستوى _rm لبلدان مختارة في الشرق الأوسط وشمال أفريقيا. نفترض أن الوساطة المالية تعمل كعامل وسيط في العلاقة بين علاقات الدولة التجارية وأداء _rm. من خلال استخدام تحليل الوساطة السببية ، تظهر نتائجنا أن العلاقات غير الفعالة مع الدولة هي سبب الأداء ضعف أداء _rm. ووفقًا لمقياس الأداء ، فإن العلاقات غير الفعالة بين الدولة وقطاع الأعمال تعمل على خفض أداء الشركة بحوالي 2.3-4.4 بالمائة من خلال الوصول إلى التمويل وبنحو 12 إلى 40 بالمائة عبر تأثيرها المباشر. تتم وساطة تقدر بحوالي 3 إلى 16 في المائة من التأثير الكلي من خلال الوصول إلى الموارد المالية في حين أن الباقي هو التأثير المباشر لعلاقات الدولة التجارية غير الفعالة على أداء الشركة. تسلط نتائجنا الضوء على أن الوساطة المالية هي عامل وساطة هام في الآلية العلاقات بين الدولة وأداء الشركة.

1 Introduction

Since the path-breaking contributions of North (1990), North (1994), Acemoğlu et al. (2001) and Rodrik et al. (2004), governance and institutions have been investigated intensely as a source of cross-country income differences. Rule of law, voice of accountability, level of democracy, absence of violence, lack of corruption etc. are widely studied among scholars. While these commonly used governance measures show the extent of institutional quality, a number of studies focuses more on state-business relations (henceforth SBR) in order to define the impact of state on business environment (Amsden, 1989; Evans, 1995; Haggard et al., 1997). Maxfield and Schneider (1997); Sen and Te Velde (2009) remark that state can support the business side through growth-enhancing channels such as; incentives to private capital, monitoring the use of private capital, enabling easier access to source and use of funds, etc. On the other hand, the relationship between state and firms can originate from simple crony associations rather than economic interactions (Kang, 2003; Chekir and Diwan, 2014). Overall, these discussions assert that the links between state and firms are important to understand firm performance. However, the direction of this effect is unclear and depends on the way these relations are constructed.

There are various micro aspects that affect firm performance, such as financial constraints and these factors can be integral parts of SBR (Chekir and Diwan, 2014). While financial repression may be a true cause for state failure from a micro perspective (McKinnon, 1973; Shaw, 1973), finance is an important element of industrial and firm development at the micro level (Demirgüç-Kunt and Maksimovic, 1998; Cleary, 1999). Strikingly, the influence of SBR and financial intermediation on firm performance has been studied separately and therefore little is known about the possible channels among these three different pillars. The impact of SBR on firm performance can work through various channels. Moreover, the strict assumption of exogeneity of financial accessibility can be highly sensitive to formal and informal links between firms and state institutions. For instance, formal and informal links with the state can bring opportunities for the firms in terms of accessing financial sources. While this brings crony growth-enhancing opportunities to politically connected firms, this might create an economic loss as the process discriminates other firms that have less political connections with the state. Therefore, a triangular relationship among finance, SBR and firm performance should be defined in order to better apprehend the soundness of the business environment.

Motivated by these discussions, this research aims at understanding whether firms that are politically more connected to the state are able to have more financial intermediation possibilities and therefore exhibit higher performance. We argue that the strength of the SBR allows politically connected firms to seek smoother financial access or intermediation, not only for locally defined financial endeavors but also in a broad spectrum of business activities, rendering SBR to yield extended advantages for the firm. The nature of

the SBR (by political proximity, institutional inefficiencies or corrupt practices) may have distinctive effects on financial intermediation and firm performance. Therefore, mechanisms through which SBR shape the health of the business side may contain significant information for the construction of sustainable industrial policies in developing countries. The business environment of countries and state capacity to handle economic activities might influence the extent of SBR. For instance, state bureaucracy, which shapes the capacity of the state, can affect the overall nationwide SBR and therefore can be firm-invariant. From a political economy perspective, even state capacity limits the ability of the business environment to move beyond a frontier, what happens at the firm-level can yield additional information for the extent of SBR and industrial policies. That is, firm level heterogeneities create a room to understand the possible invariant relations among different actors of the business side and the state bureaucracy.

In order to focus more on the political economy of SBR within a development context, we investigate the MENA region countries that have been dealing with various development-based issues. Even though different dimensions of institutional quality and business environment have been studied in detail, SBR and specifically financial accessibility has not been considered extensively for the region. Therefore, this paper examines whether firms in the MENA region countries with better economic performance are the ones that have benefited from the positive aspects of financial intermediation, conditioned on the extent of SBR. Our reasoning is tied to the place of financial capital in the form of debt and equity in order to finance start-up and daily life of businesses in developing countries. Given the nature of business environment in the MENA region, understanding whether the relationship between state and business side plays a dominant role in accessing to financial markets contain valuable information about firm success and failure.

For this purpose, this study employs a causal mediation analysis (CMA) to disentangle the direct effect of SBR on firm performance from the indirect effect mediated through financial access. Using a host of firm performance measures, the analysis suggests that inefficient SBR is a cause of poor firm performance. Depending on the performance measure used, inefficient SBR reduce firm performance by about 2.3-4.4 percent through access to finance and by about 12 to 40 percent via its direct effect. About 3 to 16 percent of the total effect is mediated through financial access while the remaining is the direct effect of inefficient state-business relations on firm performance. The sensitivity analysis conducted in order to probe the plausibility of the validity of the key identifying assumption of the CMA indicates that our results are sensitive to the violation of this assumption.

Section 2 discusses the theoretical background of the links between SBR and firm performance. The aim is not only to detail SBR but also to give an in-depth assessment of the role of financial intermediation in order to understand how finance can act as a mediating mechanism between SBR and firm performance. Section 3 discusses the measurement of SBR in our sample and invokes a CMA to identify the direct and the

indirect causal effects of SBR on firm performance, section 4 reports the results and performs a sensitivity analysis, section 5 makes a detailed discussion and section 6 concludes.

2 Theoretical Background

Literature examining the effects of good governance on economic growth considers, among others, rule of law, political freedom, absence of violence and lack of corruption. In addition to institutional factors, SBR also play a dominant role in understanding economic growth differences (Sen and Te Velde, 2009). Even with the harmonization of institutions, a substantial level of challenge exists in order to cope with the interaction between the state and the firm.

There are various discussions about the political economy of state-market relations. Not only politics and economics matter for growth but also good economic performance is tied to the connectivity among particular institutional features of the government and business side of the economy (Schumpeter, 1944). Later on, transparency, reciprocity, trust and credibility were considered as important characteristics of good SBR (Amsden, 1989; Maxfield and Schneider, 1997; Harriss, 2006). These characteristics help in constructing a better business environment through; solving information and coordination failures in the market, creating a check and balance function for public policies (i.e. tax and expenditure) and reducing policy uncertainty. Indeed, the rise of the East Asia Tigers is particularly examined for the peculiar networks among the public and the private economy. The developmental state of East Asian economies and political economies of Asian countries played a role in understanding the growth miracle of the region (Johnson, 1987; Evans, 1995). Similar results for the Latin American countries suggest that sound SBR is crucial in emerging economies of the region (Doner and Schneider, 2000). Finally, a historical perspective analysis from the Nazi period suggests that German firms connected to the state on average perform better (Ferguson and Voth, 2008). Firm survival is also found to be tied to the extent of SBR (Fajnzylber et al., 2009; Hansen et al., 2009).

On the contrary, politically connected firms were heavily hit during the Asian crisis in Malaysia, casting doubts on the soundness of the positive impact of SBR (Johnson and Mitton, 2003). As much as sound SBR seems to be a plausible factor for good economic performance, different dimensions render others to approach SBR from a skeptic perspective (Seekings and Nattrass, 2011; Faccio, 2010; Chekir and Diwan, 2014). For instance, Harriss (2006) considers the possibility of rent-seeking behavior that yields unproductive outcomes to the society. An example of this negative aspect of SBR is studied under Crony capitalism and is critically discussed as the crisis of East Asian Growth Miracles (Johnson, 1998; Chang, 2000; Fisman, 2001; Li, 2003; Khan et al., 2005; Charumilind et al., 2006; Faccio, 2006). Similarly, SBR may affect firm performance negatively once the level of corruption is considered (Fisman and Svensson, 2007; Nguyen and

Van Dijk, 2012). In all cases, the negative aspects of SBR on firm and country performance originate from the unproductive and rent-seeking behavior of economic agents.

While both pros and cons of state business relations are investigated among different set of countries, MENA region is also a good study area. We have sound knowledge on the institutional environment in the MENA region at the macro level (Aysan et al., 2007; Koldertsova, 2011). Studies evaluating the different dimensions of SBR underline that countries in the MENA region have peculiar structures that make investigation of bureaucratic administration, military force, and financial sources vital (Anderson, 1987) and that the links among state and business side of the economy are complicated (Heydemann, 2004; Schlumberger, 2007; Cammett, 2007; King, 2009; Hertog, 2010; Cammett and Diwan, 2013). Country-based studies also validate that political connections and its impact on economic performance are quite important not only for the whole MENA region but also for the individual MENA region countries (Henry, 1996; Kienle, 2001; Bellin, 2002; Chekir and Diwan, 2014).

The literature has discussed extensively, how SBR affects economic performance. The findings are contradictory, and the mechanisms behind the pattern did not receive sufficient attention. Maxfield and Schneider (1997) underlines different incentive mechanisms to promote economic development considering SBR. Likewise, Esfahani and Ramirez (2003) remarks that institutional properties of countries together with some economic factors play a role in mediating the infrastructure and GDP interaction. More generally financial intermediation, capital controls and protectionist implementations could be counted as some of the aspects of the state intervention and/or institutional inclusion. Among different factors, access to finance has been central to SBR (Faccio, 2006). The need for financial development, which Evans and Jovanovic (1989) linked with "liquidity constraints", is subject to numerous empirical work at cross-country and firm level settings (King and Levine, 1993; Levine and Zervos, 1998; Beck et al., 2005). While studies tend to focus on the link between finance and economic activity in general, sub-channels received attention as well. For instance, Claessens et al. (2008) recently underlined the extent of SBR for understanding finance and firm performance paradigm. One remarkable aspect of both studies is the special emphasis given to firms' finance usage; as financial availabilities are shaped endogenously by the level of SBR. While financial and institutional development exogenously affect firm performance (Beck et al., 2005), there is a probability for politically connected firms to better access to finance thus perform better compared to politically neutral economic actors (Claessens et al., 2008). Faccio (2006) decomposes the positive aspects of SBR and underlines that good connections with state brings the ability to access easily especially to debt markets. These arguments also find support in emerging economies (Khwaja and Mian, 2005; Dinç, 2005).

Our study design is motivated by these recent discussions. First, the impact of SBR on financial intermediation and firm performance has not received the desired attention among MENA countries. While

MENA region has been subject to discussions on institutions and SBR, we do not have enough knowledge on the background dynamics on how institutional features of MENA countries and different dimensions of SBR (i.e. financial access) affect economic performance. Second, most of the studies investigating institutional features of developing countries use country-level data and focus on the impact of macroeconomic fundamentals. However, there is a tendency in the scholarly literature to use firm-level data which enables policy makers to have a profound understanding of the mechanisms behind good and poor economic performance. To our knowledge, a comprehensive analysis of firm-level economic performance for the countries of the MENA region by discussing the impact of financial accessibility has been lacking.

3 Empirical Strategy

3.1 Data, Measurement and Sample

The firm-level dataset we employ to address the effect of SBR on financial accessibility and firm performance comes from the Business Environment and Enterprise Performance Survey (BEEPS) of the European Bank for Reconstruction and Development (EBRD) in partnership with the World Bank (WB) and the European Investment Bank (EIB). The BEEPS is particularly designed to study the extent to which government regulations facilitate or inhibit business operations. It provides detailed information on the behavior of firms to identify firm-level observable heterogeneity on financial access and firm performance. Specifically, we use two different surveys provided under the BEEPS framework; (i) the Middle East and North Africa Enterprise Survey (MENA-ES), covering 6,083 enterprises in eight MENA region countries (West Bank and Gaza, Morocco, Egypt, Yemen, Lebanon, Djibouti, Tunisia, Jordan) conducted during the period of 2013-2015; (ii) the BEEPS-V covering the Eastern Europe and Central Asia countries together with Turkey conducted for the period of 2013-2104. We merge these two surveys and focus on the eight countries of the MENA region and Turkey.

Measuring SBR is central to our research. While measuring political connectedness might require detecting issues such as unofficial gifts, bribery etc., other formal channels between state and individual economic agents also receive attention. Sen and Te Velde (2009); Sen (2013) define four pillars to construct a good index for SBR measurement: (i) organization of private sector vis-à-vis public sector, (ii) organization of public sector vis-à-vis private sector, (iii) practice and institutionalization of SBR and (iv) avoidance of harmful collusive behavior. These aspects of SBR are widely investigated in Sen and Te Velde (2009); Calì et al. (2011); Qureshi and Te Velde (2013). For instance, membership to a business association is used as a proxy to define SBR. Similarly, the existence of lobbying activities is offered as good indicators of SBR. On

the other hand, the existence and efficiency of investment promotion agencies is used to observe government inclusion on business side of the economy. Additionally, the format and the frequency of the interaction between government officials and firm managers are used to measure the existence and efficiency of SBR. Finally, laws for protecting firms against various issues are discussed as a measure to define the soundness of SBR.

Given these debates, measuring SBR is bounded by data availability (Calì et al., 2011; Qureshi and Te Velde, 2013). Moreover, using aggregate or individual data affects the measurement of SBR drastically. In the preliminary phase, we have reviewed both the BEEPS as well as some other enterprise surveys conducted by the World Bank. While the Productivity and Investment Climate Private Enterprise Survey, for example, covers issues such as membership to business associations and lobbying activities, BEEPS does not cover these aspects of business and firm-level interactions but covers other issues such as the frequency of interactions between state officials and senior managers of the investigated firms; perception on the importance of specific government activities for daily operation. Moreover, specific sections of the BEEPS (Section B. General Information; Section J. Government Business Relations) enable us to define and detail SBR among the MENA region countries. Based on these issues and the wider coverage of the BEEPS for the MENA region countries, we use the BEEPS in our analysis. Another dimension that we consider is the measurement of SBR over informal political connectedness of firms and the state. Here, we refer to indicators such as unofficial gifts to government officials and bribery. The response rate to these questions was relatively low in the BEEPS survey and the sample size dropped drastically. Therefore, we did not use these variables as potential indicators of SBR.

Based on discussions related with measurement issues and data availability in our survey, we focus on the the efficiency of SBR and use question J.2, *"What percentage of total senior management's time is spent on dealing with requirements imposed by government regulations?"*. This question is commonly used in empirical studies to understand the extent and the efficiency of SBR. For instance, Qureshi and Te Velde (2013) use this measure as an alternative SBR indicator for a set of selected Sub-Saharan African countries. From another perspective, our measure explains political connectedness differently compared to unofficial gifts or bribery. However, we discuss that the time spent on government regulations and officials might be indirectly linked with issues discussed under political connectedness. Additionally, our indicators also fit well with the previous empirical literature and shed light on how firms' senior managers deal with state officials in the daily business life of the organization.

We dichotomize our SBR measure for two reasons. First, our chosen methodology, the CMA, requires the treatment to be dichotomous (Hicks and Tingley, 2011). Second, a particular problem with the MENA-ES is that the answers given to some of the questions are not based on audited information but on the respondent's

ability to answer the relevant question accurately through recall. A close inspection of the distribution of the answers to our candidate SBR question, "What percentage of total senior management's time is spent on dealing with requirements imposed by government regulations?" is diagnostic of the problem. While the answers are supposedly continuous, we detect significant frequency spikes in round values such as 5, 10, 15, 20, 30, and so on and very low frequencies in-between these values, potentially leading to a measurement error problem.

Given these two aspects, the challenge is to determine the choice of the value that separates the treatment from the control group. A natural choice would be to divide firms that spent a positive percentage of time from those that do not spend any time dealing with government regulations. However, this type of a natural location is unlikely to truly separate the effect of spending 0 percent and the effect of spending, for example, 1 percent of the time on regulations and the effect of spending 1 percent from the effect of spending 2 percent of the time, and so on. Therefore, at the initial stage we allow a degree of arbitrariness in the choice of this value such that it is large enough to be able to pick up the effect (if any) of inefficient SBR on firm performance but also small enough to yield a sufficient number of treated observations. We selected a threshold of 10 percent, above which the firm is said to have inefficient SBR (i.e. = 1) and below which the firm is said not to have inefficient SBR (i.e. = 0). Note that the results in this paper are based on a SBR measure where we use the 10 percent threshold level to separate the treatment from the control firms. However, in order to check the robustness and to reduce the impact of arbitrariness in our results, we reconstruct our SBR measure with thresholds running from 1 to 21 percent. These robustness checks suggest that when the threshold value is between 8 to 14 percent, the direct, indirect and the total causal effects remain virtually unchanged. These results are available from the authors upon request.

In order to measure financial access or intermediation, we use a binary variable that takes the value of 1 if the firm has an overdraft facility and 0 otherwise. Based on questions regarding the sales, assets, costs and the employee size of the firm, we calculate four measures of a firm's economic performance that are used as outcome variables: sales per employee (SPE), profit per employee (PPE), assets per employee (APE) and real annual sales growth (RASG). MENA-ES survey provides information on sales, profits and total asset in local currency for each country. In order to make valid cross-country comparisons, we use the official exchange rates for each country and calculate the US dollar value of sales, profit and total asset figures.

The distribution of selected firm performance measures is displayed in Figure 2. While SPE, PPE and RASG can be regarded as overall firm productivity indicators, APE is an asset efficiency indicator. In Figure 2, we truncated the right tail for all firm performance measures (with the exception of RASG) in order to better visualize the shape of the distribution. For the SPE and PPE whose distributions are respectively given in Figures 2a and 2b, the density shows an overly right-skewed distribution with a mean SPE of 133,000

USD and a mean PPE of 53,000 USD. The distribution of the APE shows a much higher variance than SPE or PPE with a mean APE of 1,011,000 USD. The distribution of the RASG given in Figure 2d shows a fairly symmetrical growth distribution with a mean degrowth of 1 percent.[1]

While ideally one should control for as many pre-treatment confounders as possible, a particular challenge faced in the processing of the data is the strong trade-off between sample size and the number of included control variables. Based on data availability, we optimize in our choice to include firm-level control variables that are likely to be confounder and for which the non-response rate is low. These include top manager's education and tenure, firm's legal status, age of the firm and whether the firm; has previously applied for a credit or a loan, sells on credit, has introduced new products/services, spends on formal R&D, received subsidy, competes against informal firms, has an internationally recognized quality certification and whether the firm's financial statement has been checked and certified by an external auditor. The questions and the coding of the variables can be found in Table 1.

Table 2 displays the descriptive statistics for the overall sample and by the treatment status. The column "difference" show the differences in means for unequal variances between firms with and without inefficient SBR along with the standard errors under the null hypothesis of equal means between the treatment and control groups. In the sample, 32 percent of the firms have an overdraft facility and 19 percent of the firms' senior management spend more than 10 percent of their time dealing with government regulations. In our coding, the latter firms are said to have inefficient SBR. The percentage of firms that have an overdraft facility is statistically significantly higher for firms with inefficient SBR. Without adjusting for potential confounders, the direction of this difference is not consistent with our expectations. With respect to performance measures, firms with inefficient SBR have statistically significantly lower SPE but higher APE. On the other hand, the difference in PPE and RASG is statistically indistinguishable from zero between the treatment and the control groups at conventional test levels.

Along with firm-level controls, we collected a number of industrial dummy control variables based on the International Standard Industrial Classification (ISIC, Rev.4) that indicate whether the firm operates in the following industries: Manufacture (C), Electricity (D), Construction (F), Wholesale (G), Transport (H), Accommodation (I) and Real Estate (L). [2] In order to control for cross-country differences in the institutional environment we use World Governance Indicators (WGI).[3] WGI includes indices on government effectiveness, control of corruption, rule of law, regulatory quality and voice of accountability. Although they are invariant

[1] The calculation of the RASG can be found at: http://www.enterprisesurveys.org/data/exploretopics/~/media/GIAWB/EnterpriseSurveys/Documents/Misc/Indicator-Descriptions.pdf

[2] There was no variation in the dummy industrial control variables for the remaining industries. We therefore did not include them as additional controls. The full list of ISIC Rev.4 codes can be found at: https://unstats.un.org/unsd/cr/registry/regcst.asp?Cl=27.

[3] WGI is available at: http://databank.worldbank.org/data/reports.aspx?source=worldwide-governance-indicators

across firms of the same country, controlling for country-specific differences in the institutional environment can yield additional information on how SBR affects firm performance.

3.2 Causal Mediation Analysis

We are concerned about whether SBR causes changes in firm performance but we also like to know the causal mechanisms and the particular causal process through which the effect of SBR on firm performance comes about. Therefore, different causal paths (financial intermediation/accessibility) imply different cause-effect relationships. CMA helps identify intermediate variables that lie in the causal pathway of our treatment variable (SBR) and the outcome (firm performance).

Consider the causal diagram given in Figure 1 where the treatment variable is SBR, the mediator is financial access and the outcome is firm performance. Our goal is to decompose the total effect of SBR on firm performance into (1) a direct effect that goes from T to Y and (2) an indirect effect that goes from T to Y through M and assess the relative importance of the mechanism. If inefficient SBR is associated with reduced access to finance, that is the directed path $\mathbf{T} \longrightarrow \mathbf{M}$ in Figure 1 is of negative sign and that greater financial access leads to higher firm performance, that is the directed path $\mathbf{M} \longrightarrow \mathbf{Y}$ is of positive sign, the sign of the directed path $\mathbf{T} \longrightarrow \mathbf{Y}$ must be the product of the signs of the edges that constitute that path (VanderWeele and Robins, 2010). Hence, the sign of the directed path $\mathbf{T} \longrightarrow \mathbf{Y}$ should be negative, suggesting that inefficient SBR has a direct negative effect on firm performance. This also implies an indirect negative effect through $\mathbf{M}$.

Let $T_i \in \{0, 1\}$ be a binary measure of SBR, M_i be a measure of financial intermediation, X_i be the observed covariates and Y_i be the firm performance. Let $M_i(1)$ and $M_i(0)$ respectively be the potential mediators (i.e. the observed level of financial intermediation reported by firm i with inefficient and efficient SBR respectively) and $Y_i(1)$ and $Y_i(0)$ be the potential outcomes. Since only one potential mediator ($M_i = M_i(T_i)$) and one potential outcome is observed ($Y_i = Y_i(T_i, M_i(T_i))$), we focus on the average causal effect, $\mathrm{E}[Y_i(1) - Y_i(0)]$, that is the average difference between the firm performance that prevails under inefficient SBR and the firm performance that would have prevailed had the firm not exhibited inefficient SBR.

The goal of CMA is to decompose the direct effect of SBR on firm performance and the indirect effect of SBR on firm performance through financial intermediation. The causal mediation effect (CME) or the indirect effect answers the question of what change would occur to firm performance if one changes the financial intermediation from the value that would realize under efficient SBR to the value that would be observed under inefficient SBR while holding the SBR status constant, that is $\delta_i(t) = Y_i(t, M_i(1)) -$

$Y_i(t, M_i(0))$ for t=0,1.

The direct causal effect on the other hand answers the question of what difference in firm performance would result if one moves from efficient to inefficient SBR while holding the level of financial intermediation constant, that is, $\varsigma_i(t) = Y_i(1, M_i(t)) - Y_i(0, M_i(t))$. The total causal effect is the sum of the indirect and direct effect respectively, that is, $\tau_i = Y_i(1, M_i(1)) - Y_i(0, M_i(0))$. The no-interaction assumption states that the causal mediation and direct effects do not vary as functions of treatment status, $\delta_i = \delta_i(1) = \delta_i(0)$ and $\varsigma_i = \varsigma_i(1) = \varsigma_i(0)$, implying that $\tau_i = \delta_i + \varsigma_i$.

Given any unit, one cannot observe both potential outcomes or potential mediators under the treatment and control at the same time (Holland, 1986). The average CME (ACME) is $\overline{\delta}(t) = \mathrm{E}[Y_i(t, M_i(1)) - Y_i(t, M_i(0))]$, while the average direct effect (ADE) is $\overline{\varsigma}(t) = \mathrm{E}[Y_i(1, M_i(t)) - Y_i(0, M_i(t))]$. The average causal effect of SBR (average total effect, ATE) is the sum of ACME and ADE, $\overline{\tau} = \mathrm{E}[Y_i(1, M_i(1)) - Y_i(0, M_i(0))] = \overline{\delta}(t) + \overline{\varsigma}(1-t)$.

In order to decompose the causal effect via CMA where the assignment to treatment is non-random, an additional assumption called sequential ignorability (henceforth SI) is needed along with the assumption of no-interference between units (Imai et al., 2010b).

$$\begin{aligned} &\text{Unconfoundedness: } \left\{Y_i\left(t', m\right), M_i(t)\right\} \perp T_i \mid X_i = x \\ &\text{Ignorable mediator: } Y_i\left(t', m\right) \perp M_i(t) \mid T_i = t, X_i = x \end{aligned} \tag{1}$$

where $0 < Pr(T_i = t \mid X_i = x)$ and $0 < p(M_i(t) = m \mid T_i = t, X_i = x)$ for $t = 0, 1$. While the unconfoundedness states that given the observed pretreatment confounders, the assignment to treatment is assumed to be statistically independent of potential outcomes and potential mediators, the ignorable mediator states that the mediator is statistically independent of potential outcomes given the observed treatment and pretreatment confounders.

Consider the following linear structural equation modeling à la Baron and Kenny (1986):

$$M_i = \alpha_2 + \beta_2 T_i + \xi_2 X_i + \varepsilon_{i2} \tag{2}$$

$$Y_i = \alpha_3 + \beta_3 T_i + \gamma M_i + \xi_3 X_i + \varepsilon_{i3} \tag{3}$$

where equation (2) specifies the relation between the treatment, T_i (SBR) and the mediator, M_i (financial access) and equation (3) specifies the relation between the treatment T_i, the mediator M_i and the outcome Y_i (firm performance). Plugging equation (2) into (3), we obtain:

$$Y_i = \alpha_1 + \beta_1 T_i + \xi_1 X_i + \varepsilon_{i1} \tag{4}$$

where $\beta_1 = \beta_3 + \gamma\beta_2$. The estimate of the mediation effect is $\hat{\gamma}\hat{\beta}_2 \approx \hat{\beta}_1 - \hat{\beta}_3$ which is a valid causal estimate under linearity, SI and no-interaction (Imai et al., 2010b). However, when the mediator is binary as is our case and a nonlinear model is used (e.g. probit), the product of slope coefficients cannot be used (Imai et al., 2010a).

The no-interaction assumption between treatment and mediator is often unrealistic, resulting in a replacement of the structural outcome equation (3) by the following:

$$Y_i = \alpha_3 + \beta_3 T_i + \gamma M_i + \kappa T_i M_i + \xi_3 X_i + \varepsilon_{i3} \tag{5}$$

In addition to $\hat{\beta}_2$, either $\hat{\gamma}$ or $\hat{\kappa}$ must be statistically distinguishable from zero for a CME. The ACME is $\overline{\delta}(t) = \beta_2(\gamma + \kappa t)$ for $t = 0, 1$.

While the unconfoundedness is guaranteed to hold in experiments where the assignment to treatment is randomized, in observational studies it does not hold because subjects self-select into treatment. On the other hand, the ignorable mediator assumption is non-refutable. Even the randomization of the treatment and the mediator does not identify the ACME (Imai et al., 2011). SI is required for identification but cannot be directly tested. Therefore, we conduct sensitivity analysis for probing the plausibility of the SI assumption. The goal is to quantify the extent to which the key identification assumption must be violated for the original conclusion to be reversed.

Let $-1 < \rho = corr(\varepsilon_{i2}, \varepsilon_{i3}) < 1$. The correlation between the errors terms of the mediator and the outcome equations in (2) and (3) arises in the presence of omitted variables that affect both M and Y. SI implies $\rho = 0$ but the converse is not true. If small departures from zero in ρ produce an ACME that is substantively different than the estimate obtained under SI, then the study is said to be sensitive to potential violation of the SI assumption.

The sensitivity parameter ρ can be interpreted as the magnitude of an unobserved confounder and the ACME can be expressed as a function of ρ. An alternative way is to express ACME as a function of the R^2's. Let $\varepsilon_{ij} = \lambda_j U_i + \varepsilon_{ij}^{'}$ for $j = 2, 3$. The relationship between the ACME and the R^2's can be expressed as the product of the R^2 of the mediator and the outcome equations. The R^2 of the mediator and the outcome equations respectively are:

$$\begin{aligned} \tilde{R}_M^2 &= \frac{\text{var}(\varepsilon_{i2}) - \text{var}\left(\varepsilon_{i2}^{'}\right)}{\text{var}(M_i)} = \left(1 - R_M^2\right) R_M^{2*} \\ \tilde{R}_Y^2 &= \frac{\text{var}(\varepsilon_{i3}) - \text{var}\left(\varepsilon_{i3}^{'}\right)}{\text{var}(Y_i)} = \left(1 - R_Y^2\right) R_Y^{2*} \end{aligned} \tag{6}$$

where $\tilde{R}_M^2$ and $\tilde{R}_Y^2$ are based on the original variances that are explained by the unobserved confounder and R_M^{2*} and R_Y^{2*} are based on previously unexplained variances in the mediator and outcome regressions, respectively. Then, the sensitivity parameter can be expressed in terms of the previously unexplained or the original variances as:

$$\rho = \operatorname{sgn}(\lambda_2\lambda_3) R_M^* R_Y^* = \frac{\operatorname{sgn}(\lambda_2\lambda_3) \tilde{R}_M \tilde{R}_Y}{\sqrt{(1 - R_M^2)(1 - R_Y^2)}} \tag{7}$$

3.3 Selection on Observables: Entropy balancing

The difference in firm performance may be the result of a data generating process in which firms are self-selected into treatment rather than a randomization of the treatment assignment. In observational studies, the imputation of the missing counterfactual or potential outcome is complicated by the fact that the assignment to treatment mechanism is unknown and not controlled by the researcher. In such settings, the estimation of the causal effect is difficult as it involves assumptions about the assignment mechanism and the subsequent comparison between different units. In a regression framework, the pretreatment variables or covariates that predict the outcome can help in the estimation of this causal effect. However, in the absence of any objective and quantifiable measure with which the comparison units are to be selected, the researcher uses her discretion over the comparison units in the identification of the effect of treatment on the outcome. This is problematic because of selection bias: That is, firms with inefficient SBR are so because they are different from firms without inefficient SBR, implying that the factors that are thought to affect firm performance or financial intermediation may be dissimilar. Matching methods, which may be used in conjunction with a CMA analysis, nonparametrically control for these confounders by reweighting in order to obtain a better covariate balance between firms with and without inefficient SBR.

We invoke entropy balancing to achieve a balanced covariate distribution between firms with inefficient SBR and firms without. Entropy balancing is a data preprocessing technique, based on a maximum entropy reweighting algorithm that assigns unit weights so that the reweighted treatment and control groups are exactly balanced on the specified sample moments of the covariate distributions. Entropy balancing has several advantages over the existing matching procedures. First, entropy balancing improves balance across all covariates and therefore does not rely on post-matching balance checking for the characteristics that are included in the specified balance constraints. Second, it allows unit weights to vary smoothly across units and thereby prevent loss of information. Third, the method reduces model dependence by orthogonalizing the treatment variable with respect to the covariate moments (Hainmueller, 2012).

Let n_T and n_C denote the number of firms with and without inefficient SBR respectively so that $n =$

$n_T + n_C$ and let X be a matrix of J pretreatment characteristics where x_{ij} refers to the j^{th} characteristic for the i^{th} firm. Let $Y_i(1)$ be the economic performance for firm i, if it exhibits inefficient SBR and let $Y_i(0)$ be the firm performance if it did not exhibit inefficient SBR. The unit-level causal effect of inefficient SBR on firm performance is the difference between the observed performance under inefficient SBR and the missing potential performance that would be observed had the firm not exhibited inefficient SBR, that is $\tau_i = Y_i(1) - Y_i(0)$. However, the identification and measurement of this effect is impossible because we can observe only one of them (Holland, 1986). Therefore, we must rely on multiple units and infer the counterfactual (what would have happened if firms had not exhibited inefficient SBR) from observed data (what actually happened) to draw causal inferences.

The population average treatment effect on the treated is given by $\tau = E[Y(1) \mid T = 1] - E[Y(0) \mid T = 1]$. Since the first expectation is the factual but the second expectation is the counterfactual and therefore unobserved for that fact that the assignment to treatment is not random, we shall maintain the overlap, that is $Pr(T = 1 \mid X = x) < 1$, and the ignorability assumption that the treatment T is orthogonal to potential outcomes $Y_i(0), Y_i(1)$, conditional on the covariate vector X: $T_i \perp \{Y_i(0), Y_i(1)\} \mid X$ (Rosenbaum and Rubin, 1983).

4 Findings

In order to evaluate the mediating effect of finance, we define SBR inefficiency as the treatment, financial access as the mediator and firm performance as the outcome variable in the CMA analysis.[4] We consider four measures as proxy for firm performance: SPE, PPE, APE and RASG.[5] The results are reported in tables 3 to 6. In all models, the mediator equation is modeled as a probit regression and the outcome equation is modeled via ordinary least squares (OLS).

MENA-ES is based on stratified random sampling in which all population units are grouped within homogeneous groups and simple random samples are selected within each group. Due to sampling method, researchers are advised to use sampling weights in the calculation of population estimates where the weights represent the inverse probability of being included in the sample. In contrast, no weighting is necessary in a simple random sampling because every unit has equal probability of being selected. There is a fair lack of consensus on whether one should use sampling weights or not. This choice depends on what is being

[4] We use the `medeff` command in Stata (Hicks and Tingley, 2011).

[5] In the preliminary analysis, we considered a host of other measures for firm performance and alternative measures as a proxy for financial access. The performance measures include annual labor productivity growth, sales to assets ratio, return on sales, return on assets and return on fixed assets. Alternative financial access measures include whether the firm has a line of loan or credit from a financial institution and the amount of outstanding credit. However, either the causal effects were insignificant in these models or they carried signs inconsistent with our expectations. The results are available from the authors upon request.

estimated. If the purpose is to estimate a population mean on the basis of a sample, then weighting might be an appropriate strategy. However, when the purpose is to estimate causal effects, whether one should use sampling weights is nuanced (Solon et al., 2015). One reason to consider weighting is to correct for heteroscedasticity; however, weighting can reduce precision when the firm-level errors are clustered within a country. If the residuals are homoscedastic, using sampling weights will unnecessarily increase the standard errors (Dickens, 1990). Therefore, heteroscedasticity shall not be presumed and standard diagnostic tests (e.g. Breusch-Pagan) should be performed before deciding to use sampling weights (Solon et al., 2015). Another complementary approach would be to report heteroscedasticity-robust standard errors if constant variance cannot be warranted.

First, this study does not aim to draw population-based inference but causal inferences. In CMA, a recommended strategy is to bootstrap the standard errors of the ACME (Tingley et al., 2014; Hayes, 2017). Second, the Breusch-Pagan test of heteroscedasticity in the residuals of the outcome equation shows that the null hypothesis of homoscedastic residuals cannot be rejected at conventional test levels for all models with the exception of that of the APE (not reported). This suggests that the use of sampling weights will impose heteroscedasticity in the outcome model and will yield imprecise estimates. In fact, when our models are estimated using sampling weights, the causal estimates are far less precise (not reported). Therefore, in all models reported we do not use sampling weights and perform nonparametric bootstrapping to calculate the standard errors of the ACME, ADE and the ATE.

Column (1) of Table 3 show the results of the baseline model for the natural log of SPE where no control variables have been included. As mentioned in section 3.2, we expect both ATE and the ACME of SBR inefficiency on firm performance to be negative and therefore the ADE to be negative as well since $\mathbf{ATE} = \mathbf{ADE} + \mathbf{ACME}$. However, both the ACME and the ATE are statistically significant but unexpectedly positive due to the failure to control for confounding factors. The size of the ACME suggests that inefficient SBR increases SPE by about $\mathbf{e}^{0.187} - 1 = 20.6$ percent through financial access.

In column (2) of Table 3, we include the full set of control variables. The ACME, the ADE and the ATE are all statistically distinguishable from zero and the ACME carries the correct sign. Accordingly, inefficient SBR directly reduces sales by about $\mathbf{e}^{-0.186} - 1 = 17$ percent and indirectly reduces sales through restricted access to finance by about $\mathbf{e}^{-0.023} - 1 = 2.3$ percent. The ATE suggests that overall, firms with inefficient SBR have about $\mathbf{e}^{-0.21} - 1 = 19$ percent lower sales than firms without inefficient SBR. About 11.2 percent of the ATE of SBR inefficiency on firm performance is mediated through financial access whereas the remaining 88.8 percent is the direct effect.

The difference across columns (1) and (2) of Table 3 implies that our model now controls for a number of confounding factors that affect both financial access and firm performance. The problem is that we can

never be sure of how much of these confounding effects our model controls for and whether the correlation between the error terms of the mediator and the outcome equations that might arise due to the omission of these confounders should be of concern.[6] At the bottom of the table, we report the variance inflating factors (VIF) for the mediator and the outcome equations in order to assess the extent of a potentially detrimental collinearity problem. As a rule of thumb, a VIF larger than 4 is a sign of multicollinearity that warrants further investigation. All VIFs are well below 4, suggesting that our models are not plagued by multicollinearity. Notice that none of the models include the indices for the government effectiveness and the rule of law because their inclusion renders a higher-than-otherwise VIF, typically above 4.

In column (3), we add a mediator-treatment interaction term to the outcome equation to assess if the no interaction assumption is plausible. This allows us to assess the effects of the ACME and the ADE by treatment status. The interaction term is column (3) is statistically not distinguishable from zero and the results remain virtually unchanged: inefficient SBR directly reduces SPE by about $\mathbf{e}^{-0.194} - 1 = 17.6$ percent and indirectly through financial access by about $\mathbf{e}^{-0.025} - 1 = 2.5$ percent. The ATE suggests that overall, firms with inefficient SBR have about $\mathbf{e}^{-0.219} - 1 = 19.7$ percent lower sales than firms without inefficient SBR. About 11.3 percent of the ATE of SBR inefficiency on firm performance is mediated through financial access.

While columns (1)-(3) report bootstrapped standard errors, column (4) uses matching weights obtained from the entropy balancing procedure. A necessary condition on the choice of the variables used in the matching procedure is that they should not be affected by the treatment mechanism. While we do not have any a priori knowledge on whether some of these covariates could be affected by whether the firm exhibits inefficient SBR or not, a number of firm-level control variables such as the education level and the tenure of the top manager, the age and the legal status of the firm, the industrial and the country-level controls are unlikely to be affected by assignment to treatment. In order to check whether our estimates using the entropy balancing weights are robust to the choice of the variables to be employed in the matching procedure, we performed entropy balancing where once all covariates and then only the variables that are known to be unaffected by the treatment assignment are entered into the matching process. The causal estimates remain virtually the same under both set of covariates whose moments are matched across the treatment and control groups. We therefore proceed with the inclusion of all common and uncommon covariates that appear in the mediator and the outcome equations with the exception of the mediator variable. Firms with and without inefficient SBR are balanced on up to and including the third moment of these covariates.

Figure 3 displays covariate-by-covariate standardized bias in the unbalanced and entropy-balanced data.[7]

[6] While this cannot be tested directly, we provide sensitivity analyses at the end of section 4.

[7] We use `ebalance` command in Stata, available at https://ideas.repec.org/c/boc/bocode/s457326.html. For details of implementation, see Hainmueller and Xu (2013).

The standardized bias measures the difference in means between firms with and without inefficient SBR where zero bias indicates that the two groups have identical means; dots to the right (left) of the zero vertical line indicates a higher mean among firms with (without) inefficient SBR. The unadjusted data are severely imbalanced on four out of five of the WGI and on whether the firm is a shareholding company. The standardized percentage bias on these covariates ranges between 50 to 80 percent. This indicates that firms with inefficient SBR are more likely to have better firm-invariant governance and to have the legal status as a shareholding company vis-à-vis firms without inefficient SBR. In the unadjusted data, the overall mean bias is 23.3 percent whereas in the matched data the mean bias is 0.0.

Based on the entropy-balancing specification whose covariate balance comparison is given in Figure 3, the results are displayed in column (4) of Table 3. The treatment is as mean independent of all variables as possible and the covariates are additionally controlled for in the estimations as this reduces the unexplained variance in firm performance and decreases the standard errors of the treatment effect. The magnitude of the causal effects are mildly larger upon the use of matching weights in lieu of bootstrapped standard errors. The ACME suggests that inefficient SBR indirectly reduces SPE by about 4.4 percent through financial access and directly by about 32.6 percent.

So far, we excluded Turkey from our sample on the grounds that the state of affairs and business environment is conspicuously different than that of the MENA. In column (5), we include Turkey and replicate column (2). A difference between column (2) and (5) is that data on the educational level of the top manager, whether the firm received a subsidy and whether the firm spends on formal R&D for Turkish firms were not reported in the BEEPS survey. Therefore, we had to exclude those variables in order to use all the available observations pertaining to Turkish firms. When information on Turkish firms is included in the model, the ACME and the ATE are still significant and carry the expected sign. Accordingly, SPE is reduced by about $\mathbf{e}^{-0.157} - 1 = 14.5$ percent as a result of inefficient SBR and 16.4 percent of this effect is mediated through financial access with a reduction in firm performance by about 2.6 percent. While the results so far control for different firm-, sector- and country-specific factors that are supposed to influence the mediating channels, we further include two additional dimensions. First as discussed by Beck and Demirguc-Kunt (2006), firm size can matter in understanding the impact of finance and firm performance. Note that BEEPS include firms size under four categories; micro firms (only for panel), small firms, medium firms and large firms. These categories are determined by thresholds. Since we do not have exact information on the number of employees and as our data is not in panel format, we recode the data. We measure firm size in terms of the number of employees (x) and enters the model as a dummy variable for small ($5 \leq x \leq 19$) and for large ($x \geq 100$) firms. A second dimension that we consider is related with the business environment differences of countries. As discussed in Coe et al. (2009), factors affecting the business environment have influence

on cross-country differences. Therefore, we include a country-level control variable explaining the ease of starting a business. Starting a business is measured by using the distance to frontier (dtf) variable that traces the regulator performance of countries through time. Distance to frontier (dtf) variable is provided by World Bank and measures the distance of each country to its best performance. Dtf ranges between 0 and 100, 0 representing lowest and 100 representing the highest performance in terms of starting a business respectively. Column (6) of Table 3 introduces these two covariates into the model. Upon the inclusion of the firm size into the model, the sample size is reduced by about 18 percent due to missing observations. Even after the inclusion of Turkish firms that were thought to represent outliers in the sample, the ACME and the ATE are statistically distinguishable from zero at conventional test levels. Accordingly, SPE is reduced by about $\mathbf{e}^{-0.196} - 1 = 17.8$ percent as a result of inefficient SBR and 13.1 percent of this effect is mediated through financial access with a reduction in firm performance by about 2.6 percent. In contrast to column (5), the ADE is statistically significantly different from zero with a direct effect of about $\mathbf{e}^{-0.170} - 1 = 15.6$ percent.

Table 4 reports the ACME and the ADE of SBR inefficiency on the natural log of PPE along the lines of specifications reported in Table 3.[8] First, in column (1) of Table 4, the ACME and the ATE have opposite signs. If firms with inefficient ties to the state should have restricted access to finance and that firms with greater financial access should have higher firm performance, it must be the case that the ACME should be negative due to the product of these two effects. However, column (1) shows that the ACME carries a sign that is inconsistent with our expectations although it is statistically significant. If ACME $>$ 0 and ATE $<$ 0, it must be (and in fact is) the case that the ADE $<$ 0 since $\mathbf{ATE} = \mathbf{ADE} + \mathbf{ACME}$. The fact that the ACME and the ATE have opposite signs is indicative of some unaccounted confounding mechanism(s) which makes the ACME of SBR inefficiency on firm performance positive. In the remaining specifications where all control variables have been included, the ACME is not distinguishable from zero yet the ADE and the ATE in columns (2) and (3) of Table 4 have statistically significant and negative causal effects on PPE. Specifically, while the unweighted direct effect is a reduction of $\mathbf{e}^{-0.341} - 1 = 28.9$ percent, the use of entropy balancing weights results in a direct effect of a $\mathbf{e}^{-0.519} - 1 = 40.5$ percent reduction in PPE. When Turkish firms are included in the sample, neither the ACME nor the ADE is statistically significantly different from zero (column (4)). A potential explanation is that Turkish firms might have significantly different firm dynamics than those in the MENA region. The inclusion of firm size and the country-level control variable on the business environment in column (5) of Table 4 does not affect our results.

Finally, the causal mediation effect of inefficient SBR on the natural log of APE and the RASG are

[8] In the sample, there are 241 firms (6.65 percent) with a negative PPE. For the fact that the outcome variable is expressed in natural logarithm, these observations are excluded from the estimations in Table 4.

respectively given in Tables 5 and 6.[9] We were unable to include Turkish firms in these models due to the lack of data on firms' total assets and on past sales. Again, the unconditional models given in column (1) of Tables 5 and 6 yield a statistically significant but perversely large ACME whose sign is inconsistent with our expectations. Upon the inclusion of the control variables, both the direct and the indirect effects carry the expected sign. The ACME of SBR on APE are -0.023 and -0.076 that corresponds to a reduction in APE of about 2.3 and 7.3 percent respectively. 3.5 to 8.7 percent of the ATE of SBR inefficiency on APE is mediated through financial access. This large difference between the two ACMEs in column (2) and (3) is due to the differences in the variance-covariance estimation. While the standard errors in column (2) are computed via bootstrapping, column (3) uses the entropy balancing weights.

Columns (2) and (3) of Table 6 show the indirect and direct causal effects of inefficient SBR on RASG with the full set of control variables under bootstrapped standard errors and matching weights. In column (2), albeit marginally significant, the ACME implies that inefficient SBR reduces RASG by about 0.07 percentage points through financial access and by about 2.2 percentage points via its direct effect. While the ADE and the ATE across columns (2) and (3) are of similar magnitude, the ACME is no longer distinguishable from zero when the model uses entropy balancing weights in lieu of bootstrapping.

An important dimension of CMA is the sensitivity analysis. Sequential ignorability is a strong and untestable assumption. Therefore, a sensitivity analysis must be conducted to investigate the robustness of our results to the violation of the SI assumption. For this purpose, we select only the models in which the ACME is statistically distinguishable from zero. This corresponds to columns (2) and (5) of Tables 3 and 5.

The sensitivity analysis allows to examine how the estimated ACME changes with varying values of the error correlation, ρ. The results are displayed in Figure 4[10]. The black solid line shows the estimated ACME at various values of ρ and the red solid line is the ACME point estimate without correlation ($\rho = 0$), which is computed under the SI assumption. If there exist unobserved pre-treatment confounders which affect both financial access and firm performance, the SI assumption is likely to be violated and the sensitivity parameter ρ will no longer be zero. The results show that the correlation between ε_{i2} and ε_{i3} must be about 0.1 - 0.3 for the point estimate of ACME to be zero, depending on the outcome variable and the model specification. Alternatively, the product of R^2's captures the point at which the ACME is zero as a function of the proportions of residual variance or total variance in the mediator and outcome explained by the unobserved confounder. For example, when the product of the previously unexplained variance explained by the omitted confounder is 0.09 for the SPE model reported in column (2) of Table 3, the point estimate of ACME is zero (Figure 4a). In this case, the latent confounder must explain, for instance, 4.0 percent of

[9] In the sample, there are 94 firms (2.75 percent) that have an asset value of zero. For the fact that the outcome variable is expressed in natural logarithm we recoded these observations infinitesimal in order to include them in the estimations.

[10] We use the `medsens` command in Stata (Hicks and Tingley, 2011).

the remaining variance in the mediator and 2.25 percent of the remaining variance in the outcome for the ACME to be zero so that $0.04 \times 0.0225 = 0.09$. Figure 5 displays the loci of all points of the residual and total variance in the mediator and outcome explained by the unobserved confounder where the ACME is zero. The sensitivity analysis indicates that an error correlation of 10-30 percent is sufficient for our original conclusion to be reversed, suggesting that our results are sensitive to the violation of the SI assumption.

5 Discussion

Following the prominent discussions on institutions and their influence on economic well-being, new questions emerge in order to better understand how institutions function at the micro level. Economic agents interact with each other through various institutions and little is known about how individual experiences influence economic performance. This study aims to shed light on micro aspects of these experiences by investigating the relationship between SBR, access to finance and firm performance for selected MENA region countries.

Several crucial points are important in order to develop a future line of research on investigation of SBR at the firm-level. First, finding a proper measure to account for the link between firms and the state is challenging. From the perspective of cronyism, various indicators such as family-personal relations, bribery, corruption, patron-client relations, collusions, informal payments, in-kind gifts and other vast measures of corruption can be used. On the contrary, SBR may be approached from a different perspective to try to measure the efficiency of the relations. For instance, the ability of lobbying or the ability to be in good relations with state officials might decrease the regulatory and bureaucratic burden. The problem is that, it is not possible to foresee if such good relations stem from official, formal and legal ties or if some unaccounted informal channels construct such good relations. In our analyses, we were unable to measure the extent of informal gifts and bribery activities therefore used a measure to understand how much firm managers have to spent to deal with state officials. Our expectation is that, having good SBR would decrease the necessary time to deal with public requirements, which in turn increases firm performance. Note that, we do not make a discussion on the extent of the informality for SBR.

Our SBR measure, unlike other SBR measures such as lobbying activities and existence of business associations etc., defines both the efficiency and the existence of the SBR. It is true that our SBR measure may be interpreted differently. For instance, spending more time with government regulations may be grounded in the basic management capabilities of the firms. That is, firms spending less time with government regulation could be handling their paper-work and daily bureaucratic issues more properly. Or, from a different perspective some firms may be spending more time with the state simply because their production processes are complex, may cooperate more closely with the state and may require more state regulation

or interaction. Even though these two cases are plausible in general, they are less likely to be the case for the MENA region. On the side of good management practices, our knowledge from doing business in the MENA region shows substantial relative worsening during the post 2000s. Note that we control for this firm-invariant (country-variant) capabilities by using starting business indicator. Therefore, we do not expect to observe firm specific good management practices, at least not to the extent of influencing our argument on the time spent with government regulations. On the side of the production structure of the firms (i.e. complexity etc.) our analyses control a host of specific measures that enables us to understand the structure of the business (i.e. innovation and R&D spending etc.). Once again, we do not see enough reason for these two channels to bias our arguments for evaluating the time spent on government officials as an inefficiency measure for SBR.

A related issue here is that SBR can be country-variant, that is, such a SBR variable might actually be measuring the state capacity rather than explaining the relations among firms and the public officials. Such a problem would have occured had a corruption-based indicator been used in our analyses. To deal with this issue, we further control for cross-country differences in business and institutional environments to decrease the possible influence of state capacity. Finally, as our chosen methodology (CMA) requires the use of a binary treatment variable, we recoded our SBR measure as a dictohomous variable and used the 10 percent as the threshold level that separates the treatment from the control group. This arbitrary choice can be an issue due to the fact that we actually do not directly know how much time should be spent in order be efficient and productive. We iteratively recoded our SBR measure and used different threshold levels ranging between 1 and 21 percent in increments of 1 percentage point. The results show that the causal effects of SBR measure with the threshold values between 8 to 14 percent are comparably the same, suggesting that the 10 percent can be a good threshold choice. However, the range at which our SBR measure yields similar causal effects is still fairly narrow and is a certain limitation of our study concerning the robustness of our results with respect to varying threshold levels. Still, it should be noted that an important technical aspect of using prohibitively varying values for the threshold is that it severely affects the number of treatment and control firms. From table 1, 19 percent of firms in our sample spend more than 10 percent of their time dealing with gov. regulations. Increasing or lowering the threshold level too much (i.e above 21 percent or below 8 percent in our case) may result in a failure to reject the null hypothesis of no causal effects because: (i) our original findings may not be robust with respect to how our treatment variable is constructed; (ii) more strikingly, the number of treatment firms becomes extremely small (the number of control firms becomes extremely small) at this high (low) threshold level and thus our analysis ultimately fails to detect this causal effect (if any). We cannot tell whether setting a too high or a too low of a threshold level results in a failure to reject the null hypothesis of causal effects is due to (i) or (ii). In sum, increasing the window at which we

determine the threshold value for the SBR that separates the treatment from the control group may result in a situation that signals a lack of robustness of the results when in fact it is due to a micronumerosity problem in the treatment or the control group.

Another important discussion is related with the way SBR and its impact on firm performance is evaluated. From the perspective of cronyism, one might expect that firms, linked with the state through bribery and other corrupt lines are the ones that are less productive and less efficient. On the contrary, the way firms and the state in this study are linked is slightly different. We only know how much time firms have spent with state officials and we have no claim on the nature of the relations as we lack data on unofficial gifts, bribery etc. Therefore, our results are not one-on-one comparable with the literature on cronyism. Rather, our results are consistent and comparable with the literature on SBR that mostly uses indicators such as lobbying activities, time spent with public officials etc. More importantly, our central objective is not to question the impact of SBR on firm performance; instead we are more interested in the mediating effect of finance, which has not been discussed so far by the scholarly literature.

It is also possible to define other potential mediating mechanisms through which SBR may influence firm performance. However, investigating other possible paths that bridge SBR to firm performance is beyond the scope of our paper. Still, innovation capacity, capabilities based on infrastructure, unequal access to public procurement processes etc. stand as avenues for future research. Inevitably, increasing the number of sub-channels will yield new issues such as omitted variables and endogeneity. That is, we do not directly know how much of these sub-channels are indeed exogenous. This certainly stands as a future question on our research agenda.

Our study suggests that there is certainly a smoke in the light of the pros and cons of our findings; however, the triangular relationship between SBR, financial access and firm performance should be further assessed using comprehensive datasets and samples in order to actually conclude that there is a fire. The construction of business enterprise surveys that enables researchers to control for more determinants at the firm-level is important. Moreover, further attempts should be made to combine aggregate macro-economic indicators with survey-based individual data. This can be achieved by using perception-based questions where respondents are directed questions that measure their perception on certain governance, institutional and business environment-based issues.

6 Conclusion

We investigated the direct causal effects of SBR on firm performance and the indirect causal effects that are hypothesized to be mediated through financial access using firm-level data from the MENA enterprise

survey. We proxied firm performance by using four measures related to sales, assets and profits. The results show that without controlling for any of the factors that are thought to affect both financial access and firm performance, the causal effects of SBR are perversely large but its direction is not in line with our expectations. We stressed that unaccounted confounding factors are a cause for this unexpected effect. The results turn out to be in line with our expectations only after controlling for a number of possibly confounding firm-level, industrial and country-level characteristics. Accordingly, inefficient SBR and/or failure to have active ties with the state reduces SPE through restricted access to finance in the range of 2.3 to 4.4 percent. On the other hand, the direct effect of SBR on firm performance corresponds to a reduction in SPE in the range of 12 to 32 percent. With respect to PPE, the models do not detect any indirect effect of SBR that is mediated through financial access; however, the ADE and the ATE implies a reduction in profits of about 41 percent. When firm performance is measured by APE, specifications point to a significant ACME that corresponds to a reduction in firm performance of about 2.3 and 7.3 percent. As for the RASG, inefficient SBR reduces sales growth by about 0.07 percentage points through finance and directly reduces growth by about 2.2-2.7 percentage points. We assessed the plausibility of the SI assumption through a series of sensitivity analyses that showed 10-30 percent of error correlation is sufficient for the violation of this key identifying assumption and for the reversion of our original conclusions.

Overall our results indicate that SBR is an important factor that affects economic performance at the firm level for the selected MENA countries. These results are in line with some previous evidence that measures SBR with the help of indicators such as lobbying activities, time spent with government officials etc. More remarkably, focusing on a sub-channel validates that finance acts as a mediating mechanism for a number of selected firm performance measures. It is interesting that the measures we considered to detect the overall and the indirect effects of SBR are the ones that include both asset efficiency and the overall firm productivity. Firms with more efficient ties with the state perform better both in terms of efficiency as well as productivity. Among different channels, our results confirm that the mediating mechanism works through financial intermediation.

References

Acemoğlu, D.; S. Johnson; and J. Robinson (2001): The Colonial origins of comparative development. *American Economic Review*, 91(5):1369–1401.

Amsden, A. (1989): *Asia's Next Giant: South Korea and Late Industrialisation*. New York: Oxford University Press.

Anderson, L. (1987): The State in the Middle East and North Africa. *Comparative Politics*, 20(1):1–18.

Aysan, A.F.; M.K. Nabli; and M. Véganzonès-Varoudakis (2007): Governance institutions and private investment: an application to the Middle East and North Africa. *The Developing Economies*, 45(3):339–377.

Baron, R.M. and D.A. Kenny (1986): The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, 51(6):1173.

Beck, T. and A. Demirguc-Kunt (2006): Small and medium-size enterprises: Access to finance as a growth constraint. *Journal of Banking & finance*, 30(11):2931–2943.

Beck, T.; A. Demirgüç-Kunt; and V. Maksimovic (2005): Financial and legal constraints to growth: Does firm size matter? *The Journal of Finance*, 60(1):137–177.

Bellin, E.R. (2002): *Stalled Democracy: Capital, Labor, and the Paradox of State-Sponsored Development*. Cornell University Press.

Calì, M.; S. Mitra; and P. Purohit (2011): Measuring state–business relations within developing countries: An application to Indian states. *Journal of International Development*, 23(3):394–419.

Cammett, M.C. (2007): *Globalization and Business Politics in Arab North Africa: a Comparative Perspective*. Cambridge University Press.

Cammett, Melani Claire and Ishac Diwan (2013): *The political economy of the Arab uprisings*. Westview Press.

Chang, H. (2000): The hazard of moral hazard: untangling the Asian crisis. *World Development*, 28(4):775–788.

Charumilind, C.; R. Kali; and Y. Wiwattanakantang (2006): Connected lending: Thailand before the financial crisis. *The Journal of Business*, 79(1):181–218.

Chekir, H. and I. Diwan (2014): Crony capitalism in Egypt. *Journal of Globalization and Development*, 5(2):177–211.

Claessens, S.; E. Feijen; and L. Laeven (2008): Political connections and preferential access to finance: The role of campaign contributions. *Journal of Financial Economics*, 88(3):554–580.

Cleary, S. (1999): The relationship between firm investment and financial status. *The Journal of Finance*, 54(2):673–692.

Coe, D.T.; E. Helpman; and A.W. Hoffmaister (2009): International R&D Spillovers and Institutions. *European Economic Review*, 53(7):723–741.

Demirgüç-Kunt, A. and V. Maksimovic (1998): Law, finance, and firm growth. *The Journal of Finance*, 53(6):2107–2137.

Dickens, W.T. (1990): Error components in grouped data: is it ever worth weighting? *The Review of Economics and Statistics*, pp. 328–333.

Dinç, I.S. (2005): Politicians and banks: Political influences on government-owned banks in emerging markets. *Journal of Financial Economics*, 77(2):453–479.

Doner, R.F. and B.R. Schneider (2000): Business Associations and Economic Development: Why Some Associations Contribute More Than Others. *Business and Politics*, 2(3):261–288.

Esfahani, H.S. and M.T. Ramirez (2003): Institutions, infrastructure, and economic growth. *Journal of Development Economics*, 70(2):443–477.

Evans, D.S. and B. Jovanovic (1989): An estimated model of entrepreneurial choice under liquidity constraints. *Journal of Political Economy*, 97(4):808–827.

Evans, P. (1995): *Embedded Autonomy: States and Industiral Transformation*. Princeton: Princeton University Press.

Faccio, M. (2006): Politically connected firms. *The American Economic Review*, 96(1):369–386.

Faccio, M. (2010): Differences between politically connected and nonconnected firms: A cross-country analysis. *Financial Management*, 39(3):905–928.

Fajnzylber, P.; W.F. Maloney; and G.V. Montes-Rojas (2009): Relasing constraints to growth or pushing on a string? Policies and Performance of Mexican micro-firms. *Journal of Development Studies*, 45(7):1027–1047.

Ferguson, T. and H. Voth (2008): Betting on Hitler the value of political connections in Nazi Germany. *The Quarterly Journal of Economics*, 123(1):101–137.

Fisman, R. (2001): Estimating the value of political connections. *The American Economic Review*, 91(4):1095–1102.

Fisman, R. and J. Svensson (2007): Are corruption and taxation really harmful to growth? Firm level evidence. *Journal of Development Economics*, 83(1):63–75.

Haggard, S.; S. Maxfield; and B.R. Schneider (1997): *Business and the State in Developing Countries*, Cornell University Press Ithaca, NY, chap. Theories of business and business-State relations, pp. 36–60.

Hainmueller, J. (2012): Entropy balancing for causal effects: A multivariate reweighting method to produce balanced samples in observational studies. *Political Analysis*, 20(1):25–46.

Hainmueller, J. and Y. Xu (2013): ebalance: A Stata Package for Entropy Balancing. *Journal of Statistical Software*, 54(i07).

Hansen, H.; J. Rand; and F. Tarp (2009): Enterprise growth and Survival in Vietnam: Does Government Support Matter? *Journal of Development Studies*, 45(7):1048–1069.

Harriss, J. (2006): *Institutions and state-business relations.* Tech. rep., Improving Institutions for Pro-Poor Growth (IPPG).

Hayes, A.F. (2017): *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach.* Guilford Publications.

Henry, C.M. (1996): *The Mediterranean Debt Crescent: Money and Power in Algeria, Egypt, Morocco, Tunisia, and Turkey.* University Press of Florida.

Hertog, S. (2010): *Princes, Brokers, and Bureaucrats: Oil and the state in Saudi Arabia.* Cornell University Press.

Heydemann, S. (2004): *Networks of privilege in the Middle East: the politics of economic reform revisited.* New York: Palgrave Macmillan.

Hicks, R. and D. Tingley (2011): Causal mediation analysis. *Stata Journal*, 11(4):605.

Holland, P.W. (1986): Statistics and Causal Inference. *Journal of the American Statistical Association*, 81:945–960.

Imai, K.; L. Keele; and D. Tingley (2010a): A general approach to causal mediation analysis. *Psychological Methods*, 15(4):309.

Imai, K.; L. Keele; and T. Tingley, D.and Yamamoto (2011): Unpacking the black box of causality: Learning about causal mechanisms from experimental and observational studies. *American Political Science Review*, 105(4):765–789.

Imai, K.; L. Keele; and T. Yamamoto (2010b): Identification, inference and sensitivity analysis for causal mediation effects. *Statistical Science*, 25(1):51–71.

Johnson, C. (1987): *The Political Economy of New Asian Industrialism*, Ithaca: Cornell University Press, chap. Political Institutions and Economic Performance: the government business relationin Japan, South Korea and Taiwan.

Johnson, C. (1998): Economic crisis in East Asia: the clash of capitalisms. *Cambridge Journal of Economics*, 22(6):653–661.

Johnson, S. and T. Mitton (2003): Cronyism and capital controls: evidence from Malaysia. *Journal of Financial Economics*, 67(2):351–382.

Kang, D.C. (2003): Transaction costs and crony capitalism in East Asia. *Comparative Politics*, pp. 439–458.

Khan, S.; F. Islam; and S. Ahmed (2005): The Asian crisis: an economic analysis of the causes. *The Journal of Developing Areas*, 39(1):169–190.

Khwaja, A.I. and A. Mian (2005): Do lenders favor politically connected firms? Rent provision in an emerging financial market. *The Quarterly Journal of Economics*, 120(4):1371–1411.

Kienle, E. (2001): *A grand delusion: Democracy and Economic Reform in Egypt*, vol. 32. IB Tauris.

King, R.G. and R. Levine (1993): Finance and growth: Schumpeter might be right. *The Quarterly Journal of Economics*, 108(3):717–737.

King, S.J. (2009): *The new authoritarianism in the Middle East and North Africa*. Indiana University Press.

Koldertsova, A. (2011): The second corporate governance wave in the Middle East and North Africa. *OECD Journal: Financial Market Trends*, 2010(2):219–226.

Levine, R. and S. Zervos (1998): Stock markets, banks, and economic growth. *American Economic Review*, pp. 537–558.

Li, J.S. (2003): Relation-based versus rule-based governance: An explanation of the east asian miracle and asian crisis. *Review of International Economics*, 11(4):651–673.

Maxfield, S. and B.R. Schneider (1997): *Business and the State in Developing Countries*. Ithaca: Cornell University Press.

McKinnon, R.I. (1973): *Money and capital in economic development*. Brookings Institution Press.

Nguyen, T.T. and M.A. Van Dijk (2012): Corruption, growth, and governance: Private vs. state-owned firms in Vietnam. *Journal of Banking & Finance*, 36(11):2935–2948.

North, D.C. (1990): *Institutions, institutional change and economic performance*. Cambridge university press.

North, D.C. (1994): Economic performance through time. *American Economic Review*, 84(3):359–368.

Qureshi, M. and D.W. Te Velde (2013): State-business relations, investment climate reform and firm productivity in sub-Saharan Africa. *Journal of International Development*, 25(7):912–935.

Rodrik, D.; A. Subramanian; and F. Trebbi (2004): Institutions Rule: the primacy of institutions over geography and integration in economic development. *Journal of Economic Growth*, 9(2):131–165.

Rosenbaum, P.R and D.B. Rubin (1983): The central role of the propensity score in observational studies for causal effects. *Biometrika*, 70(1):41–55.

Schlumberger, O. (2007): *Debating Arab authoritarianism: dynamics and durability in nondemocratic regimes*. Stanford University Press.

Schumpeter, J. A. (1944): *Capitalism, Socialism and Democracy*. Unwin: London.

Seekings, J. and N. Nattrass (2011): State-business relations and pro-poor growth in South Africa. *Journal of International Development*, 23(3):338–357.

Sen, K. (2013): *State-business relations and economic development in Africa and India*. Routledge.

Sen, K. and D.W. Te Velde (2009): State business relations and economic growth in Sub-Saharan Africa. *Journal of Development Studies*, 45(8):1267–1283.

Shaw, E.S. (1973): *Financial deepening in economic development*. New York, NY (USA) Oxford Univ. Press.

Solon, G.; S.J. Haider; and J.M. Wooldridge (2015): What are we weighting for? *Journal of Human resources*, 50(2):301–316.

Tingley, D.; Y. Teppei; H. Kentaro; L. Keele; and K. Imai (2014): mediation: R package for causal mediation analysis. *Journal of Statistical Software*, 59(5):1–38.

VanderWeele, T.J. and J.M. Robins (2010): Signed directed acyclic graphs for causal inference. *Journal of the Royal Statistical Society: Series B (Statistical Methodology)*, 72(1):111–127.

A Figures

Figure 1: Conceptual framework

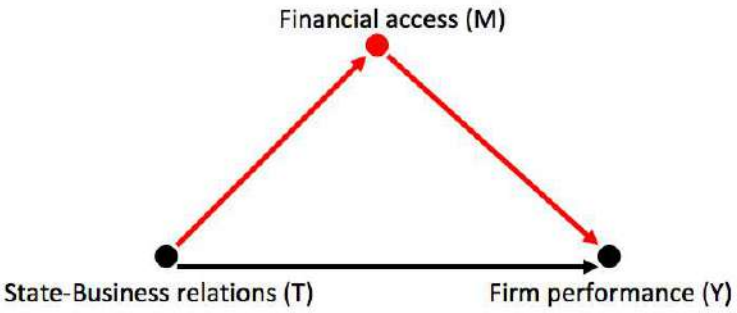
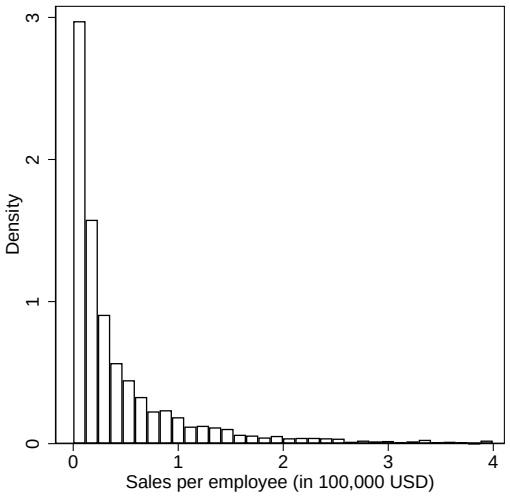
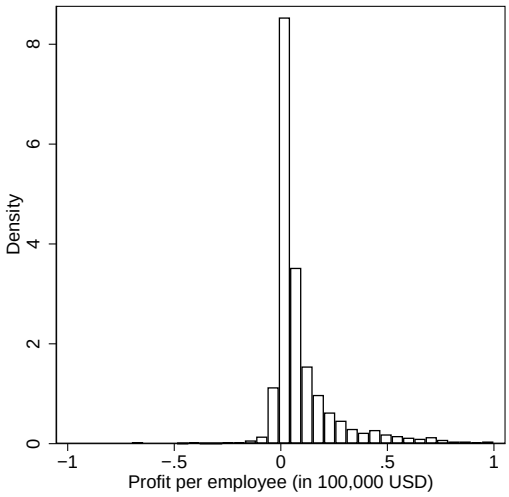


Figure 2: Density distribution of selected firm performance measures, MENA-ES 2014

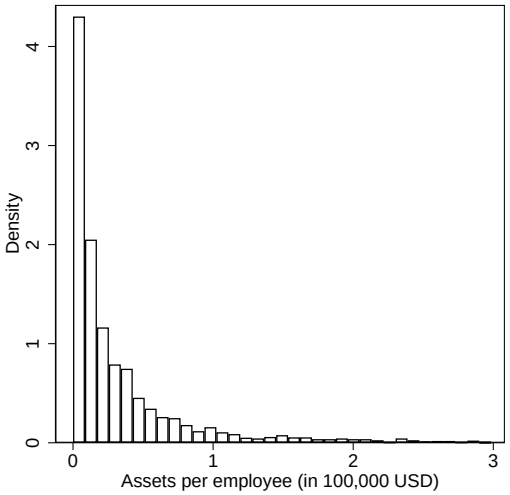
(a) Sales per employee



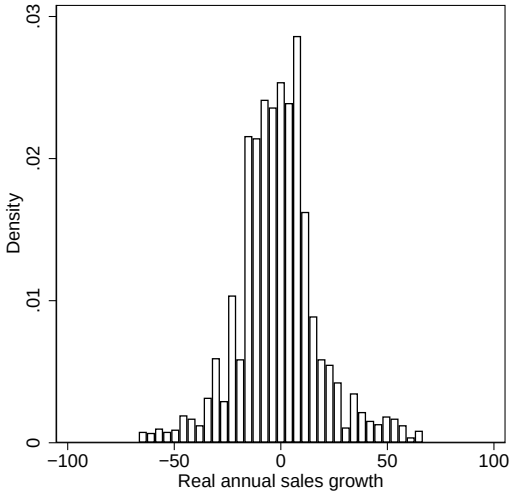
(b) Profit per employee



(c) Assets per employee

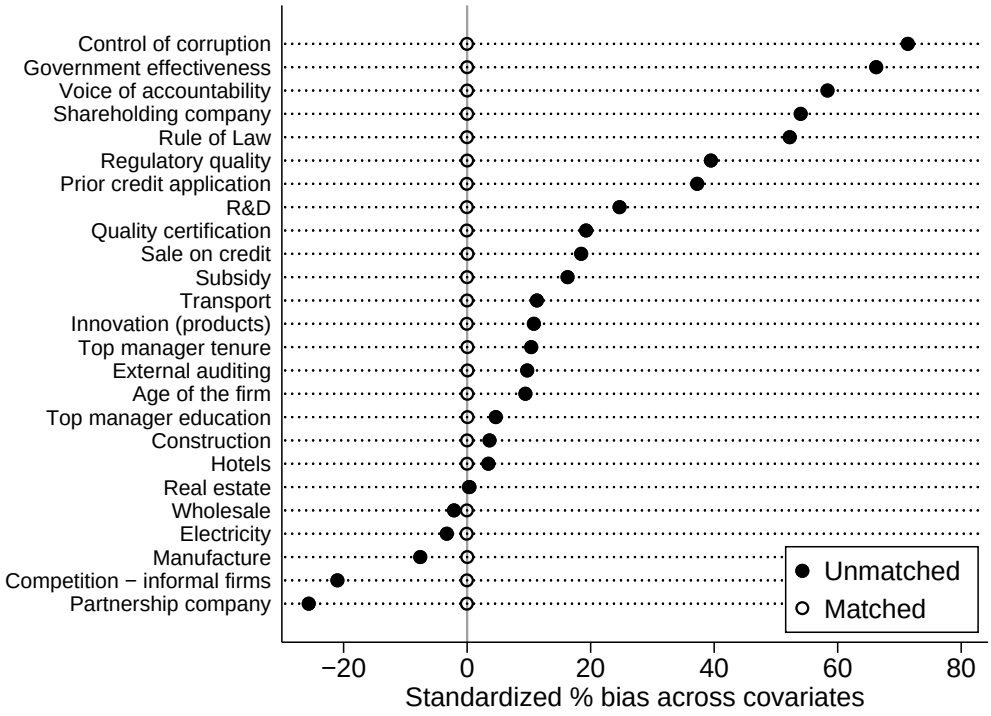


(d) Real annual sales growth



Source: Authors' own calculations.

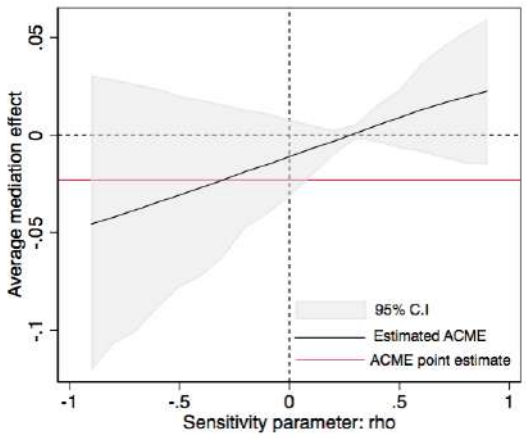
Figure 3: Covariate balance comparison by SBR status



Note: Firms with and without inefficient SBR are balanced on up to and including the third moments of all variables listed in the y-axis. The standardized percentage bias is defined as $100\left(\overline{x}_1 - \overline{x}_{0m}\right)/\sqrt{\left(s_1^2 + s_{0m}^2\right)(0.5)}$ where $\overline{x}_1$ and $\overline{x}_{0m}$ are the means of the treatment and matched control respectively and s_1^2 and s_{0m}^2 are the corresponding sample variances.

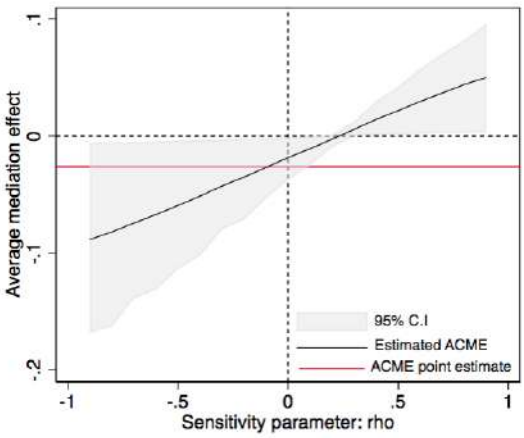
Figure 4: ACME Sensitivity analysis results based on ρ

(a) ln(SPE) (Table 3, column 2)



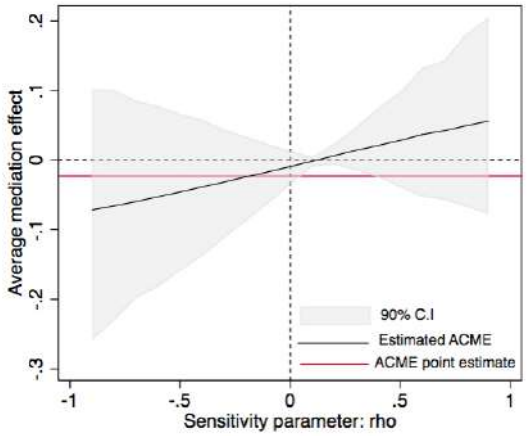
ACME is zero when $\rho = 0.3$
$R_M^{2*} R_Y^{2*} = 0.09$
$\tilde{R}_M^2 \tilde{R}_Y^2 = 0.0364$

(b) ln(SPE) (Table 3, column 5)



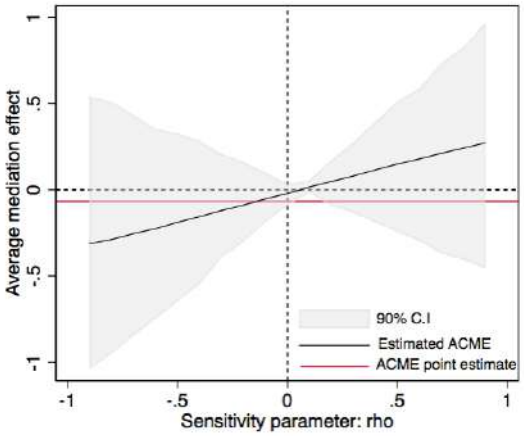
ACME is zero when $\rho = 0.2$
$R_M^{2*} R_Y^{2*} = 0.04$
$\tilde{R}_M^2 \tilde{R}_Y^2 = 0.0162$

(c) ln(APE) (Table 5, column 2)



ACME is zero when $\rho = 0.1$
$R_M^{2*} R_Y^{2*} = 0.01$
$\tilde{R}_M^2 \tilde{R}_Y^2 = 0.0151$

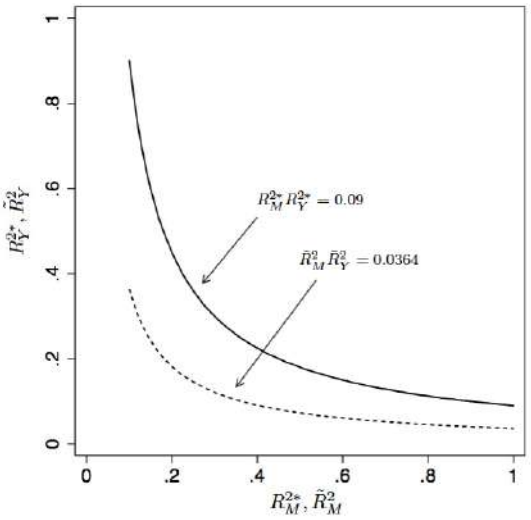
(d) RASG (Table 6, column 2)



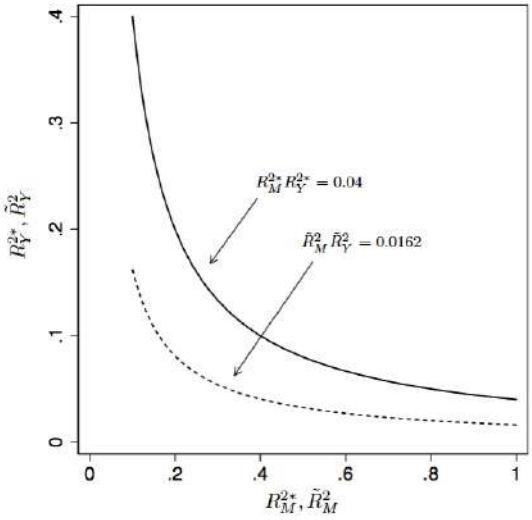
ACME is zero when $\rho = 0.1$
$R_M^{2*} R_Y^{2*} = 0.01$
$\tilde{R}_M^2 \tilde{R}_Y^2 = 0.0155$

Figure 5: ACME Sensitivity analysis results based on R^2

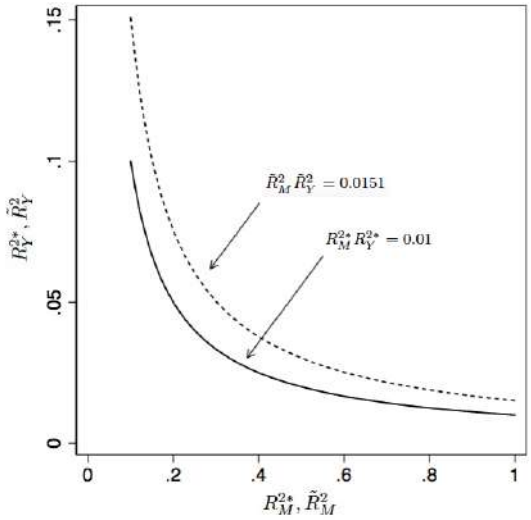
(a) ln(SPE) (Table 3, column 2)



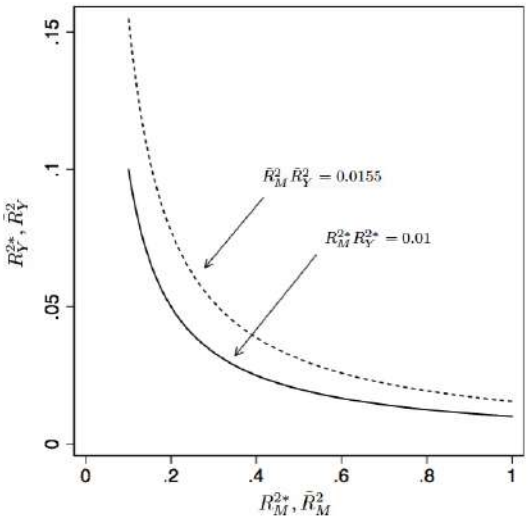
(b) ln(SPE) (Table 3, column 5)



(c) ln(APE) (Table 5, column 2)



(d) RASG (Table 6, column 2)



B Tables

Table 1: Variable coding, MENA enterprise survey 2014

Variable	Survey question (no.)	Original coding	Our coding
Financial access	Does the firm have an overdraft facility? (K7)	=1 if yes; =2 if no	=1 if yes; =0 if no
SBR measure	How much of the management time is spent on dealing with regulations? (J2)	percentage	=1 if $>10\%$; =0 if otherwise
Current sales	What were this establishment's total annual sales for all products and services? (D2)	LCU	USD
Past sales	What were this establishment's total annual sales three years ago? (N3)	LCU	USD
Assets	What is the value of your total assets? (MNAN8)	LCU	USD
Costs	What is the total annual cost? (sum of N2X)	LCU	USD
Labor force	What is the number of permanent, full-time employees? (L1)	count	count
Past Labor force	What was is the number of permanent, full-time employees three fiscal years ago? (L2)	count	count
Sale on credit	What % of this establishment's total annual sales of its goods or services was sold on credit? (K2C)	percentage	=1 if $>0\%$; =0 if 0%
Prior credit application	Did this establishment apply for any loans or lines of credit in the last fiscal year? (K16)	=1 if yes; =2 if no	=1 if yes; =0 if no
Firm's legal status	What is the firm's current legal status? (B1)	=1 Shareholding (shares traded) =2 Shareholding (non-traded shares) =3 Sole proprietorship =4 Partnership =5 Ltd partnership =6 other	a dummy variable is created for each of the following: shareholding; partnership; sole proprietorship
Innovation	During the last three years, has this establishment introduced new or significantly improved products or services? (H1)	=1 if yes; =2 if no	=1 if yes; =0 if no
R&D	Does the firm spend on formal R&D or contracted with other companies? (H7)	=1 if yes; =2 if no	=1 if yes; =0 if no
External auditing	Annual financial statements checked and certified by an external auditor ? (K21)	=1 if yes; =2 if no	=1 if yes; =0 if no
Competition	Does the firm compete against unregistered or informal firms? (E11)	=1 if yes; =2 if no	=1 if yes; =0 if no
Subsidy	Does the firm receive subsidies from the regional, national or local governments or from a EU source? (Subsidy)	=1 if yes; =2 if no	=1 if yes; =0 if no
Top manager education	What is the highest level of education completed by the Top Manager? (MNAB7B)	=1 university; ,... =5 Incomplete primary school	=1 if university; =0 otherwise
Top manager experience	Top Manager's number of years of experience working in this sector (B7)	years	years
Quality certification	Does the firm have an internationall-recognized quality certification? (B8)	=1 if yes; =2 if no	=1 if yes; =0 if no
Age of the firm	In what year did this establishment begin operations? (B5)	year	2014 − operation year
Size of the firm (employee based)	What is the size of the firm? (A6A)	=1 if small; =2 if medium =3 if large	a dummy variable is created for each category

Note: The MENA enterprise manufacturing module survey questionnaire can be found at: http://ebrd-beeps.com/wp-content/uploads/2015/07/mena_es_q_mnf.pdf

Table 2: Descriptive statistics, MENA-ES 2014

Variable	Overall				Treatment		Control		Difference
	mean (s.d)	min.	max.	# obs.	mean (s.d)	# obs.	mean (s.d)	# obs.	Diff. [s.e]
Financial access (mediator)	0.32 (0.47)	0	1	4570	0.44 (0.50)	878	0.29 (0.45)	3692	0.15***[0.02]
SBR inefficiency (treatment)	0.19 (0.39)	0	1	4570	-	-	-	-	-
Firm performance (outcome)									
Sales per employee (SPE)	1.33 (18.48)	≈ 0	641.33	3196	0.68 (1.52)	669	1.50 (20.77)	2527	-0.82*[0.42]
Profit per employee (PPE)	0.53 (15.19)	-6.03	640.37	1781	0.16 (0.52)	341	0.62 (16.89)	1440	-0.46 [0.45]
Assets per employee (APE)	10.11 (110.45)	≈ 0	3052.73	3339	21.98 (155.06)	645	7.27 (96.58)	2694	14.70**[6.38]
Real annual sales growth (RASG)	-1.01 (19.13)	-66.67	66.67	3392	-1.29 (18.32)	713	-0.94 (0.37)	2679	-0.35 [0.78]
Firm-level control variables									
Sale on credit	0.67 (0.47)	0	1	4570	0.74 (0.44)	878	0.66 (0.47)	3692	0.08***[0.02]
Prior credit application	0.17 (0.38)	0	1	4570	0.29 (0.46)	878	0.14 (0.35)	3692	0.15***[0.02]
Innovation (products, services)	0.26 (0.44)	0	1	4570	0.30 (0.46)	878	0.25 (0.43)	3692	0.05***[0.02]
Expenditure on R&D	0.11 (0.31)	0	1	4570	0.17 (0.38)	878	0.09 (0.28)	3692	0.08***[0.01]
External auditing	0.71 (0.45)	0	1	4570	0.75 (0.44)	878	0.70 (0.46)	3692	0.04***[0.02]
Competition	0.45 (0.50)	0	1	4570	0.37 (0.48)	878	0.47 (0.50)	3692	-0.10***[0.02]
Subsidy	0.05 (0.22)	0	1	4570	0.08 (0.27)	878	0.04 (0.20)	3692	0.04***[0.009]
Quality certification	0.18 (0.39)	0	1	4570	0.24 (0.43)	878	0.17 (0.37)	3692	0.08***[0.02]
Shareholding company	0.29 (0.45)	0	1	4570	0.49 (0.50)	878	0.24 (0.43)	3692	0.25***[0.02]
Partnership company	0.34 (0.47)	0	1	4570	0.24 (0.43)	878	0.36 (0.48)	3692	-0.12***[0.02]
Top manager experience (years)	21.60 (11.96)	1	70	4570	22.60 (11.89)	878	21.37 (11.96)	3692	1.24***[0.45]
Top manager education (university)	0.70 (0.46)	0	1	4570	0.71 (0.45)	878	0.69 (0.46)	3692	0.02 [0.02]
Age of the firm	20.88 (15.96)	1	157	4570	22.08 (15.53)	878	20.59 (16.04)	3692	1.49** [0.57]
Size of the firm									
Small	0.46 (0.50)	0	1	3834	0.38 (0.49)	589	0.47 (0.50)	3245	-0.09***[0.02]
Medium	0.33 (0.47)	0	1	3834	0.29 (0.46)	589	0.33 (0.47)	3245	-0.04*[0.02]
Large	0.21 (0.41)	0	1	3834	0.32 (0.47)	589	0.19 (0.39)	3245	0.13***[0.02]
Industrial control variables									
Manufacture	0.57 (0.49)	0	1	4570	0.54 (0.50)	878	0.58 (0.49)	3692	-0.04**[0.02]
Construction	0.04 (0.20)	0	1	4570	0.05 (0.22)	878	0.04 (0.20)	3692	0.007 [0.008]
Wholesale	0.24 (0.43)	0	1	4570	0.23 (0.42)	878	0.24 (0.43)	3692	-0.009 [0.02]
Real Estate	0.005 (0.07)	0	1	4570	0.006 (0.08)	878	0.005 (0.07)	3692	0.0003 [0.003]
Accommodation	0.07 (0.25)	0	1	4570	0.07 (0.26)	878	0.06 (0.25)	3692	0.009 [0.010]
Transport	0.07 (0.26)	0	1	4570	0.09 (0.29)	878	0.06 (0.25)	3692	0.03***[0.01]
Country-level control variables									
Government effectiveness	-0.59 (0.38)	-1.27	-0.01	4570	-0.39 (0.39)	878	-0.64 (0.36)	3692	0.25***[0.01]
Rule of Law	-0.44 (0.36)	-1.27	0.37	4570	-0.29 (0.33)	878	-0.47 (0.36)	3692	0.18***[0.01]
Regulatory quality	-0.30 (0.25)	-0.69	0.19	4570	-0.23 (0.23)	878	-0.32 (0.25)	3692	0.09***[0.009]
Control of corruption	-0.52 (0.33)	-1.25	0.07	4570	-0.34 (0.32)	878	-0.56 (0.32)	3692	0.23***[0.01]
Voice of accountability	-0.71 (0.30)	-1.43	-0.17	4570	-0.57 (0.34)	878	-0.75 (0.27)	3692	0.18***[0.01]
Starting business (days to frontier)	78.85 (13.49)	27.69	87.08	3834	77.71 (16.23)	589	79.05 (12.93)	3245	-1.34*[0.71]

Notes: All firm performance measures are expressed in 100,000 US dollars. Standard deviations in parentheses, standard errors in brackets.

*, ** and *** denote statistical significance at 10, 5, and 1 percent level respectively.

Table 3: Causal mediation effects of SBR on firm performance, MENA-ES 2014

	(1)	(2)	(3)	(4)	(5)	(6)
Mediator equation			**Financial access**			
SBR inefficiency	0.455*** (0.057)	-0.075 (0.069)	-0.075 (0.07)	-0.175** (0.084)	-0.146** (0.061)	-0.199*** (0.073)
Sale on credit	-	0.330*** (0.064)	0.330*** (0.062)	0.383*** (0.091)	0.357*** (0.058)	0.268*** (0.063)
Prior credit application	-	0.967*** (0.068)	0.967*** (0.066)	1.060*** (0.099)	0.879*** (0.06)	-0.725*** (0.071)
Quality certification	-	0.410*** (0.064)	0.410*** (0.067)	0.199* (0.12)	0.455*** (0.06)	0.432*** (0.066)
Subsidy	-	0.258**(0.11)	0.258** (0.12)	0.141 (0.179)	-	-
Shareholding company	-	0.617*** (0.072)	0.617*** (0.073)	0.648*** (0.11)	0.694*** (0.067)	0.669*** (0.075)
Partnership company	-	0.156** (0.068)	0.156** (0.067)	0.270** (0.107)	0.159** (0.067)	0.128* (0.074)
Top manager education	-	0.207*** (0.061)	0.207*** (0.066)	-0.019 (0.094)	-	-
Age of the firm	-	0.005*** (0.002)	0.005*** (0.002)	0.006** (0.003)	0.005*** (0.002)	0.002 (0.002)
Size of the firm	-					
Small	-	-	-	-	-	-0.134** (0.066)
Large	-	-	-	-	-	0.297*** (0.077)
Control of corruption	-	-0.504*** (0.117)	-0.504*** (0.113)	-0.331** (0.172)	-0.477*** (0.114)	-0.684*** (0.148)
Regulatory quality	-	0.733*** (0.155)	0.733*** (0.152)	0.536** (0.211)	0.976*** (0.13)	1.814*** (0.186)
Voice of accountability	-	1.078*** (0.136)	1.078*** (0.133)	1.213*** (0.172)	1.054*** (0.127)	0.728*** ((0.172)
Starting business (dtf)	-	-	-	-	-	-0.033***(0.005)
Manufacture	-	-0.206** (0.088)	-0.206** (0.085)	-0.102 (0.125)	-0.228** (0.08)	-0.324*** (0.095)
Wholesale	-	0.272*** (0.102)	0.272*** (0.098)	0.313** (0.159)	0.192** (0.089)	-0.011 (0.107)
Accomodation	-	-0.214 (0.14)	-0.214* (0.129)	-0.240 (0.198)	-0.285** (0.126)	-0.523*** (0.150)
Constant	-0.494*** (0.026)	-0.729*** (0.141)	-0.729*** (0.145)	-0.533*** (0.206)	-0.451*** (0.123)	2.442*** (0.487)
Outcome equation			**ln (Sales per employee, $)**			
SBR inefficiency	-0.012 (0.065)	-0.184*** (0.065)	-0.243*** (0.088)	-0.393*** (0.075)	-0.132** (0.066)	-0.171** (0.079)
Financial access	1.142*** (0.057)	0.570*** (0.059)	0.537*** (0.068)	0.668*** (0.084)	0.525*** (0.057)	0.411*** (0.067)
Financial access × SBR	-	-	0.142 (0.119)	-	-	-
Quality certification	-	0.173*** (0.067)	0.176*** (0.067)	0.129 (0.109)	0.183*** (0.061)	0.214*** (0.072)
Innovation (products)	-	-0.106* (0.059)	-0.105* (0.057)	0.083 (0.087)	0.059 (0.058)	-0.037 (0.068)
Spending on R&D	-	0.374*** (0.089)	0.377*** (0.092)	0.291** (0.118)	-	-
Comp., informal firms	-	-0.123** (0.051)	-0.121** (0.052)	-0.170** (0.081)	-0.235*** (0.048)	-0.216*** (0.057)
External auditing	-	0.222*** (0.057)	0.222*** (0.057)	0.180** (0.088)	0.298*** (0.055)	0.307*** (0.063)
Shareholding company	-	0.374*** (0.073)	0.371*** (0.074)	0.363*** (0.101)	0.325*** (0.072)	0.298*** (0.083)
Partnership company	-	0.234*** (0.061)	0.235*** (0.06)	0.153 (0.103)	0.372*** (0.062)	0.348*** (0.067)
Top manager education	-	0.317*** (0.055)	0.322*** (0.053)	0.256*** (0.086)	-	-
Age of the firm	-	-0.004*** (0.002)	-0.004** (0.002)	-0.001 (0.003)	-0.003* (0.002)	-0005*** (0.002)
Size of the firm	-					
Small	-	-	-	-	-	-0.137** (0.061)
Large	-	-	-	-	-	0.063 (0.082)
Top manager experience	-	0.004 (0.002)	0.004 (0.002)	0.002 (0.003)	0.003 (0.002)	0.004* (0.002)
Control of corruption	-	-0.787*** (0.101)	-0.799*** (0.102)	-0.404*** (0.144)	-0.643*** (0.102)	-1.043*** (0.140)
Regulatory quality	-	2.247*** (0.136)	2.272*** (0.141)	2.038*** (0.191)	1.201*** (0.127)	1.563*** (0.198)
Voice of accountability	-	0.390*** (0.121)	0.379*** (0.12)	0.656*** (0.166)	0.525*** (0.12)	0.727*** (0.170)
Starting business (dtf)	-	-	-	-	-	-0.028***(0.006)
Manufacture	-	-0.082 (0.085)	-0.086 (0.087)	-0.236** (0.114)	-0.180** (0.088)	-0.141 *** (0.103)
Wholesale	-	0.719*** (0.095)	0.712*** (0.095)	0.662*** (0.116)	0.725*** (0.103)	0.630*** (0.119)
Accomodation	-	-0.682*** (0.133)	-0.685*** (0.143)	-0.686*** (0.153)	-0.697*** (0.141)	-0.751*** (0.162)
Constant	9.588*** (0.035)	9.750*** (0.156)	9.753*** (0.164)	10.271*** (0.195)	9.764*** (0.149)	12.226*** (0.561)
ACME	0.187**	-0.023**	-0.025**	-0.045***	-0.026***	-0.026**
ACME - treated	-	-	-0.028**	-	-	-
ACME - control	-	-	-0.022**	-	-	-
ADE	-0.013	-0.186***	-0.194**	-0.395***	-0.132	-0.170**
ADE - treated	-	-	-0.197**	-	-	-
ADE - control	-	-	-0.191**	-	-	-
ATE	0.175**	-0.210***	-0.219***	-0.440***	-0.157**	-0.196**
% ATE mediated	106.718	11.169	11.321	10.223	16.341	13.105
via ACME treated	-	-	12.634	-	-	-
via ACME control	-	-	10.008	-	-	-
VIF (mediator : outcome)	1.00 : 1.02	1.59 : 1.59	1.59 : 1.70	1.59 : 1.59	1.88 : 1.83	2.27 : 2.14
R-squared (mediator)	0.0165	0.2672	0.2672	0.2964	0.3082	0.3444
R-squared (outcome)	0.1155	0.2964	0.2967	0.3302	0.2156	0.2181
Number of observations	3196	3196	3196	3196	3760	3090
Includes Turkey	No	No	No	No	Yes	Yes

Notes: The unit of observation is the firm. The treatment is SBR inefficiency. Bootstrapped standard errors in parentheses in columns (1)-(3) and (5)-(6) with 1000 replications. Column (4) uses entropy balancing weights. *, ** and *** denote statistical significance at the 10, 5 and 1 percent level respectively. VIF: variance inflating factor, ACME: average causal mediation effect, ADE: average direct effect, ATE: average total effect.

Table 4: Causal mediation effects of SBR on firm performance, MENA-ES 2014

	(1)	(2)	(3)	(4)	(5)
Mediator equation			**Financial access**		
SBR inefficiency	0.689*** (0.081)	-0.040 (0.11)	-0.181 (0.127)	-0.092 (0.102)	0.031 (0.118)
Sale on credit	-	0.095 (0.095)	0.221 (0.156)	0.157* (0.089)	0.115 (0.101)
Prior credit application	-	0.918*** (0.11)	1.070*** (0.137)	0.886*** (0.096)	0.790*** (0.124)
Quality certification	-	0.525*** (0.101)	0.509*** (0.131)	0.583*** (0.092)	0.544*** (0.103)
Subsidy	-	0.373** (0.173)	0.390* (0.223)	-	-
Shareholding company	-	0.600*** (0.114)	0.498*** (0.157)	0.635*** (0.102)	0.605*** (0.118)
Partnership company	-	0.189* (0.105)	0.062 (0.159)	0.209** (0.102)	0.260** (0.120)
Top manager education	-	0.403*** (0.096)	0.181 (0.136)	-	-
Age of the firm	-	0.003 (0.002)	0.004 (0.004)	0.001 (0.002)	-0.001 (0.003)
Size of the firm					
Small	-	-	-	-	-0.111 (0.106)
Large	-	-	-	-	0.434*** (0.116)
Control of corruption	-	-0.658*** (0.196)	-0.570* (0.315)	-0.541*** (0.183)	-1.311*** (0.386)
Regulatory quality	-	0.725*** (0.237)	1.013*** (0.357)	0.555*** (0.2)	1.657*** (0.334)
Voice of accountability	-	2.020*** (0.219)	1.813*** (0.258)	1.963*** (0.204)	1.040*** (0.347)
Starting business (dtf)	-	-	-	-	0.063 (0.042)
Manufacture	-	0.659 (0.766)	0.334 (0.472)	0.595(1.017)	0.700 (1.730)
Wholesale	-	0.788 (0.778)	0.635 (0.503)	0.783(1.016)	0.798 (1.759)
Accomodation	-	0.339 (0.897)	0.698 (0.599)	0.366(1.11)	0.426 (1.804)
Constant	-0.722*** (0.039)	-1.088 (0.795)	-0.544 (0.545)	-0.771(1.045)	-6.913* (4.101)
Outcome equation			**ln (Profit per employee, $)**		
SBR inefficiency	-0.208* (0.11)	-0.335*** (0.123)	-0.511*** (0.181)	-0.146 (0.115)	-0.102 (0.132)
Financial access	0.736*** (0.098)	0.230** (0.101)	0.480*** (0.174)	0.303*** (0.098)	0.283** (0.120)
Quality certification	-	0.183* (0.105)	0.106 (0.221)	0.310*** (0.100)	0.334*** (0.121)
Innovation (products, services)	-	-0.194* (0.103)	0.142 (0.23)	-0.045 (0.097)	-0.097 (0.112)
Spending on R&D	-	0.598*** (0.161)	0.647** (0.281)	-	-
Comp. against informal firms	-	-0.153* (0.08)	-0.234 (0.191)	-0.225*** (0.082)	-0.191** (0.093)
External auditing	-	0.209** (0.1)	0.035 (0.194)	0.248*** (0.091)	0.266*** (0.102)
Shareholding company	-	0.221* (0.115)	0.263 (0.173)	0.264** (0.111)	0.271** (0.128)
Partnership company	-	0.057 (0.1)	0.064 (0.179)	0.123 (0.101)	0.045 (0.107)
Top manager education	-	0.442*** (0.095)	0.519*** (0.193)	-	-
Age of the firm	-	-0.005* (0.003)	0.001 (0.005)	-0.005* (0.003)	-0.008** (0.003)
Size of the firm					
Small	-	-	-	-	-0.147 (0.103)
Large	-	-	-	-	-0.172 (0.122)
Top manager experience	-	0.003 (0.004)	-0.001 (0.006)	-0.0004 (0.004)	0.0003 (0.004)
Control of corruption	-	-1.295*** (0.191)	-0.848** (0.355)	-1.224*** (0.204)	-0.631 (0.404)
Regulatory quality	-	2.620*** (0.24)	2.187*** (0.4)	2.372*** (0.234)	1.820*** (0.375)
Voice of accountability	-	0.449*** (0.239)	0.346 (0.31)	0.315 (0.226)	0.644** (0.317)
Starting business (dtf)	-	-	-	-	-0.079** (0.033)
Manufacture	-	-0.054 (0.468)	-0.649 (0.737)	-0.131 (0.455)	-0.219 (0.414)
Wholesale	-	0.620 (0.497)	0.010 (0.774)	0.593 (0.484)	0.819* (0.477)
Accomodation	-	0.064 (0.673)	-0.540 (0.759)	-0.017 (0.662)	-0.303 (0.777)
Constant	8.386 (0.053)	8.613*** (0.54)	9.164*** (0.797)	8.820*** (0.495)	15.998*** (2.913)
ACME	0.171**	-0.002	-0.009	-0.009	0.002
ADE	-0.209	-0.341***	-0.519***	-0.148	-0.104
ATE	-0.038	-0.343***	-0.529***	-0.157	-0.102
% ATE mediated	-110.127	0.587	1.777	5.025	-0.997
VIF (mediator : outcome)	1.00 : 1.02	1.60 : 1.95	1.60 : 1.95	1.75 : 2.17	2.06 : 2.54
R-squared (mediator)	0.0381	0.3156	0.3579	0.3161	0.3202
R-squared (outcome)	0.0359	0.1594	0.1765	0.1484	0.1602
Number of observations	1553	1553	1553	1705	1407
Includes Turkey	No	No	No	Yes	Yes

Notes: The unit of observation is the firm. The treatment is SBR inefficiency. Bootstrapped standard errors in parentheses in columns (1), (2) and (4) with 1000 replications. Column (3) uses entropy balancing weights. *, ** and *** denote statistical significance at the 10, 5 and 1 percent level respectively. VIF: variance inflating factor, ACME: average causal mediation effect, ADE: average direct effect, ATE: average total effect.

Table 5: Causal mediation effects of SBR on firm performance, MENA-ES 2014

	(1)	(2)	(3)	(4)
Mediator equation		**Financial access**		
SBR inefficiency	0.557*** (0.057)	-0.049 (0.073)	-0.182** (0.088)	-0.033 (0.087)
Sale on credit	-	0.365*** (0.06)	0.373*** (0.094)	0.216*** (0.069)
Prior credit application	-	0.952*** (0.069)	0.996*** (0.102)	0.786*** (0.081)
Quality certification	-	0.535*** (0.072)	0.247* (0.128)	0.540*** (0.076)
Subsidy	–	0.327*** (0.122)	0.150 (0.192)	0.231 (0.147)
Shareholding company	-	0.611*** (0.073)	0.670*** (0.115)	0.603*** (0.086)
Partnership company	-	0.176*** (0.068)	0.360*** (0.111)	0.148* (0.078)
Top manager education	-	0.246*** (0.063)	0.031 (0.098)	0.392*** (0.080)
Age of the firm	-	0.006*** (0.002)	0.005* (0.003)	0.003* (0002)
Size of the firm				
Small	-	-	-	-0.200*** (0.074)
Large	-	-	-	0.180** (0.085)
Control of corruption	-	-0.392*** (0.116)	-0.125 (0.181)	-0.652*** (0.158)
Regulatory quality	-	0.503*** (0.155)	0.250 (0.231)	1.284*** (0.233)
Voice of accountability	-	1.111*** (0.137)	1.278*** (0.185)	0.809*** (0.188)
Starting business (dtf)	-	-	-	-0.037*** (0.006)
Manufacture	-	-0.278*** (0.09)	-0.111 (0.127)	-0.298*** (0.096)
Wholesale	-	0.207** (0.096)	0.304* (0.169)	0.033 (0.114)
Accomodation	-	-0.176 (0.135)	-0.203 (0.211)	-0.374** (0.163)
Constant	-0.645*** (0.026)	-0.851*** (0.139)	-0.550*** (0.208)	2.240*** (0.589)
Outcome equation		**ln (Assets per employee, $)**		
SBR inefficiency	0.148 (0.181)	-0.627*** (0.204)	-0.787*** (0.215)	-0.618** (0.244)
Financial access	1.641*** (0.143)	0.729*** (0.153)	0.874*** (0.245)	0.612*** (0.181)
Quality certification	-	0.276* (0.165)	0.768*** (0.288)	0.138 (0.192)
Innovation (products)	-	0.207 (0.152)	0.596** (0.236)	0.263 (0.179)
Spending on R&D	-	0.688*** (0.204)	0.537* (0.317)	0.657*** (0.232)
Competition against informal firms	-	0.140 (0.134)	-0.146 (0.218)	0.231 (0.152)
External auditing	-	0.852*** (0.165)	0.633*** (0.236)	0.895*** (0.184)
Shareholding company	-	-0.032 (0.197)	0.672** (0.31)	-0.077 (0.225)
Partnership company	-	0.290 (0.184)	0.516* (0.298)	0.255 (0.197)
Top manager education	-	0.229 (0.163)	-0.214 (0.221)	0.343* (0.182)
Age of the firm	-	0.002 (0.004)	0.004 (0.006)	0.0002 (0.005)
Size of the firm				
Small	-	-	-	0.336* (0.191)
Large	-	-	-	0.163 (0.211)
Top manager experience	-	0.004 (0.006)	0.014 (0.01)	0.005 (0.007)
Control of corruption	-	0.465 (0.353)	0.497 (0.522)	0.792* (0.461)
Regulatory quality	-	-1.379*** (0.492)	-1.356* (0.727)	-2.482*** (0.871)
Voice of accountability	-	3.730*** (0.404)	2.904*** (0.509)	4.971*** (0.723)
Starting business (dtf)	-	-	-	-0.056*** (0.011)
Manufacture	-	0.577** (0.242)	0.443 (0.322)	0.695*** (0.262)
Wholesale	-	0.390 (0.313)	1.002** (0.404)	0.433 (0.369)
Accomodation	-	-0.566 (0.439)	0.788 (0.506)	-0.614 (0.495)
Constant	8.505*** (0.092)	9.643*** (0.469)	8.889*** (0.604)	14.627*** (1.219)
ACME	0.317**	-0.023*	-0.076***	-0.013
ADE	0.145	-0.633***	-0.793***	-0.618**
ATE	0.462**	-0.656***	-0.869***	-0.631**
% ATE mediated	68.143	3.490	8.744	2.123
VIF (mediator : outcome)	1.00 : 1.02	1.61 : 1.61	1.61 : 1.61	1.75 : 1.64
R-squared (mediator)	0.0243	0.2762	0.3038	0.2707
R-squared (outcome)	0.0339	0.1159	0.1736	0.1050
Number of observations	3339	3339	3339	2719

Notes: The unit of observation is the firm. The treatment is SBR inefficiency. The sample excludes all Turkish firms. Bootstrapped standard errors in parentheses in columns (1), (2) and (4) with 1000 replications. Columns (3) uses entropy balancing weights. *, ** and *** denote statistical significance at the 10, 5 and 1 percent level respectively. VIF: variance inflating factor, ACME: average causal mediation effect, ADE: average direct effect, ATE: average total effect.

Table 6: Causal mediation effects of SBR on firm performance, MENA-ES 2014

	(1)	(2)	(3)	(4)
Mediator equation		**Financial access**		
SBR inefficiency	0.454*** (0.052)	-0.048 (0.063)	-0.138* (0.079)	-0.059 (0.080)
Sale on credit	-	0.347*** (0.061)	0.395*** (0.087)	0.242*** (0.069)
Prior credit application	-	0.943*** (0.065)	1.011*** (0.094)	0.826*** (0.078)
Quality certification	-	0.407*** (0.066)	0.219* (0.113)	0.422*** (0.072)
Subsidy	-	0.284** (0.113)	0.146 (0.173)	0.152 (0.136)
Shareholding company	-	0.593*** (0.069)	0.613*** (0.103)	0.502*** (0.081)
Partnership company	-	0.139** (0.066)	0.228** (0.101)	0.073 (0.074)
Top manager education	-	0.201*** (0.057)	0.005 (0.089)	0.375*** (0.074)
Age of the firm	-	0.004*** (0.002)	0.006** (0.003)	0.003 (0.002)
Size of the firm				
Small	-	-	-	-0.193*** (0.070)
Large	-	-	-	0.268*** (0.080)
Control of corruption	-	-0.515*** (0.111)	-0.339** (0.167)	-0.940*** (0.136)
Regulatory quality	-	0.886*** (0.149)	0.684*** (0.206)	1.556*** (0.214)
Voice of accountability	-	0.979*** (0.119)	1.156*** (0.158)	0.687*** (0.172)
Starting business (dtf)	-	-	-	-0.014*** (0.004)
Manufacture	-	-0.231*** (0.082)	-0.123 (0.12)	-0.293*** (0.098)
Wholesale	-	0.197** (0.094)	0.218 (0.148)	0.041 (0.108)
Accomodation	-	-0.196 (0.135)	-0.186 (0.19)	-0.396*** (0.147)
Constant	-0.494*** (0.026)	-0.692*** (0.132)	-0.480** (0.198)	0.314 (0.396)
Outcome equation		**Real annual sales growth (%)**		
SBR inefficiency	-1.101 (0.793)	-2.160** (0.876)	-2.700*** (0.895)	-2.397** (1.094)
Financial access	4.323*** (0.694)	1.851** (0.8)	0.935 (1.01)	1.551 (0.956)
Quality certification	-	2.052** (0.961)	1.451 (1.278)	2.072* (1.069)
Innovation (products)	-	1.953** (0.827)	1.233 (1.032)	1.329 (0.946)
Spending on R&D	-	2.796** (1.186)	4.744*** (1.363)	2.313 (1.513)
Competition against informal firms	-	-1.089 (0.703)	-1.277 (0.931)	-1.553** (0.767)
External auditing	-	0.739 (0.701)	0.653 (1.032)	0.024 (0.916)
Shareholding company	-	0.702 (0.935)	-0.102 (1.18)	0.723 (1.129)
Partnership company	-	-0.075 (0.817)	0.344 (1.289)	-0.267 (0.903)
Top manager education	-	0.599 (0.763)	2.127* (1.198)	1.248 (0.884)
Age of the firm	-	-0.080*** (0.022)	-0.057* (0.033)	-0.086*** (0.025)
Size of the firm				
Small	-	-	-	0.367 (0.900)
Large	-	-	-	0.741 (1.077)
Top manager experience	-	-0.031 (0.032)	-0.107** (0.049)	-0.006 (0.037)
Control of corruption	-	-4.094*** (1.372)	-6.297*** (2.051)	-3.770** (1.834)
Regulatory quality	-	16.078*** (1.741)	15.150*** (2.662)	12.908*** (2.458)
Voice of accountability	-	1.991(1.415)	6.037*** (1.732)	7.397*** (2.271)
Starting business (dtf)	-	-	-	-0.183*** (0.042)
Manufacture	-	4.407*** (1.198)	5.818*** (1.597)	5.396*** (1.495)
Wholesale	-	3.155** (1.341)	5.028*** (1.701)	3.992** (1.692)
Accomodation	-	-0.441 (1.864)	0.338 (2.21)	0.374 (2.133)
Constant	-2.283*** (0.429)	0.144 (1.979)	1.714 (2.523)	17.401*** (5.247)
ACME	0.667**	-0.067*	-0.068	-0.033
ADE	-1.114	-2.177**	-2.718**	-2.395**
ATE	-0.447	-2.245**	-2.787**	-2.428**
% ATE mediated	-62.642	2.993	2.452	1.340
VIF (mediator : outcome)	1.00 : 1.02	1.59 : 1.57	1.59 : 1.57	1.73 : 1.70
R-squared (mediator)	0.0165	0.2530	0.2773	0.2523
R-squared (outcome)	0.0114	0.0655	0.0893	0.0711
Number of observations	3392	3392	3391	2745

Notes: The unit of observation is the firm. The treatment is SBR inefficiency. The sample excludes all Turkish firms. Bootstrapped standard errors in parentheses in columns (1), (2) and (4) with 1000 replications. Column (3) uses entropy balancing weights. *, ** and *** denote statistical significance at the 10, 5 and 1 percent level respectively. VIF: variance inflating factor, ACME: average causal mediation effect, ADE: average direct effect, ATE: average total effect.