Review of Economic Perspectives – Národohospodářský obzor
Volume 25, Issue 2, 2025, pp. 123–146, DOI: 10.2478/revecp-2025-0008

HOW BUSINESS ENVIRONMENT CONSTRAINTS SHAPE FIRM PERFORMANCE: EVIDENCE FROM GLOBAL MICRO-LEVEL DATA

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ABSTRACT

This study investigates how business environment constraints shape firm performance using micro-level data from the World Bank Enterprise Surveys (WBES). We assess the impact of access to finance, corruption, electricity reliability, political stability, labour regulations, and infrastructure on productivity and output, measured by total factor productivity (TFP), sales per worker, value added per worker, and sales-to-labour cost ratios. To address endogeneity due to reverse causality, omitted variables, and measurement error, we employ an instrumental variables approach using two-stage least squares (2SLS) estimators. The instruments are derived from national-level indicators capturing structural economic and institutional conditions, including capital formation, inflation volatility, education quality, infrastructure, and governance. The findings show that limited access to finance, unreliable electricity supply, and corruption significantly reduce firm performance across multiple metrics. Political instability exerts no short-term effect on productivity but adversely influences value added per worker, highlighting its long-term implications for investment and growth. Firms constrained by inadequate human capital also perform worse, highlighting the importance of financial inclusion, infrastructure development, and institutional quality. Policy efforts should focus on improving access to finance, strengthening anti-corruption mechanisms, investing in reliable infrastructure, and enhancing regulatory predictability to foster competitiveness and economic resilience.

KEY WORDS

business environment, firm performance, financial access, governance, productivity

JEL CODES

D22, D24, L25, O12, O43, G32

1 INTRODUCTION

The business environment (BE) plays a pivotal role in shaping firm performance through its influence on productivity, investment decisions, and competitiveness. Establishing a robust institutional framework that delivers high-quality public goods such as efficient bureaucracy, reliable infrastructure, and a skilled human resource can have a significant impact on the firm economic performance. Conversely, weak institutions characterised by policy uncertainty, corruption, and unreliable infrastructure can undermine firm efficiency and stifle development.

A conducive investment climate promotes coordination between public and private sectors, improving trust, reducing information asymmetry, and enabling efficient resource allocation. The quality of governance, access to finance, infrastructure reliability, and labour market efficiency are consistently identified as critical determinants of firm performance. While existing studies have explored these factors individually, fewer have provided an integrated assessment of how multiple dimensions of the business environment interact to influence firm outcomes across diverse economic contexts.

Existing empirical work shows that access to finance is a major constraint on firm growth and productivity, particularly for small and medium-sized enterprises (Beck et al., 2005; Beck and Demirgüç-Kunt, 2006; Ayyagari et al., 2014). Infrastructure deficiencies, especially unreliable electricity supply, have been found to substantially reduce firm productivity in developing economies (Dollar et al., 2005; Escribano et al., 2010). Corruption operates as an implicit tax on firms, distorting incentives and lowering profits and growth (Fisman and Svensson, 2007), while political instability primarily affects investment decisions and employment dynamics rather than short-run productivity (Aterido et al., 2011; Aisen and Veiga, 2013).

More recent studies continue to confirm the importance of business environment constraints for firm performance, with emerging research emphasising infrastructure, governance, resilience to shocks, and firm exit decisions. Using recent firm-level data, Roy (2025) shows that electricity reliability, access to finance, regulatory delays, and informality significantly influence firm performance across economies. Other recent work highlights the sustained role of unfriendly business climates in increasing firm exit (Orjiakor, 2022) and documents broader determinants of performance in dynamic business environments (Cicea et al., 2024; Zahra et al., 2025). Empirical evidence also points to how energy shortages harm firm productivity (Xiao et al., 2022), highlighting persistent environment-related constraints in the contemporary context.

Despite this growing literature, many existing studies examine individual constraints in isolation, rely on single-country or regional samples, or do not explicitly address endogeneity in firm-reported business environment measures. Comprehensive cross-country micro-level analyses that jointly assess multiple institutional and infrastructural constraints within a causal framework remain relatively scarce.

This study contributes to the literature in three main ways. First, using harmonised firm-level data from 134 economies, it provides a global assessment of how multiple business environment constraints jointly shape productivity and revenue-based performance. Second, it applies an instrumental variables framework to mitigate reverse causality, omitted variable bias, and perception-related measurement error in firm-reported obstacles. Third, it evaluates impacts across several complementary performance indicators, offering a more comprehensive picture of firm responses to institutional and infrastructural barriers.

The empirical analysis utilises data from the World Bank Enterprise Surveys (WBES) conducted between 2006 and 2023, which provide consistent firm-level information on the investment climate across countries. Firm performance is measured using several indicators, including total factor productivity (TFP), sales per worker, value added per worker, and sales-to-labour cost ratios. To address potential endogeneity due to reverse causality, omitted variable bias, or measurement error, we apply an instrumental variables (IV) approach within a two-stage least squares (2SLS) framework. The instruments are constructed from national-level indicators reflecting macroeconomic stability, infrastructure quality, education, and governance conditions.

The results demonstrate that access to finance, corruption, and electricity reliability are the most significant barriers to firm performance. Political instability, while not directly affecting short-term productivity, has a pronounced negative effect on value added per worker, suggesting that uncertainty primarily constrains long-term investment and growth. These findings underline

the importance of financial sector reform, anti-corruption initiatives, and infrastructure investment to foster a more enabling environment for business development.

The remainder of the study is structured as follows: Section 2 reviews the literature on the role of the business environment in firm performance. Section 3 describes the data and methods used in the empirical analysis. Section 4 presents the results, and Section 5 concludes the study.

2 LITERATURE REVIEW

Institutional economics highlights that the quality of governance and the regulatory framework fundamentally shape firm performance by influencing transaction costs, investment incentives, and productivity (North, 1990). Effective institutions reduce uncertainty, enforce property rights, and create a predictable environment conducive to investment and innovation. In contrast, bureaucratic inefficiencies, corruption, and weak rule of law increase business costs and discourage formal activity. Evans (1995) introduced the concept of "embedded autonomy," whereby the state can promote industrial development through collaboration with the private sector while maintaining independence from vested interests.

Empirical evidence consistently links better regulatory quality with higher firm productivity. Hallward-Driemeier and Pritchett (2015) and Jiang et al. (2024) show that firms facing fewer bureaucratic barriers experience greater efficiency, while Djankov et al. (2002) find that excessive regulation deters firm entry and growth. Efficient business regulations foster competitiveness by lowering the cost of doing business and facilitating entrepreneurship (Klapper et al., 2006; Audretsch et al., 2024; Valdiglesias and Quintana, 2026).

Infrastructure is another major determinant of firm productivity. Access to reliable electricity, transport, and communication networks enhances operational efficiency, while deficiencies raise production costs and restrict market access (Apeti and Ly, 2024; Aly and Ahmed, 2025). Dollar et al. (2005, 2006) and Apeti and Ly (2024) demonstrate that poor infrastructure reduces firm productivity, particularly in developing countries. Escribano and Guasch (2005) estimate significant productivity losses from infrastructure bottlenecks in Central America, while Escribano et al. (2010) find similar effects for Sub-Saharan Africa, where frequent power outages disproportionately harm small and medium enterprises (SMEs). Investment in transport and information infrastructure has been associated with integration into global value chains and improved competitiveness (Calderón and Servén, 2010).

Political stability also plays a central role in shaping investment decisions and business confidence. Instability introduces uncertainty, prompting firms to adopt risk-averse strategies that constrain growth (Banerjee and Dutta, 2022; Odei, 2024). Aterido et al. (2011) report that political instability in Sub-Saharan Africa significantly reduces firm-level investment and job creation, while Aisen and Veiga (2013) show that macroeconomic instability undermines long-term growth. Odei (2024) finds that in a panel of 42 African countries, perceived policy instability is negatively associated with firm-level product innovation, suggesting that political and policy uncertainty can discourage innovative activity. Effective governance that ensures policy continuity and contract enforcement fosters a stable business climate conducive to firm expansion.

Corruption is another major constraint on firm performance. It distorts competition by encouraging rent-seeking behaviour, raises transaction costs, and undermines investment incentives (Fisman and Svensson, 2007; Bilan and Apostoaie, 2025). Fisman and Svensson (2007) provide firm-level evidence that corruption acts as an additional tax on businesses, reducing profits and growth. Empirical studies find that corruption disproportionately affects SMEs, which lack the political connections and resources of larger firms (Campos et al., 2010). Conversely, strong institutions that enforce the rule of law and curb rent-seeking promote business development (Kaufmann et al., 2011).

Access to finance is a recurrent constraint for firms, particularly in developing economies (Arayssi et al., 2019; Bui et al., 2021). The resource-based theory (Barney, 1991) posits that firms with greater access to financial resources can invest in technology, skilled labour, and market expansion, enhancing their competitive advantage. Empirical evidence confirms that financial constraints impede firm growth and innovation (Beck et al., 2005; Beck and Demirgüç-Kunt, 2006; Beck et al., 2008; Abdisa and Hawitibo, 2021; Bui et al., 2021; Duong et al., 2024). Ayyagari et al. (2014) find that well-functioning credit markets and financial inclusion policies significantly increase firm growth and job creation. However, politically connected firms often receive preferential credit, resulting in inefficient resource allocation (Cull et al., 2012). Policies that strengthen banking regulation, expand microfinance, and support credit guarantees are thus vital for levelling the playing field (McKenzie and Woodruff, 2008).

Labour market efficiency and human capital also influence firm performance. An inadequately educated workforce limits innovation, productivity, and technological adoption (Hanushek and Woessmann, 2012; Fonseca et al., 2019). Empirical studies show that countries investing in education and research achieve higher productivity and growth (Barro and Lee, 2013). At the same time, overly rigid labour regulations can discourage formal employment and limit firm adaptability (Heckelman, 2000; Gwartney et al., 2021).

Finally, taxation and informality remain pervasive challenges in many developing economies. High or complex tax rates discourage formalisation and investment, while large informal sectors generate unfair competition for registered firms (Djankov et al., 2010; La Porta and Shleifer, 2014; Bilan and Apostoaie, 2025). Simplifying tax systems and reducing compliance costs can therefore enhance firm performance and formal sector growth (Besley and Persson, 2014; Bilan and Apostoaie, 2025).

More recent contributions continue to document the relevance of business environment constraints for firm performance, while placing greater emphasis on governance quality, infrastructure resilience, and firm exit dynamics in the post-2010 period (Orjiakor, 2022; Xiao et al., 2022; Cicea et al., 2024; Roy, 2025).

Despite extensive empirical research, important gaps remain. Many studies examine individual business environment components in isolation rather than their joint effects, and few employ causal methods that address endogeneity between firm performance and perceived constraints. Moreover, cross-country evidence remains limited, with most research focusing on single-country or regional analyses. This study addresses these gaps by using firm-level data across 134 economies and applying an instrumental variables approach to provide more robust causal insights into how business environment constraints affect firm productivity and output.

3 DATA AND METHODOLOGY

3.1 Data and Variables

The empirical analysis uses firm-level data from the World Bank Enterprise Surveys (WBES), which provide harmonised information on the business environment and firm performance across developing and emerging economies. Three complementary datasets are merged to construct the analytical sample. The first dataset is the standardised WBES Firm-Level Database, which collects information from business owners and senior managers on finance, infrastructure, regulation, competition, corruption, and firm performance. We draw from this source to obtain firm characteristics such as size, age, sector, ownership structure, managerial experience and gender, and whether firms hold internationally recognised quality certifications or belong to larger groups. The WBES identifies firms at the subnational level, allowing the inclusion of region fixed effects that capture within-country spatial heterogeneity.

The second dataset, Firm-Level TFP Estimates and Factor Ratios, covers 267 surveys conducted in 134 economies and more than 161,000 firms across forty industries (classified using two-digit ISIC Rev. 3.1 codes). The analysis spans 2006–2023. We rely on this dataset for the key outcome variables: revenue-based total factor productivity (TFPR), sales per worker, value added per worker, and sales-to-labour-cost ratios. Details of the TFP estimation method are provided by Francis et al. (2020).

TFP estimation employs the standard production function inputs: total annual sales (Y), employment (L), labour costs (W), capital stock (K), and intermediate inputs (M). Value added (VA) is calculated as sales minus input costs. Monetary values are converted from local currency to USD using official exchange rates from the World Development Indicators and deflated to 2009 values using the U.S. GDP deflator. Firms with missing or inconsistent production data are excluded, resulting in a final balanced sample of 50,754 firms from 134 countries. To ensure comparability, TFP is estimated at the two-digit ISIC level, pooling data across countries and controlling for income-level fixed effects following the World Bank's classification. Both the gross-output (YKLM) and value-added (VAKL) specifications are employed.

The third source, the Enterprise Survey Indicators Database (Global Methodology), provides country-level aggregate responses on business environment obstacles such as access to finance, electricity, corruption, and political instability. These aggregated indicators are subsequently used as instruments in the econometric analysis.

Tab. 1 summarises the main variables. The mean TFP equals 2.03 (gross-output specification) and 1.21 (value-added specification), with substantial heterogeneity across firms. Sales per worker average USD 103,938 (2009 prices), and value added per worker averages USD 35,558, both with wide dispersion, reflecting productivity differences across firms and countries.

Business environment indicators range between 0 ("no obstacle") and 4 ("very severe obstacle"). On average, tax rates (1.65), electricity supply (1.54), corruption (1.51), and political instability (1.48) are reported as the most serious barriers to firm operation, followed by access to finance (1.32) and an inadequately educated workforce (1.30).

Regarding firm characteristics, most establishments are small or medium-sized. Small firms (< 20 employees) account for 46 per cent of the sample, medium firms (20–99 employees) 34 per cent, and large firms (≥ 100 employees) 20 per cent. Only 9.8 per cent report foreign ownership and 15.8 per cent engage in exports, indicating limited international integration. About 24 per cent possess internationally recognised quality certifications. The share of firms with female top managers is 15.5 per cent, and managers have on average 18 years of experience. Private non-traded shareholding companies constitute 42 per cent of firms, while sole proprietorships account for 33 per cent, confirming that privately owned domestic firms dominate the sample. The manufacturing sector represents slightly more than half of the firms, followed by retail and other services.

Overall, the combined datasets offer rich cross-country and cross-sectoral variation that enables the empirical assessment of how business environment constraints influence firm performance while controlling for firm heterogeneity and macro-institutional context.

3.2 Rationale for Variable Selection

The selection of business environment variables follows both theoretical considerations and established empirical practice using the World Bank Enterprise Surveys. Access to finance, electricity reliability, corruption, political instability, labour regulations, workforce skills, access to land, taxation, and informal competition are among the most frequently identified constraints affecting firm productivity and growth in developing and emerging economies (Beck et al., 2005; Dollar et al., 2005; Escribano et al., 2010; Aterido et al., 2011; Ayyagari et al., 2014). These

Tab. 1: Summary Statistics

Panel A: Outcome Variables

Variables	Mean	Standard Deviation	Minimum	Maximum
Revenue-Based TFP gross output specification (YKLM)	2.025	1.888	−10.9900	8.370
Revenue-Based TFP using value-added specification (VAKL)	1.209	1.741	−5.5930	8.328
Sales per worker (in USD 2009)	103,938.300	2,382,359.000	0.0065	630 million
Value Added per Worker (in USD 2009)	35,558.420	213,636.300	0.0039	42 million
Sales per labour cost (in USD 2009)	1,421.811	188,118.600	0.0006	51 million

Panel B: Obstacles-Business Environment

Variables	Mean	Standard Deviation	Minimum	Maximum
Access to Finance	1.321	1.297	0	4
Access to Land	0.952	1.253	0	4
Corruption	1.508	1.467	0	4
Electricity	1.538	1.477	0	4
Inadequately educated workforce	1.303	1.277	0	4
Labour regulations	0.983	1.133	0	4
Political Instability	1.483	1.434	0	4
Practices of competitors in the informal sector	1.369	1.330	0	4
Tax Administration	1.278	1.252	0	4
Tax Rates	1.653	1.330	0	4
Transportation	1.136	1.241	0	4

Panel C: Continuous Control Variables

Variables	Mean	Standard Deviation	Minimum	Maximum
Establishment is a part of a large firm (Yes)	0.166	0.372	0	1
Manager if Female (Yes)	0.155	0.362	0	1
The establishment has an internationally-recognized quality certification (Yes)	0.239	0.426	0	1
Ownership (Foreign)	0.098	0.297	0	1
Exporter (Yes)	0.158	0.364	0	1
Years of Manager's Experience	18.303	11.347	0	69

Panel D: Categorical Control Variables

Firm Size		Sector		Legal Status	
Small (< 20)	46.05	Manufacturing	53.50	Shareholding company with shares trade in the stock market	5.27
Medium (20–99)	33.97	Retail	14.70	Shareholding company with non-traded shares or shares traded privately	41.99
Large (100 and over)	19.98	Other Services	31.80	Sole proprietorship	33.36
				Partnership	8.55
				Limited partnership	9.42
				Other	1.41

indicators capture complementary dimensions of institutional quality, infrastructure provision, and market functioning, which jointly shape firms' operating environments. Their inclusion is further motivated by the WBES conceptual framework, which explicitly emphasises finance, governance, infrastructure, labour markets, and regulatory burden as core components of the investment climate. Together, these variables provide a comprehensive representation of the principal structural barriers faced by firms across countries.

3.3 Rationale for the Instrumental Variables Approach

A standard Ordinary Least Squares (OLS) framework may yield biased estimates of the effects of business environment constraints on firm performance due to reverse causality, omitted firm characteristics, and perception-related measurement error (Beck et al., 2005; Aterido et al., 2011). More productive firms may report fewer obstacles because they are better able to mitigate constraints, while unobserved managerial ability or technological capacity may simultaneously influence performance and reported barriers. To address these concerns, we adopt an instrumental variables approach estimated via two-stage least squares (2SLS), following established firm-level studies using WBES data (Beck et al., 2005; Dollar et al., 2005; Ayyagari et al., 2014). The IV framework allows us to exploit exogenous variation in national institutional, infrastructural, and macroeconomic conditions to obtain more credible causal estimates of how business environment constraints affect firm outcomes.

3.4 Benchmarking Model

$$\mathrm{FP}_{isjt} = \beta_0 + \beta_1 \mathrm{BE}_{ijt} + \beta' X_{ijt} + \mu_s + l_j + \theta_t + \epsilon_{isjt} \tag{1}$$

FP_{isjt} denotes the firm performance, for firm i, in industry s, located in subnational region j (e.g., state, province, or administrative area depending on the country) and year t. In the empirical analysis, firm performance is alternately measured using revenue-based total factor productivity (TFP), sales per worker, value added per worker, and sales-to-labour cost ratios, as described in Section 3.1. BE indicates the measures of business environment. Vector X is a vector of standard control variables. Set μ_s controls for fixed-industry or sector effects. The term l_j denotes subnational region fixed effects (e.g., state, province, or administrative area), which control for time-invariant local characteristics such as geography, infrastructure endowments, institutional quality, and regional economic conditions. Set θ_t is the time-fixed effects, and ϵ is the error term. Firm performance is proxied by various variables discussed in the data section, including the Revenue-based TFP (TFPR), the value added per worker, sales per worker and labour cost. Regarding the business environment, we employ a number of indicators as proxies, which refer to opinions and perceptions on business environment and about whether specific factors are obstacles in the operation of the firm. These include access to finance and credit, political instability, tax administration and tax rates, labour regulations, customs and trade, regulations infrastructure, as obstacles to electricity supply and related interruptions in production, and corruption.

The region-area effects in regression (1) may capture geographical and cultural characteristics, such as weather and climatic differences, infrastructure properties, whether the area is coastal or landlocked and other unobserved characteristics. The time effects are included to capture time national level shocks, including weather shocks, oil prices and financial crises and other macroeconomic shocks that may affect the outcome of interest. Regarding the control variables, since we make use of a micro-level survey, we include firm characteristic described in the data section. However, to the extent that the business environment may be endogenous to firm performance, the coefficients derived by the effect of regression (1) would be invalid.

We emphasise that we consider the available dataset taking both cross-sectional and panel data surveys. In particular, in some countries, only one year of survey data is available or only cross-sectional surveys have been conducted. If we limit our analysis to panel data, these countries would be excluded, leading to an incomplete global assessment of the business environment. Hence, by incorporating cross-sectional data, we ensure broader geographic and economic representation, capturing a more comprehensive picture of business constraints across different regions.

Another reason is that obstacles in business environment vary across countries and years. Relying only on panel data might limit the ability to analyze these variations in countries where longitudinal data is unavailable. Cross-sectional data helps capture a wider range of economic conditions, regulatory frameworks, and institutional differences that might not be adequately reflected in a limited panel dataset.

3.5 Instrumental Variables and Two-Stage Least Squares

Endogeneity may arise in the relationship between business environment obstacles and firm performance for several reasons. First, reverse causality can occur if more productive firms perceive fewer obstacles because they are better equipped to overcome them (Beck et al., 2005; Aterido et al., 2011). Second, omitted variable bias may emerge when unobserved characteristics, such as managerial ability or technological capacity, simultaneously influence both firm performance and perceived constraints. Third, measurement error may result from the subjective nature of perception-based data, as firms facing identical external conditions may report different levels of obstacles depending on internal management styles or expectations.

To mitigate these concerns, the analysis adopts an Instrumental Variables (IV) approach estimated through Two-Stage Least Squares (2SLS). The chosen instruments satisfy two core requirements: they are correlated with the endogenous business environment variables (relevance), and they are exogenous to firm performance (validity). The instruments are derived from three main sources: the Enterprise Survey Indicators Database (Global Methodology), the World Development Indicators and World Risk Index Report, and complementary datasets such as the Heritage Foundation's Index of Economic Freedom and the Government Revenue Dataset (UNU-WIDER).

The first category of instruments comprises aggregate country-level perceptions from the Enterprise Survey Indicators Database, which reports the percentage of firms identifying a given obstacle, such as access to finance, electricity, corruption, or political instability, as their most severe constraint. These macro-level indicators reflect structural business environment conditions but are independent of the idiosyncratic performance of individual firms.

The second category consists of macroeconomic and institutional indicators that capture broader contextual features. For access to finance, the analysis uses Gross Fixed Capital Formation (GFCF) and inflation volatility, which jointly reflect the overall investment climate and credit market stability. Higher GFCF indicates deeper capital markets and enhanced credit availability (Levine, 2005; Beck and Demirgüç-Kunt, 2006; Ayyagari et al., 2014), while greater inflation variability raises risk premiums and constrains lending (Rajan and Zingales, 1998; Boyd et al., 2001; Mishkin, 2009). For access to land, we use the proportion of population exposed to natural disasters such as earthquakes, floods, or cyclones, which restricts land availability through physical destruction and regulatory constraints. Repeated exposure to such disasters heightens uncertainty in land markets and increases acquisition costs (Kellenberg and Mobarak, 2008; Hallegatte et al., 2019).

Institutional quality indicators are used for corruption and political instability. The analysis employs measures of Control of Corruption, Rule of Law, Government Effectiveness, and Political Stability and Absence of Violence/Terror derived from the World Governance Indicators.

Countries with weak rule of law and ineffective governance tend to experience higher corruption and political unrest, but these national characteristics are exogenous to the productivity of individual firms (Mauro, 1995; Djankov et al., 2002; Kaufmann et al., 2011). Large-scale internal displacement due to disasters or conflict, which signals state fragility, further contributes to political instability (Fearon and Laitin, 2003; Collier and Hoeffler, 2004).

Infrastructure and human capital constraints are also instrumented using macro-level indicators. For electricity, we include national measures of grid coverage, reliability of power supply, and access to alternative energy sources obtained from the World Risk Index Report. These capture exogenous variation in energy infrastructure, which strongly affects firms' reported electricity obstacles (Dollar et al., 2005; Calderón and Servén, 2010; Escribano et al., 2010). For the inadequately educated workforce, we use indicators of educational investment and attainment such as government expenditure per student, teacher supply, enrolment rates, R&D spending, research personnel, mean years of schooling, and school life expectancy. These variables represent structural differences in educational systems and human capital formation, which influence workforce quality but are unrelated to individual firm outcomes (Hanushek and Woessmann, 2012; Barro and Lee, 2013).

Labour regulation constraints are instrumented using the Index of Economic Freedom, which aggregates measures of labour market flexibility, business freedom, government size, and regulatory efficiency (Heckelman, 2000; Gwartney et al., 2021). Higher values indicate more flexible and less burdensome labour market institutions, plausibly influencing firms' perceptions of labour regulations without being affected by firm-level productivity. Similarly, tax-related obstacles are instrumented using national data on income and corporate tax rates from the Government Revenue Dataset (UNU-WIDER), following earlier studies linking taxation systems to investment climate (Djankov et al., 2010; Besley and Persson, 2014; Suárez Serrato and Zidar, 2016). Finally, for informality, the share of informal output in GDP, derived from dynamic general equilibrium (DGE) model estimates (Elgin et al., 2021), captures cross-country variation in shadow economic activity that shapes competition from unregistered firms.

The chosen instruments operate at macro or micro levels and thus are unlikely to be influenced by an individual firm's outcomes. They capture institutional, infrastructural, and educational characteristics that evolve slowly over time and are determined by national policy or geographic factors rather than firm-specific performance. Their relevance is theoretically and empirically supported by prior literature showing strong associations between these macro indicators and the corresponding business environment dimensions (Mauro, 1995; Beck et al., 2005; Calderón and Servén, 2010; Hanushek and Woessmann, 2012).

By leveraging these exogenous sources of variation, the instrumental variables approach mitigates bias from reverse causality, omitted variables, and perception errors, enabling more reliable causal inference on how business environment constraints affect firm productivity and performance.

3.6 Instrumental Variables Limitations

However, there are potential concerns regarding the use of national-level instruments. First, we may face weak instruments due to limited variation at the firm level. In particular, since the endogenous variables, obstacles in business environment, are firm-specific, but the instruments vary only at the national level, this can limit the ability of the instruments to explain firm-level variation in financial constraints. If the variation in business environment obstacles across firms within a country is substantial and not well-explained by national-level volatility, the instruments may be weak, leading to imprecise estimates in the two-stage least squares (2SLS) approach (Stock and Yogo, 2005). Second, for the IV to be valid, it must affect firm performance only through

obstacles in business environment. However, national-level variables can have direct effects on firm performance beyond their effect on business environment obstacles. For example, regarding access to finance, a country with high investment levels (GFCF) may have better infrastructure, improved technological diffusion, or higher aggregate demand, all of which could influence firm performance independently of financial access.

Similarly, inflation instability may affect firms through changes in input prices, wage adjustments, or consumer purchasing power, not just through credit market conditions. Furthermore, if national variables are themselves determined by economic conditions that also influence firm performance, the IV approach may not fully eliminate endogeneity. For instance, in countries with strong financial institutions, both GFCF and firms' access to credit may be simultaneously high due to historical financial development trends, rather than GFCF causing financial access per se.

Another example concerns access to land, where firms in disaster-prone areas may also experience productivity declines due to infrastructure damage, supply chain disruptions, or labour displacement, this could violate the exclusion restriction (i.e., the instrument affects firm performance through multiple pathways).

Despite these concerns, the use of national-level instruments for firm-level variables can be justified under specific conditions. More specifically, if firm-level financial constraints and other obstacles in business environment, are largely determined by national economic policies and conditions rather than purely firm-specific characteristics, especially corruption, political instability, electricity, transportation, telecommunications, and tax rates, then national-level instruments can be relevant. For example, previous studies have used country-level instruments for firm-level financial access effectively, particularly when financial policies and market conditions are primarily driven by national rather than local decisions (Rajan and Zingales, 1998; Beck et al., 2005). Moreover, we use one-year lagged measures of variables, such as for example regarding access to land, lagged disaster exposure aims to focus on structural land constraints rather than short-term business shocks.

4 RESULTS

4.1 Estimates

Tab. 2 and 3 present the estimates of revenue-based TFP for both value-added and gross-output specifications. Access to finance is seen as a major hindrance to firm performance. The 2SLS estimates capture a negative effect on productivity with coefficients of -0.0859 ($p < 0.01$) for the gross output specification and -0.1025 ($p < 0.01$) for the value-added specification. Similarly, corruption is significantly related to lower productivity (-0.0874, $p < 0.05$), in line with previous studies (Beck et al., 2005; Fisman and Svensson, 2007) that point out corruption as one of the strong deterrents for firm growth. Electricity supply issues also negatively contribute to productivity (-0.0607, $p < 0.05$ in the gross-output specification; -0.1194, $p < 0.01$ in the value-added specification), in line with previous studies of infrastructure bottlenecks (Escribano and Guasch, 2005; Dollar et al., 2006).

Political instability is not statistically significant, suggesting that while it may exacerbate investment decisions, its effect on firm productivity is negligible. Insufficiently educated labour and labour laws also have weak or insignificant effects on TFP, suggesting that determinants other than these may play a more significant role in explaining firm productivity.

Tab. 2: OLS and 2SLS Estimates for Revenue-Based TFP gross output specification (YKLM)

	Access to Finance		*Access to Land*		*Corruption*		*Electricity*		*Inadequately educated workforce*	
	OLS	**2SLS**	**OLS**	**2SLS**	**OLS**	**2SLS**	**OLS**	**2SLS**	**OLS**	**2SLS**
	−0.0214***	−0.0859***	0.0061	−0.0558	−0.0040	−0.0874**	−0.0022	−0.0607**	−0.0069	−0.0055
	(0.0074)	(0.0253)	(0.0077)	(0.0445)	(0.0073)	(0.0427)	(0.0068)	(0.0291)	(0.0079)	(0.0300)
No. observations	46,701	44,203	46,242	43,774	45,655	43,235	46,840	44,331	46,723	44,245
R-Square	0.0511		0.0509		0.0519		0.0516		0.0515	
Centered *R*-Square		0.0036		0.0044		0.0027		0.0041		0.0052
Weak Instrument		1,542.176		182.750		431.831		1,175.789		410.441
F-Statistic Test		[0.000]		[0.000]		[0.000]		[0.000]		[0.000]
Endogeneity Test		3.539		1.856		3.546		0.178		6.555
Hansen *J* statistic		[0.170]		[0.151]		[0.114]		[0.672]		[0.585]

	Labour regulations		*Political instability*		*Practices of competitors in the informal sector*		*Tax administration*		*Tax rates*	
	OLS	**2SLS**	**OLS**	**2SLS**	**OLS**	**2SLS**	**OLS**	**2SLS**	**OLS**	**2SLS**
	−0.0064	−0.0059	−0.0053	−0.0052	−0.0192**	−0.0267**	−0.0019	−0.0401	0.0057	−0.0372
	(0.0082)	(0.0437)	(0.0076)	(0.0381)	(0.0094)	(0.0127)	(0.0097)	(0.0776)	(0.0092)	(0.0486)
No. observations	44,447	42,091	46,274	43,804	29,848	26,831	34,878	27,063	35,317	27,444
R-Square	0.0589		0.0516		0.0521		0.0523		0.0519	
Centered *R*-Square		0.0050		0.0053		0.0049		0.0036		0.0034
Weak Instrument		1,059.591		375.666		1,345.510		188.362		498.126
F-Statistic Test		[0.000]		[0.000]		[0.000]		[0.000]		[0.000]
Endogeneity Test		3.724		5.539		2.804		5.120		3.994
Hansen *J* statistic		[0.126]		[0.642]		[0.181]		[0.128]		[0.115]

Notes: Standard errors within parentheses, *p*-values within the brackets, **, ** and * indicate significance respectively at 1%, 5% and 10% level.

Tab. 3: OLS and 2SLS Estimates for Revenue-Based TFP using value-added specification (VAKL)

	Access to Finance		*Access to Land*		*Corruption*		*Electricity*		*Inadequately educated workforce*	
	OLS	**2SLS**	**OLS**	**2SLS**	**OLS**	**2SLS**	**OLS**	**2SLS**	**OLS**	**2SLS**
	−0.0306***	−0.1025***	−0.0112	−0.0810*	−0.0114*	−0.0734*	−0.0209***	−0.1194***	−0.0182**	−0.0968***
	(0.0071)	(0.0234)	(0.0074)	(0.0413)	(0.0060)	(0.0401)	(0.0063)	(0.0278)	(0.0072)	(0.0260)
No. observations	46,701	44,203	46,242	43,774	45,655	43,235	46,840	44,331	46,723	44,245
R-Square	0.0881		0.0880		0.0870		0.0860		0.0878	
Centered *R*-Square		0.0060		0.0064		0.0052		0.0026		0.0056
Weak Instrument		1,542.176		182.750		431.831		1,175.789		410.441
F-Statistic Test		[0.000]		[0.000]		[0.000]		[0.000]		[0.000]
Endogeneity Test		2.148		7.908		4.097				8.752
Hansen *J* statistic		[0.341]		[0.102]		[0.102]				[0.363]

	Labour regulations		*Political instability*		*Practices of competitors in the informal sector*		*Tax administration*		*Tax rates*	
	OLS	**2SLS**	**OLS**	**2SLS**	**OLS**	**2SLS**	**OLS**	**2SLS**	**OLS**	**2SLS**
	−0.0147*	−0.0539	−0.0034	−0.0381	−0.0273***	−0.0965***	−0.0081	−0.0510	−0.0207**	−0.0872***
	(0.0081)	(0.0369)	(0.0071)	(0.0356)	(0.0089)	(0.0295)	(0.0090)	(0.0686)	(0.0095)	(0.0428)
No. observations	44,447	42,091	46,274	43,804	29,848	26,831	34,878	27,063	35,317	27,444
R-Square	0.0862		0.0874		0.0931		0.0900		0.0915	
Centered *R*-Square		0.0066		0.0076		0.0063		0.0079		0.0049
Weak Instrument		1,059.591		375.666		1,345.510		188.362		498.126
F-Statistic Test		[0.000]		[0.000]		[0.000]		[0.000]		[0.000]
Endogeneity Test		2.898		5.824		2.091		5.824		3.641
Hansen *J* statistic		[0.137]		[0.603]		[0.148]		[0.603]		[0.162]

Notes: Standard errors within parentheses, *p*-values within the brackets, **, ** and * indicate significance respectively at 1%, 5% and 10% level.

Tab. 4 reports the impact of business restrictions on sales per employee. Access to finance is negative and highly significant (-0.1105, $p < 0.01$), indicating financially constrained companies have lower revenues per worker. Corruption and power constraints negatively affect sales per worker, while competition from informal firms significantly reduces performance (-0.0466, $p < 0.05$), as found previously (Ayyagari et al., 2014). Value added per employee in Tab. 5 also points in the same direction. Finance availability (-0.1317, $p < 0.01$) and corruption (-0.0158, $p < 0.1$) are negatively related to value added per employee. Interestingly, political instability (-0.0594, $p < 0.01$) is negative in this specification, implying uncertainty affects the ability of firms to generate value-added output. Tax rates negatively affect value-added output (-0.0872, $p < 0.01$), as would be expected under the hypothesis that overtaxation deters firm expansion (Djankov et al., 2010).

Tab. 6 reports the results for sales per labour cost. Similar to the previous outcomes, access to finance (-0.0543, $p < 0.01$) and electricity (-0.0091, $p < 0.05$) exhibit negative and significant coefficients, suggesting that firms with greater financial constraints or electricity issues experience lower sales per labour costs. Corruption (-0.0261, $p < 0.1$) and practices of informal sector competitors (-0.0258, $p < 0.05$) are also negatively associated with sales per labour cost.

Limited access to land is another important constraint to firm expansion. The evidence suggests that firms that struggle to acquire land for business operations have poorer productivity and revenue-based performance measures. Complex land tenure systems, transaction costs, and uncertain property rights can be hindrances to investment and can restrain business expansion. In addition, the research indicates that limited access to a skilled workforce significantly restricts firm productivity and revenue realisation. The negative and significant coefficient suggests that firms facing issues in finding adequately trained workers tend to have lower total factor productivity (TFP) and value-added per worker. The lack of readiness of the workforce might restrict the ability of firms to adopt new technologies, innovate, and expand the scale of operations. The findings align with previous literature focusing on human capital as one of the key determinants of firm success.

Constrictive labour market regulations were also found to negatively impact firm performance, albeit less than financial constraints or infrastructure deficiencies. Highly restrictive hiring and firing regulations, bureaucratic labour compliance procedures, and costly labour regulations associated with firing could limit firms' ability to respond to economic conditions. While some degree of labour regulation is necessary to protect workers, excessive rigidity could discourage formal employment and firm development. Finally, our results confirm that competition from informal firms negatively affects firm performance. Significant coefficients suggest that formal firms that compete in product markets with high informal sector activity experience lower productivity and revenue collection because they compete with firms that do not respect tax payment, labour legislation, or business registration. The presence of a large informal sector can reduce market opportunities for formal firms and also generate unfair competition, particularly in low-income economies where informality is greater.

From the tables, the Weak Instrument F-statistics in most models are well above 10, indicating that the chosen instruments are sufficiently strong and should not suffer from weak instrument bias. The strength of the instruments lends credibility to the 2SLS estimates, suggesting that the IV approach is appropriately correcting for potential endogeneity. The Hansen J statistic tests the overidentifying restrictions in IV estimation. In most cases, the Hansen J statistic reports p-values above 0.1, suggesting that the instruments are valid and correctly specified. However, in some cases, the p-value is below 0.05, meaning we reject the null hypothesis of instrument validity. This suggests that the instruments may be correlated with the error term, introducing potential bias in the IV estimates. In these cases, there are concerns about instrument validity,

Tab. 4: OLS and 2SLS Estimates for Sales per Worker

	Access to Finance		*Access to Land*		*Corruption*		*Electricity*		*Inadequately educated workforce*	
	OLS	**2SLS**	**OLS**	**2SLS**	**OLS**	**2SLS**	**OLS**	**2SLS**	**OLS**	**2SLS**
	−0.0415***	−0.1105***	0.0033	−0.0529***	−0.0068**	−0.0080*	0.0007	−0.0477***	−0.0059**	−0.0533***
	(0.0032)	(0.0099)	(0.0031)	(0.0166)	(0.0029)	(0.042)	(0.0026)	(0.0128)	(0.0029)	(0.0101)
No. observations	133,487	124,571	131,131	122,481	130,223	121,632	134,271	125,248	133,644	124,704
R-Square	0.4762		0.4777		0.4765		0.4696		0.4749	
Centered *R*-Square		0.0621		0.0623		0.0643		0.0632		0.0623
Weak Instrument		4,428.805		588.254		1,719.615		3,465.356		1,111.047
F-Statistic Test		[0.000]		[0.000]		[0.000]		[0.000]		[0.000]
Endogeneity Test		3.189		203.591		104.284		27.720		273.845
Hansen *J* statistic		[0.128]		[0.000]		[0.000]		[0.000]		[0.000]

	Labour regulations		*Political instability*		*Practices of competitors in the informal sector*		*Tax administration*		*Tax rates*	
	OLS	**2SLS**	**OLS**	**2SLS**	**OLS**	**2SLS**	**OLS**	**2SLS**	**OLS**	**2SLS**
	−0.0048	−0.0148	−0.0029	−0.0302**	−0.0436***	−0.0466**	−0.0049	−0.0398	−0.0051	−0.0181
	(0.0334)	(0.0147)	(0.0027)	(0.0146)	(0.0035)	(0.0224)	(0.0036)	(0.0253)	(0.0034)	(0.0152)
No. observations	127,53	119,233	132,088	123,371	87,534	78,531	101,775	79,767	103,069	80,907
R-Square	0.4811		0.4764		0.4691		0.4870		0.4914	
Centered *R*-Square		0.0666		0.0606		0.0760		0.0715		0.0716
Weak Instrument		3,036.967		1,145.409		3,847.520		723.394		1,666.952
F-Statistic Test		[0.000]		[0.000]		[0.000]		[0.000]		[0.000]
Endogeneity Test		104.751		172.632		2.792		4.085		1.663
Hansen *J* statistic		[0.000]		[0.000]		[0.135]		[0.130]		[0.326]

Notes: Standard errors within parentheses, *p*-values within the brackets, **, ** and * indicate significance respectively at 1%, 5% and 10% level.

Tab. 5: OLS and 2SLS Estimates for Value Added per Worker

	Access to Finance		*Access to Land*		*Corruption*		*Electricity*		*Inadequately educated workforce*	
	OLS	**2SLS**	**OLS**	**2SLS**	**OLS**	**2SLS**	**OLS**	**2SLS**	**OLS**	**2SLS**
	−0.0468***	−0.1317***	−0.0075*	−0.0176*	−0.0145***	−0.0158*	−0.0006	0.0168	−0.0126**	−0.0268**
	(0.0041)	(0.0127)	(0.0042)	(0.0092)	(0.0039)	(0.0083)	(0.0035)	(0.0157)	(0.0061)	(0.0130)
No. observations	61,060	57,506	60,406	56,905	59,518	56,082	61,335	57,744	61,159	57,609
R-Square	0.5059		0.5070		0.5060		0.4983		0.5064	
Centered *R*-Square		0.0744		0.0776		0.0792		0.0792		0.0774
Weak Instrument		2,181.002		278.586		715.186		1,206.877		549.393
F-Statistic Test		[0.000]		[0.000]		[0.000]		[0.000]		[0.000]
Endogeneity Test		4.124		83.437		75.158		27.380		3.370
Hansen *J* statistic		[0.110]		[0.000]		[0.000]		[0.000]		[0.283]

	Labour regulations		*Political instability*		*Practices of competitors in the informal sector*		*Tax administration*		*Tax rates*	
	OLS	**2SLS**	**OLS**	**2SLS**	**OLS**	**2SLS**	**OLS**	**2SLS**	**OLS**	**2SLS**
	−0.0114**	−0.0357*	−0.0203**	−0.0594***	−0.0468***	−0.0556***	−0.0007	−0.0392	−0.0094**	−0.0136**
	(0.0045)	(0.0184)	(0.0094)	(0.0210)	(0.0048)	(0.0155)	(0.0048)	(0.0346)	(0.0046)	(0.0062)
No. observations	58,179	54,835	60,412	56,911	41,133	37,187	46,999	37,164	47,673	37,767
R-Square	0.5075		0.5063		0.5123		0.5157		0.5217	
Centered *R*-Square		0.0806		0.0758		0.0891		0.0803		0.0822
Weak Instrument		1,593.589		468.301		2,015.580		300.850		843.046
F-Statistic Test		[0.000]		[0.000]		[0.000]		[0.000]		[0.000]
Endogeneity Test		3.598		5.260		0.110		4.537		5.592
Hansen *J* statistic		[0.252]		[0.173]		[0.740]		[0.265]		[0.202]

Notes: Standard errors within parentheses, *p*-values within the brackets, **, ** and * indicate significance respectively at 1%, 5% and 10% level.

Tab. 6: OLS and 2SLS Estimates for Sales per Labour Cost

	Access to Finance		*Access to Land*		*Corruption*		*Electricity*		*Inadequately educated workforce*	
	OLS	**2SLS**	**OLS**	**2SLS**	**OLS**	**2SLS**	**OLS**	**2SLS**	**OLS**	**2SLS**
	−0.0268***	−0.0543***	−0.0112***	−0.0191**	−0.0051*	−0.0261*	−0.0052**	−0.0091**	−0.0129***	−0.0528***
	(0.0027)	(0.0088)	(0.0028)	(0.0082)	(0.0026)	(0.0139)	(0.0024)	(0.042)	(0.0025)	(0.0090)
No. observations	125,837	117,777	123,667	115,862	122,895	115,077	126,535	118,374	125,986	117,895
R-Square	0.1412		0.1417		0.1394		0.1406		0.1411	
Centered *R*-Square		0.0285		0.0283		0.0277		0.0283		0.0216
Weak Instrument		4,209.424		554.151		1,584.411		2,252.959		1,063.804
F-Statistic Test		[0.000]		[0.000]		[0.000]		[0.000]		[0.000]
Endogeneity Test		20.907		1.026		3.637		1.107		25.427
Hansen *J* statistic		[0.000]		[0.242]		[0.162]		[0.212]		[0.000]

	Labour regulations		*Political instability*		*Practices of competitors in the informal sector*		*Tax administration*		*Tax rates*	
	OLS	**2SLS**	**OLS**	**2SLS**	**OLS**	**2SLS**	**OLS**	**2SLS**	**OLS**	**2SLS**
	−0.0094***	−0.0387***	−0.0014	−0.0086	−0.0214***	−0.0258**	−0.0147*	−0.0381*	0.0046	−0.0128
	(0.0030)	(0.0130)	(0.0026)	(0.0134)	(0.0033)	(0.0117)	(0.0084)	(0.0227)	(0.0032)	(0.0136)
No. observations	120,446	112,850	124,604	116,672	81,298	73,005	94,775	74,146	96	75,224
R-Square	0.1426		0.1394		0.1369		0.1370		0.1378	
Centered *R*-Square		0.0288		0.0285		0.0272		0.0282		0.0297
Weak Instrument		2,940.862		1,075.583		3,643.219		682.289		1,591.964
F-Statistic Test		[0.000]		[0.000]		[0.000]		[0.000]		[0.000]
Endogeneity Test		19.566		24.190		62.452		5.329		30.816
Hansen *J* statistic		[0.000]		[0.000]		[0.000]		[0.136]		[0.136]

Notes: Standard errors within parentheses, *p*-values within the brackets, **, ** and * indicate significance respectively at 1%, 5% and 10% level.

meaning some IV estimates might still be biased. This could suggest the instruments may be directly affecting firm performance beyond their effect on business environment constraints.

4.2 Control Variables

Tab. 7 presents the OLS estimates for various control variables across the firm performance outcomes explored. We should mention that for the purposes of precision estimation, the TFPR was estimated only if the total number of observations in a sector was at least 500 (Francis et al., 2020). Furthermore, the TFP and value added was estimated using mainly manufacturing firms, which is the reason for the lower number of observations and the omitted estimated coefficients of the sector. We also emphasise that we perform the regressions, considering only access to finance as an obstacle to the business environment, while the estimates for the remaining obstacles remain very similar. The regression results indicate a non-linear (quadratic) relationship between firm age and performance measures of value added per worker and sales per labour cost, while we find an insignificant relationship in the other firm outcomes. The presence of both a linear and quadratic term for firm age suggests that firm age has a concave effect on value added per worker and sales per labour cost implying that initially, an increase in firm age increases the specific firm outcomes, but after a certain threshold, the effect reverses. The turning points are respectively 13.5 and 15.5 years.

The manager's years of experience, being part of a large firm, exporting firms, those with foreign ownership, and having an internationally recognised quality certification are positively related to the firm performance outcomes. Also, firms operating in the retail and other services, experience high performance compared to manufacturing firms. Firms with female top managers report lower firm performance on average. The negative coefficient for female top managers across firm performance metrics may reflect gender-related structural constraints, which can be systemic biases, industry selection effects, or constraints faced by female managers. In particular, female leaders may often encounter stereotypes that question their suitability for leadership roles, which can adversely affect their perceived and actual performance and are more likely to lead firms in industries with limited growth opportunities, which can influence overall firm performance metrics (Allison et al., 2023; Galsanjigmed and Sekiguchi, 2023). However, this is out of the study's topic and we do not further investigate it. Regarding the firm's legal status, non-traded or privately traded shares generally exhibit lower productivity compared to publicly traded shareholding firms. However, they generate higher sales per worker, suggesting stronger revenue generation relative to workforce size. Moreover, the increase in sales per labour cost implies that these firms may be more cost-efficient in terms of revenue per labour expenditure.

4.3 Limitations

While the study provides strong evidence that business environment constraints affect firm performance, it has certain limitations. Caution is warranted when drawing policy recommendations from models where instrument validity is questionable. Given that some instrumental variables (IVs) may be problematic, further robustness checks, such as the use of alternative instruments and sensitivity analyses, could help confirm the validity of our findings.

For instance, future studies can provide additional estimates by considering ownership gender, managerial gender, regional variations, and other specifications. Future applications can also exploit regional-level business environment variation within countries to identify more robust instruments, such as corruption levels across regions and historical infrastructure differences.

An additional limitation is that, as discussed in the methodology, the empirical analysis relies on cross-sectional data. Therefore, instead of cross-sectional surveys, tracking firms over time would

Tab. 7: OLS Estimates for the Control Variables

	DV: TFPR-YKLM	DV: TFPR-VAKL	DV: Sales per Worker	DV: Value Added per Worker	DV: Sales per Labour Cost
Log Firm Age Linear Term	−0.9098	−1.6560	−0.9978	0.0856***	0.1151***
	(1.0640)	(1.0180)	(1.0330)	(0.0288)	(0.0191)
Log Firm Age Quadratic Term				−0.0164***	−0.0210***
				(0.0059)	(0.0039)
Establishment is a part of a large firm (Yes)	0.0513*	0.1152***	0.2120***	0.1579***	−0.1368***
	(0.0276)	(0.0242)	(0.0106)	(0.0142)	(0.0095)
The establishment has an internationally-recognized quality certification (Yes)	0.0541**	0.1245***	0.3251***	0.3075***	0.1690***
	(0.0240)	(0.0211)	(0.0092)	(0.0113)	(0.0083)
Ownership (Foreign)	0.0747*	0.0595*	0.2847***	0.2760***	0.0763***
	(0.0386)	(0.0318)	(0.0141)	(0.0186)	(0.0125)
Exporter (Yes)	0.0179	0.1477***	0.1379***	0.1503***	0.0565***
	(0.0264)	(0.0225)	(0.0103)	(0.0124)	(0.0096)
Female Top Manager (Yes)	−0.0966***	−0.1207***	−0.1562***	−0.1455***	−0.0665***
	(0.0269)	(0.0236)	(0.0100)	(0.0143)	(0.0089)
Log Years of Manager's Experience	0.0426*	0.0144	0.0684***	0.0178**	0.0275***
	(0.0242)	(0.0125)	(0.0058)	(0.0071)	(0.0047)
Firm Size-Reference category Small (<20)					
Medium (20–99)	0.1293***	0.0560***	0.0889***	0.0951***	
	(0.0217)	(0.0201)	(0.0083)	(0.0109)	
Large (100 and over)	0.0734***	0.1661***	0.0747***	0.0939***	
	(0.0295)	(0.0259)	(0.0117)	(0.0147)	
Sector-Reference category Manufacturing					
Retail			0.4170***		0.3751***
			(0.0112)		(0.0106)
Other Services			0.2380***		0.0529***
			(0.0285)		(0.0076)
Legal Status-Reference category Shareholding company with shares trade in the stock market					
Shareholding company with non-traded shares or shares traded privately	−0.1711***	−0.1268***	0.0523***	−0.0681***	0.0405**
	(0.0463)	(0.0415)	(0.0178)	(0.0226)	(0.0157)
Sole proprietorship	−0.2341***	−0.1169***	−0.3580***	−0.4064***	−0.1412***
	(0.0482)	(0.0446)	(0.0196)	(0.0252)	(0.0172)
Partnership	−0.1688***	−0.0382	−0.1879***	−0.2544***	−0.0127
	(0.0529)	(0.0491)	(0.0221)	(0.0283)	(0.0195)
Limited partnership	−0.1578***	−0.0343	−0.0410*	−0.1330***	0.0153
	(0.0538)	(0.0491)	(0.0214)	(0.0272)	(0.0189)
Other	−0.2845**	−0.1675**	−0.0051	−0.0597	−0.0014
	(0.0926)	(0.0838)	(0.0035)	(0.0418)	(0.0328)

Notes: DV denotes dependent variable. Standard errors within parentheses, p-values within the brackets, ***, ** and * indicate significance respectively at 1%, 5% and 10% level.

enable causal relationships between business environment constraints and firm performance to be identified. Additional robustness tests could analyze sectoral heterogeneity and firm survival rates to identify whether specific industries (e.g., manufacturing vs. services) are more or less susceptible to specific business constraints. Besides, the study of firm entry, exit, and expansion in response to business environment challenges could yield more revealing findings.

4.4 Discussion

The findings reinforce the importance of a stable business environment for firm performance. The negative effects of finance access on income and productivity are consistent with evidence that finance limitations restrict firm development and innovation (Beck and Demirgüç-Kunt, 2006). Similarly, corruption is costly for firms, deters investment, and reduces competitiveness (Fisman and Svensson, 2007). Infrastructural deficiencies, particularly electricity, are major productivity limiting factors, validating earlier evidence of the value of stable energy to firm performance (Calderón and Servén, 2010; Escribano et al., 2010). While political instability does not have a significant impact on TFP, its negative effect on value-added per employee indicates its role in contributing to affecting firms' long-term growth strategies.

These results are largely in line with previous empirical work on firm performance in developing countries. For example, Aterido et al. (2011) reported that political instability lowers firm-level investment and employment growth substantially, consistent with our evidence for value-added per worker. Our results regarding the minimal impact of political instability on productivity are, however, consistent with Escribano et al. (2010), who reported more pronounced negative effects in Sub-Saharan Africa.

In terms of financial limitations, Beck et al. (2008) demonstrated that SMEs experience higher financing constraints than large companies, which results in slower growth rates. This is in line with our findings of a significant negative effect of access to finance on measures of productivity and revenue. Dollar et al. (2005) also concluded that electricity restrictions significantly reduce firm productivity, which is also replicated in our estimates for TFP and revenue-based performance metrics.

The degree to which corruption affects the performance of the firm has been strongly debated. Our findings, as evident in the negative impact on productivity, value added, and sales, support the findings by Campos et al. (2010), which contends that corruption is a tax on the firm activities and it creates inefficiency. However, other studies argue that corruption can facilitate doing business in rigorous regulatory environments, explaining the negative weak relationship with sales per labour cost (Dreher and Schneider, 2010).

Second, our conclusions on informal sector competition on firm performance are consistent with La Porta and Shleifer (2014), whose research found that the prevalence of the informal sector reduces formal firms' growth, particularly in poor economies. Consistent with Djankov et al. (2010) are our conclusions on the adverse impacts of high tax rates on value-added per worker, illustrating the disincentivising impact of high taxation on firm growth.

Overall, our findings contribute to the business environment constraints literature by providing empirical evidence on multiple firm performance outcomes, including revenue-based total factor productivity, sales per worker, value added per worker, and sales-to-labour cost ratios. Beyond confirming established relationships, our analysis also highlights nuanced firm responses, particularly in labour cost adjustment and pricing strategies. These findings have important policy implications, especially with respect to financial sector reforms, anti-corruption efforts, and infrastructure investment aimed at enhancing firm productivity and competitiveness in developing economies.

4.5 Policy implications

The study provides several policy-relevant implications. First, the adverse impact of financing constraints on firm performance emphasises the need to increase the ability of all firms to access finance, particularly for small and medium-sized enterprises (SMEs). Governments can support this through credit guarantee schemes, microfinance programmes, and alternative financing channels such as fintech-based lending platforms. The level of governance within the banking sector,

combined with increasing financial literacy among enterprises, may also help improve access to credit.

Second, based on the significant impact of corruption on firm performance, there exists a need for an increase in transparency and accountability through the implementation of digital tax administration, digital government services and the simplification of licensing within government so that direct interaction between the firm and government is reduced.

Third, the negative impact on productivity caused by unreliable electricity indicates the need for targeted investment in power generation infrastructure and reliability of the electricity grid, as well as for incentives through regulation and reform for private investment in electrical generation and distribution.

Finally, informal competition adversely affects the productivity of formal firms. To promote formal firms and improve competition among them, there must be policies aimed at promoting formalisation via the streamlining of business registration, reducing compliance costs, and establishing a predictable basis for taxation. Overall, these findings indicate that coordinated reforms across finance, governance, infrastructure, and regulation are likely to generate larger productivity gains than isolated policy interventions.

The sizeable productivity losses resulting from unreliable electricity supply illustrates the need for reliable energy, such as grid reliability and energy infrastructure to help support long-term business growth in areas experiencing frequent electric outages. Likewise, adverse effects of political instability on workers' value-added point to regulatory stability and policy momentum as being supportive for long term business growth. In combination with the strong negative effects of corruption and informal competition, these results confirm that strengthened governance and reduced uncertainty are critical to creating a more productive, competitive, and attractive environment for businesses.

5 CONCLUSION

The business environment significantly shapes firm performance through various mechanisms, including access to finance, electricity reliability, political stability, and corruption. Understanding these linkages is essential for policymakers seeking to improve the business environment and foster private sector development. This study provides empirical evidence on how business environment constraints impact firm performance using micro-level data from the World Bank Enterprise Surveys (WBES) spanning 2006 to 2023. By employing an instrumental variables (IV) approach within a two-stage least squares (2SLS) framework, we address potential endogeneity concerns.

Our findings highlight that access to finance, corruption, and inadequate infrastructure (particularly electricity supply) are among the most significant obstacles to firm performance, negatively affecting productivity and revenue-based indicators. Political instability, while often cited as a major constraint, does not exhibit a direct impact on total factor productivity (TFP) but significantly reduces value-added per worker, suggesting that uncertainty influences long-term firm growth rather than immediate productivity. These findings highlight the importance of financial sector reforms, anti-corruption measures, and infrastructure investments in fostering a conducive business environment. Policymakers should prioritise reducing financial constraints, improving institutional quality, and enhancing public infrastructure to support firm growth and competitiveness. Additionally, targeted policies to improve governance and ensure a stable regulatory framework could reduce firm-level uncertainty and encourage long-term investment.

Acknowledgements:

The authors would like to thank the Editor and an anonymous reviewer for their valuable suggestions and constructive comments, which greatly improved the quality of this paper. Any remaining errors or omissions are solely the responsibility of the authors.

Availability of data and materials:

The data used in this study are publicly available from the World Bank's Enterprise Surveys portal. The standardized firm-level data, total factor productivity (TFP) estimates, and aggregate business environment indicators can be accessed at `https://www.enterprisesurveys.org`.

Competing interests:

The authors have no relevant financial or non-financial interests to disclose.

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