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FINANCIAL FRICTIONS AND CAPITAL ALLOCATION EFFICIENCY: EVIDENCE FROM EMERGING MARKETS

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Abstract

This paper looks at whether financial frictions hurt how capital is allocated in emerging markets. It uses public data on 148 emerging and developing economies (1996–2024), about 450 listed Pakistani firms (2009–2023) and 1,300 unlisted Pakistani firms surveyed by the World Bank. There are three main findings. First, investment goes with faster growth across countries, but the payoff does not change with bank credit depth or interest spreads. It rises with equity-market depth only in a fragile result. Second, Pakistani firms run almost entirely on internal funds. Only 2% of surveyed firms have bank credit, investment at listed firms moves strongly with cash flow, and about half of surveyed firms say they are discouraged from borrowing. Even so, firms that look constrained do not invest less, earn higher returns on capital or grow more slowly. Two quasi-experiments, the 2020–23 interest-rate cycle and the 2020 opening of subsidized long-term refinance to all manufacturers, show no differential response either. Third, Pakistan invests far less than its peers (12.6% of GDP against a median of 22.0%), and the spread of returns to capital among listed firms widened from 1.27 to 1.45 log points. The evidence points to too little capital formation more than to visible misallocation. All estimates are associations.

1. INTRODUCTION

Capital is scarce in emerging markets, so how well it is allocated matters as much as how much there is. Income gaps between countries owe more to how efficiently factors are used than to how much of them each country has [1, 2].

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Financial systems are the main route savings take to productive uses. When they work badly, a firm's investment depends on its own cash and collateral instead of on how good its projects are [3, 4].

This paper examines whether the severity of financial frictions changes how well capital is used. It draws on three public data sets: a panel of 148 emerging and developing economies, State Bank of Pakistan financial statements for about 450 listed companies, and World Bank Enterprise Surveys of unlisted Pakistani firms. Pakistan is the focal case. It is a large economy with a very low investment rate and a shallow financial system.

We make two contributions. First, we put country, listed-firm and unlisted-firm evidence together in one transparent, reproducible analysis, testing frictions at each level and adding two quasi-experimental checks. Second, we report every result, including the ones that run against the simple friction story.

Three findings matter most. First, finance changes the payoff to investment less than theory suggests. Across countries, investment goes with faster growth, but that does not vary with credit depth or interest spreads, and the equity-market result is fragile. Second, Pakistani firms are financed almost entirely from internal funds, and many say they are discouraged from borrowing. But firms that look constrained do not invest less, earn higher returns to capital or grow more slowly, and neither policy episode we study produces a differential response. Third, the shortfall is in capital formation itself. Pakistan invests far less than comparable economies, and the spread of returns to capital among listed firms has widened.

The rest of the paper is organized as follows. Section 2 reviews the literature and sets out the hypotheses. Section 3 describes the country data and Section 4 the empirical strategy. Section 5 reports the main country-level results, Section 6 places Pakistan in the sample, and Section 7 covers robustness checks. Section 8 introduces the firm-level data and design, and Section 9 reports the results for listed firms. Section 10 uses survey data on unlisted firms, Section 11 discusses implications and limitations, and Section 12 concludes.

2. Literature Review and Hypotheses

2.1 Theory and evidence on financial frictions

Asymmetric information and moral hazard lead lenders to ration credit or to charge a premium for external funds [5, 6]. The size of the premium depends on borrowers' net worth and collateral [3]. Where this premium is high, investment responds to internal funds and not to productivity, and capital is misallocated even if every firm optimizes. Firm-level evidence supports this: firms in India expanded when a directed-lending program relaxed credit limits [7], and small firms report the heaviest financing obstacles [8].

2.2 Misallocation and aggregate outcomes

Dispersion in the marginal products of capital across plants in China and India implies large aggregate productivity losses [2], and distortions that act like firm-specific taxes can depress aggregate output [1]. Financial frictions can generate such distortions, though the size of the effect depends on firms' ability to save their way out of constraints [4, 9]. The classic aggregate test [10] shows that countries with more developed financial markets increase investment more in growing industries and cut it more in declining ones.

2.3 Finance and growth

Financial development is positively associated with growth [11–13], and external-finance-dependent industries grow faster in financially developed countries [14, 15]. Stock markets and banks each contribute independently to growth [16]. The relationship may weaken at high levels of finance [17], which is not an issue for most of our sample.

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This paper does not repeat the finance–growth regression. It looks at a narrower channel: whether finance affects the growth payoff of investment, as a theory of capital misallocation would imply.

2.4 Evidence from Pakistan and South Asia

Most firm-level work on Pakistan looks at the investment and financing of listed companies. Listed firms appear to face financing constraints. Investment tracks internal cash most closely among small firms and firms that pay no dividends, while business-group membership makes little difference [21]. In a sample of non-financial firms over 2000–2013, firms with more cash flow raise less external finance, and that substitution is weaker where firms are constrained [22]. Other studies cover financial constraints, bank concentration and small firms [23], and financial constraints and exporting [24]. Loan data from Pakistan show that politically connected firms get preferential credit [25]. That is a direct example of credit being allocated by connections and not by productivity.

For India, studies look at investment–cash flow sensitivity in business-group firms [26]. A reform that opened domestic industries to foreign capital reduced capital misallocation. Firms that started with the highest returns to capital gained the most capital and revenue, especially in areas with weaker local banks [27]. Together with the directed-lending evidence [7] and the plant-level evidence from India and China [2], this makes South Asia a central setting for the misallocation question.

Two cautions apply. Commonly used constraint measures, including dividend payout, size and the Whited–Wu index, do not reliably identify firms that behave as financially constrained [28], and it is disputed whether investment–cash flow sensitivity measures constraints at all [29]. At the country level, financial development reduces how much investment depends on internal funds [30], which ties the firm-level and country-level parts of this paper together. Our analysis adds evidence on the dispersion of returns to capital in Pakistan and links the firm-level results to a cross-country benchmark.

2.5 Hypotheses

H1. Investment is positively associated with subsequent growth (investment productivity is positive).

H2. The growth payoff of investment is larger where bank credit to the private sector is deeper (positive credit interaction).

H3. The growth payoff of investment is smaller where the interest-rate spread, a proxy for the cost of intermediation, is wider (negative spread interaction).

H4. The growth payoff of investment is larger where equity markets are deeper (positive market-capitalization interaction).

3. Data and Variables

3.1 Source and sample

All data come from the World Bank's World Development Indicators (WDI) [18], downloaded from DataBank as a single extract for 1996–2025 (file stamped with the database version dated 10/08/2026). We drop World Bank aggregates and regional groups, retain annual data to 2024 because 2025 is incomplete, and define the emerging and developing sample as economies whose average real GDP per capita over 1996–2024 is below US$15,000 in constant 2015 dollars. This yields 148 economies, including Pakistan. We choose a data-based rule rather than the current World Bank income classification because the extract does not contain that classification; the rule excludes economies that were already rich over the period and is fully reproducible from the data we use.

To reduce the influence of business-cycle noise, we average each variable over non-overlapping five-year windows (1996–2000, 2001–05, 2006–10, 2011–15, 2016–20, and 2021–24, the last being four years). A window is retained only if it has at least three annual growth observations. This is a standard approach in the finance–

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growth literature [12]. The resulting panel has 868 country-windows; the regressions use between 204 and 571 observations, depending on which friction variable is available.

3.2 Variables

Table 1. Variable definitions

Variable	WDI definition	Role
GDP growth	Annual GDP growth, %, window average	Dependent variable
Investment	Gross fixed capital formation, % of GDP	Main regressor, centered at its sample mean
Private credit	Domestic credit to private sector, % of GDP	Friction proxy: lower is tighter
Interest spread	Lending rate minus deposit rate, %	Friction proxy: wider is more costly
Market capitalization	Listed domestic companies, % of GDP	Equity-market depth: lower is tighter
Inflation	Consumer prices, annual %, entered as log(1 + inflation/100)	Control
Trade	Trade, % of GDP	Control
Initial income	Log real GDP per capita (constant 2015 US$), previous window	Control (conditional convergence [19])

The three friction measures enter lagged by one window and are centered at their sample means, so the coefficient on investment is the payoff at the average level of the friction measure. Lagging reduces simultaneity, though it cannot remove it.

3.3 Descriptive statistics

Table 2. Descriptive statistics

Variable (window averages)	Obs.	Mean	Std. dev.	Min	Median	Max
GDP growth, %	868	3.87	4.31	−21.98	3.79	56.84
Investment, % GDP	726	22.54	7.89	0.00	21.89	65.47
Private credit, % GDP	719	33.88	28.29	0.73	26.09	184.81
Market capitalization, % GDP	288	37.01	43.74	0.01	23.52	309.55
Interest spread, %	575	8.26	7.85	−18.49	6.85	73.23
Inflation, %	793	11.07	42.12	−4.07	5.21	1008.95
Trade, % GDP	762	78.69	38.10	0.00	73.25	273.23
GDP per capita, 2015 US$	868	4,273.88	3,904.32	222.80	3,088.78	21,053.41

Source: authors' calculations from WDI. The extreme growth, investment and inflation values reflect small states, conflict and hyperinflation episodes; Section 7 shows that winsorizing growth does not change the conclusions.

Equity-market data are available for only about one-third of the sample, so the H4 sample may not be representative of the full set of economies, which is a limitation.

4. Empirical Strategy

We estimate, for country i and five-year window t:

$$Growth_{it} = \alpha_i + \delta_t + \beta_1 Inv_{it} + \beta_2 (Inv_{it} \times F_{i,t-1}) + \beta_3 F_{i,t-1} + \gamma' X_{it} + \varepsilon_{it}$$

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Volume 4 • Issue 6 • October 2026

where Growth is the average annual GDP growth rate, Inv is the investment share of GDP (centered), F is one of the three friction proxies (centered, lagged one window), and X contains log inflation, trade openness and initial log income. α and δ are country and period fixed effects, so identification comes from within-country changes over time and removes time-invariant country traits such as institutions and geography, as well as global shocks common to all countries in a period.

H1 predicts $\beta_1 > 0$. H2 predicts $\beta_2 > 0$ when F is private credit, H3 predicts $\beta_2 < 0$ when F is the interest spread, and H4 predicts $\beta_2 > 0$ when F is market capitalization. Standard errors are clustered by country. Because the number of clusters is small in the equity-market sample (48), we also report p-values from a wild-cluster bootstrap with the null imposed and Rademacher weights, with 2,999 replications [20].

The coefficient β_1 is a growth–investment association, not the marginal product of capital. The interaction β_2 therefore tests whether the association varies with financial conditions, which is how a capital-allocation channel would show up in aggregate data. We do not claim a causal effect: investment and growth are jointly determined, and lagging the friction variable cannot fully address this. We return to the limitation in Section 11.

5. Main Results

5.1 Investment and growth

The baseline (Table 3, column 1) supports H1. A one-percentage-point-higher investment share is associated with 0.157 percentage points faster growth (standard error 0.050; p = 0.002). The controls have the expected signs. Higher inflation is associated with slower growth, trade openness with faster growth, and initial income with slower subsequent growth, consistent with conditional convergence.

5.2 Financial frictions and the payoff of investment

Table 3. Growth, investment and financial frictions

	(1) Baseline	(2) Credit	(3) Spread	(4) Equity market
Investment (centered)	0.157*** (0.050)	0.187*** (0.070)	0.085* (0.049)	0.150*** (0.048)
Investment × private credit		0.0008 (0.0011)		
Investment × interest spread			0.0052 (0.0034)	
Investment × market capitalization				0.0015** (0.0007)
Friction level (lagged)		0.018 (0.022)	0.064** (0.031)	−0.008 (0.007)
Log inflation	−9.19** (3.91)	−9.38** (4.38)	−13.33** (5.67)	−6.88** (2.65)
Trade, % GDP	0.040*** (0.014)	0.038** (0.019)	0.032** (0.015)	0.025* (0.014)
Initial log income	−6.26*** (1.41)	−6.98*** (2.42)	−5.68*** (1.41)	−6.49*** (1.46)
Wild-cluster bootstrap p, interaction		0.390	0.118	0.067
Countries	122	118	96	48
Observations	571	488	402	204

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Volume 4 • Issue 6 • October 2026

	(1) Baseline	(2) Credit	(3) Spread	(4) Equity market
Within R^2	0.327	0.333	0.286	0.318

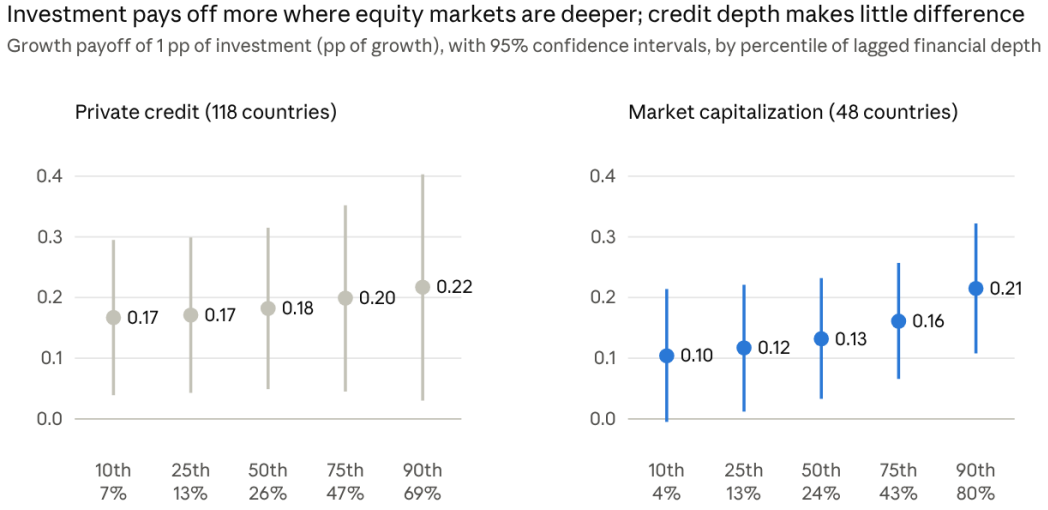
Dependent variable: average annual GDP growth, %. All columns include country and period fixed effects. Standard errors clustered by country in parentheses. *, **, *** denote p < 0.10, 0.05, 0.01. Friction variables are lagged one window and centered.

Bank credit (H2). The interaction between investment and private credit is 0.0008 (standard error 0.0011; p = 0.479; bootstrap p = 0.390). Moving from the 25th to the 75th percentile of private credit changes the growth payoff of a percentage point of investment by only about 0.03 percentage points against a baseline of 0.19. H2 is not supported.

Interest spread (H3). The interaction is positive (0.0052; p = 0.131), the opposite sign from the one H3 predicts, and is not statistically significant (bootstrap p = 0.118). One reading is that wide spreads in this sample reflect scarcity of capital and high returns to investing, not only intermediation inefficiency. H3 is not supported.

Equity-market depth (H4). The interaction is positive and significant at the 5% level (0.0015; standard error 0.0007; p = 0.032), but the wild-cluster bootstrap p-value is 0.067. Each additional 10 percentage points of market capitalization is associated with a 0.015-percentage-point higher growth payoff of a percentage point of investment, about 10% of the baseline coefficient. H4 receives qualified support, subject to the robustness caveats in Section 7.

Joint specification. When credit and spread interactions enter together (93 countries, 351 observations), neither is significant (credit −0.0002, p = 0.866; spread 0.0039, p = 0.424), and the investment coefficient is no longer significant (0.090, p = 0.189), which may reflect the smaller sample and the correlation between the friction proxies.



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An International Peer-Reviewed Open Access Journal

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Volume 4 • Issue 6 • October 2026

WDI; authors' estimates from Table 3, columns 2 and 4

Figure 1. Estimated growth payoff of one percentage point of investment across the distribution of financial depth. The credit estimates barely move across the distribution, while the equity-market estimates rise with depth, though the intervals for neighbouring percentiles overlap.

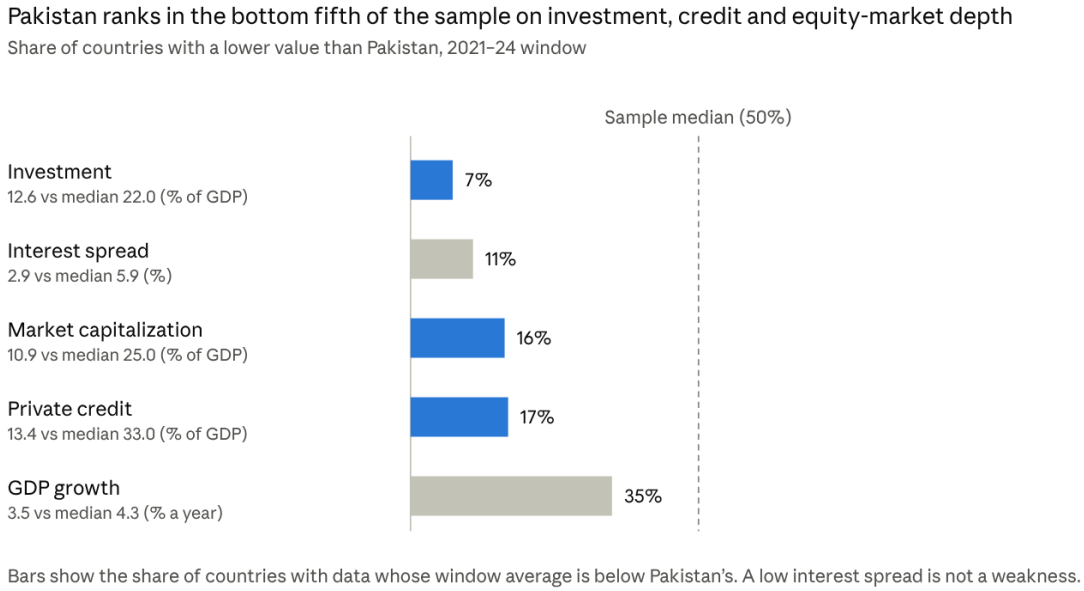
6. Pakistan in the Sample

6.1 Where Pakistan stands

Pakistan lies in the bottom fifth of the sample on investment, private credit and equity-market depth. Its growth is below the median but not extreme, and its interest-rate spread is among the narrowest.

Table 4. Pakistan against the sample, 2021–24 window

Variable	Pakistan	Sample median	Share of countries below Pakistan	Countries with data
GDP growth, %	3.49	4.28	35%	143
Investment, % GDP	12.61	21.98	7%	123
Private credit, % GDP	13.41	32.95	17%	124
Market capitalization, % GDP	10.90	25.04	16%	49
Interest spread, %	2.91	5.93	11%	83



WDI; authors' calculations, 2021–24 window averages

Figure 2. Pakistan's position in the sample distribution. Pakistan's interest spread is among the narrowest in the sample, which is not a sign of weakness.

The time profile shows a shrinking financial system. Private credit fell from 23.3% of GDP in 1996–2000 to 13.4% in 2021–24, and

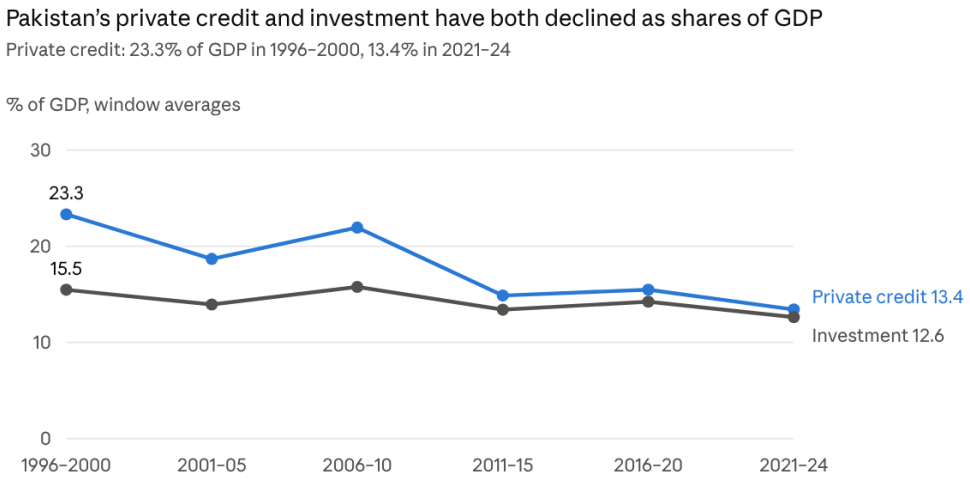
JOURNAL FOR SOCIAL SCIENCE STUDIES
An International Peer-Reviewed Open Access Journal

ISSN (Online): 3006-2071 | ISSN (Print): 3006-2063
Volume 4 • Issue 6 • October 2026

investment from 15.5% to 12.6%. Growth was fastest in 2001–05 (5.35%), when credit and market capitalization (23.6% of GDP) were both higher than they are now.

Table 5. Pakistan by five-year window (window averages)

Window	GDP growth, %	Investment, % GDP	Private credit, % GDP	Market cap., % GDP	Spread, %
1996–2000	3.27	15.46	23.31	12.76	n/a
2001–05	5.35	13.93	18.67	23.58	6.05
2006–10	3.52	15.76	21.93	22.70	6.21
2011–15	3.68	13.39	14.86	14.12	5.04
2016–20	3.68	14.22	15.47	16.03	3.47
2021–24	3.49	12.61	13.41	10.90	2.91



WDI; authors' calculations, five-year window averages (Table 5)

Figure 3. Private credit and investment in Pakistan, 1996–2024.

6.2 What the estimates imply for Pakistan

Because the credit interaction is small, the estimated growth payoff of investment varies little with credit depth. At Pakistan's credit level (13.4% of GDP) the model implies that a percentage point of investment is associated with 0.172 percentage points of growth, against 0.182 at the sample median and 0.199 at the 75th percentile. The differences are small relative to the standard errors.

Table 6. Implied growth payoff of one percentage point of investment (credit model)

Credit level	Credit, % GDP	Implied payoff, pp	Std. error	p-value
25th percentile	13.1	0.172	0.065	0.009
Pakistan (2021–24)	13.4	0.172	0.065	0.009
Median	26.1	0.182	0.067	0.008
75th percentile	47.4	0.199	0.078	0.012

JOURNAL FOR SOCIAL SCIENCE STUDIES
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ISSN (Online): 3006-2071 | ISSN (Print): 3006-2063
Volume 4 • Issue 6 • October 2026

In the spread model Pakistan's narrow spread (2.9%) implies a payoff of 0.057 (standard error 0.052), against 0.078 at the median spread, which is not a statistically meaningful difference ($p = 0.27$ for Pakistan; the effect has the sign opposite to H3).

The gap that stands out is therefore the investment rate itself. Pakistan invests 9.4 percentage points of GDP less than the sample median. Applying the estimated payoff for Pakistan (0.172) and treating the association as if it were causal, closing that gap would be associated with roughly 1.6 percentage points of additional annual growth. A 95% confidence interval for the payoff gives about 0.4 to 2.8 percentage points, and closing half the gap would give about half those amounts. This is an illustration, not a forecast: it assumes the cross-country association holds for Pakistan, that the extra investment could be financed without offsetting effects, and that returns do not diminish.

7. Robustness

Table 7. Credit interaction under alternative specifications (Investment × private credit)

Specification	Countries	Obs.	Coefficient	Std. error	p-value
Baseline	118	488	0.0008	0.0011	0.479
Excluding Pakistan	117	483	0.0008	0.0011	0.484
Excluding 2006–10 window (global financial crisis)	117	399	0.0000	0.0015	0.986
Excluding 2016–20 window (COVID-19)	106	361	0.0010	0.0012	0.414
Growth winsorized at 1% and 99%	118	488	0.0009	0.0007	0.215
GDP per capita between US$1,000 and US$10,000	85	350	0.0004	0.0014	0.780
Private credit at most 100% of GDP	114	466	0.0022	0.0016	0.167
Contemporaneous (not lagged) credit	118	515	0.0000	0.0011	0.984
Pooled OLS, no fixed effects	118	488	0.0009	0.0007	0.221

The credit result is a stable null: the point estimate is small and never significant. The null is not an artifact of the smaller equity sample either: on the same 47 countries that have market-capitalization data the credit interaction is 0.0013 (standard error 0.0014; $p = 0.391$).

Table 8. Equity-market interaction under alternative specifications (Investment × market capitalization)

Specification	Countries	Obs.	Coefficient	Std. error	p-value
Baseline	48	204	0.0015	0.0007	0.032
Excluding Pakistan	47	199	0.0014	0.0007	0.034
Excluding 2006–10 window	48	167	0.0016	0.0008	0.051
Excluding 2016–20 window	45	156	0.0012	0.0007	0.104
Growth winsorized at 1% and 99%	48	204	0.0015	0.0007	0.032
GDP per capita between US$1,000 and US$10,000	39	166	0.0013	0.0007	0.059
Market capitalization at most 100% of GDP	46	190	0.0020	0.0017	0.240

JOURNAL FOR SOCIAL SCIENCE STUDIES
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ISSN (Online): 3006-2071 | ISSN (Print): 3006-2063
Volume 4 • Issue 6 • October 2026

The point estimate for the equity interaction is stable between 0.0012 and 0.0020, but its significance is not. It is significant at the 5% level in the baseline, falls to the 10% level after dropping one window or restricting to middle-income countries, and is not significant once countries with market capitalization above 100% of GDP are excluded or once the 2016–20 window is dropped. We therefore treat H4 as suggestive evidence and not as an established result.

8. Firm-Level Evidence from Pakistan

The country panel cannot see how capital is allocated across firms within an economy. This section and the next use company-level data for Pakistan to examine the dependence of investment on internal funds, the returns on capital of firms that look financially constrained, and the dispersion of those returns over time.

8.1 Data

We use the State Bank of Pakistan's archive of financial statements of non-financial companies listed on the Pakistan Stock Exchange [31]. The file reports balance-sheet, income-statement, cash-flow and ratio items for each company, in thousands of rupees, grouped into 14 sectors. We use 457 companies and 5,766 company-years for 2009–2023, with between 362 and 409 companies in each year. The State Bank publishes the data in three sheets with different formats (2005–08, 2009–13 and 2014–23); we use the last two, which report the items we need, and the main balance-sheet items line up across the 2013–14 format change (the median ratio of net fixed assets in 2014 to 2013 is 1.00).

Four features of the data matter. First, the State Bank repeats the data of non-responding companies for up to three years; we set to missing the 124 company-years in which sales, fixed assets and total assets are identical to the previous year. Second, the move to new reporting standards from 2018 changed some classifications, so sudden shifts in individual items are possible. Third, the market price per share is reported only from 2014, so market-based Tobin's q and the leverage inputs of the Whited–Wu index are available for 2014–2023 only. Fourth, the data cover listed companies, which are larger and more established than the typical Pakistani firm, so they are likely to understate the severity of frictions.

8.2 Variables

Capital K is net operating fixed assets plus capital work in progress. The investment rate is $I/K = (K(t) - K(t-1) + \text{depreciation}(t)) / K(t-1)$. Because the data contain no capital-expenditure line, this measure also picks up revaluations of fixed assets, which adds noise. Cash flow is pre-tax profit plus depreciation, divided by lagged capital. Sales growth is the change in log sales. Tobin's q is (market value of equity + total assets − book equity) / total assets, with market equity computed as the market price per share times the number of ordinary shares. The average product of capital, our proxy for the marginal revenue product of capital [2], is ln(Sales/K). It is an average rather than a marginal product and also reflects markups, capacity utilization and the age of the capital stock, which we discuss in Section 11.

We use three proxies for constraints, all measured in the previous year. Small firms are those below the yearly median of total assets. Non-dividend payers are firms that paid no cash dividend. The Whited–Wu index [32] is −0.091 × cash flow/assets − 0.062 × dividend-payer dummy + 0.021 × long-term debt/assets − 0.044 × ln(assets) + 0.102 × sector sales growth − 0.035 × firm sales growth, so that a higher value indicates a more constrained firm. All ratios are winsorized at the 1st and 99th percentiles.

JOURNAL FOR SOCIAL SCIENCE STUDIES
An International Peer-Reviewed Open Access Journal

ISSN (Online): 3006-2071 | ISSN (Print): 3006-2063
Volume 4 • Issue 6 • October 2026

Table 9. Firm-level descriptive statistics, 2009–2023

Variable	Obs.	Mean	Std. dev.	Median
Investment rate, I/K	4,537	0.206	0.329	0.102
Cash flow / K	4,537	0.384	0.809	0.179
Sales growth (log)	4,496	0.059	0.430	0.102
Tobin's q (lagged, 2014–23)	2,996	1.397	1.320	1.003
ln(Sales/K)	4,965	0.628	1.270	0.774
ln(Total assets, Rs thousand)	5,638	15.05	2.14	15.13

Source: State Bank of Pakistan data; authors' calculations. Ratios are winsorized at the 1st and 99th percentiles.

8.3 Hypotheses

H5. Investment is positively related to internal cash flow, and more so for firms that are small or do not pay dividends [33]. A positive cash-flow coefficient can also reflect measurement error in growth opportunities, and the sensitivity need not rise with the degree of constraint [34].

H6. Investment responds less to growth opportunities (q) in firms with a higher Whited–Wu index.

H7. Firms that look more constrained have a higher average product of capital, because constraints leave them with too little capital relative to their productivity.

H8. The dispersion of ln(Sales/K) across firms is larger in years of tighter credit.

8.4 Estimation

The investment equation is:

$$(I/K)_{it} = \alpha_i + \delta_t + \beta_1 \, Opp_{it} + \beta_2 \, (CF/K)_{it} + \beta_3 \, C_{i,t-1} + \beta_4 \, (Opp_{it} \times C_{i,t-1}) + \beta_5 \, ((CF/K)_{it} \times C_{i,t-1}) + \varepsilon_{it}$$

where Opp is sales growth (2009–2023) or lagged q (2014–2023), C is a constraint indicator, α are firm fixed effects and δ are year fixed effects. H5 predicts $\beta_2 > 0$ and $\beta_5 > 0$, and H6 predicts $\beta_4 < 0$ when C is the Whited–Wu index. For H7 we regress ln(Sales/K) on lagged constraint proxies with sector-by-year fixed effects, so that comparisons are among firms in the same sector and year, and also with firm fixed effects. Standard errors are clustered by firm. As in Section 4, the estimates are associations, not causal effects.

9. Firm-Level Results

9.1 Investment and cash flow

Investment is strongly related to cash flow (Table 10, column 1). The coefficient of 0.119 (standard error 0.020) means that a ten-percentage-point increase in cash flow relative to lagged capital is associated with a 1.2-percentage-point higher investment rate. The coefficient on sales growth is small (0.025, p = 0.086).

Table 10. Investment, cash flow and constraint proxies

	(1) All	(2) Small	(3) Dividends	(4) q model	(5) q, Whited–Wu
Sales growth	0.025* (0.015)	−0.000 (0.021)	−0.009 (0.037)		
Lagged q				0.021** (0.010)	0.013 (0.009)
Cash flow / K	0.119*** (0.020)	0.095*** (0.019)	0.111*** (0.023)	0.115*** (0.022)	0.107*** (0.023)

JOURNAL FOR SOCIAL SCIENCE STUDIES
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Volume 4 • Issue 6 • October 2026

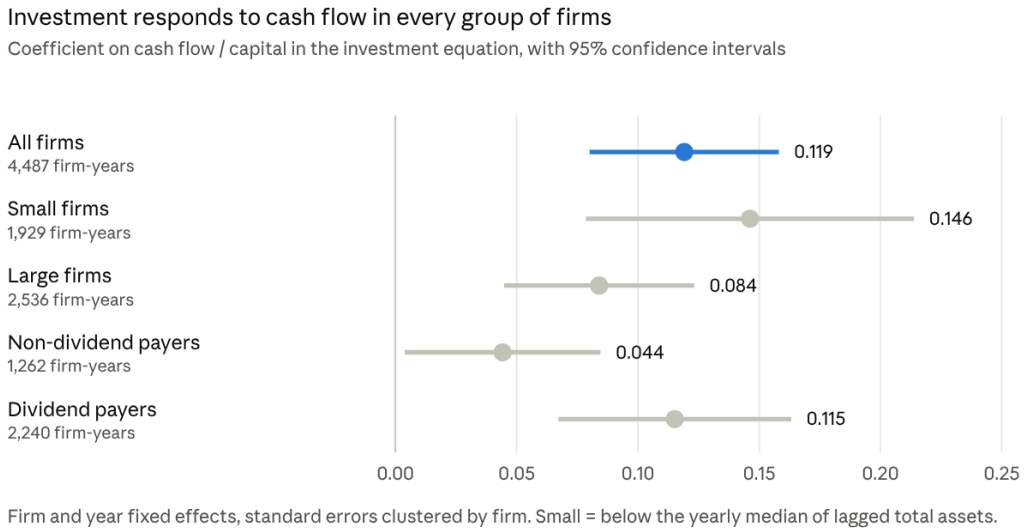
	(1) All	(2) Small	(3) Dividends	(4) q model	(5) q, Whited–Wu
Small		0.102*** (0.027)			
Sales growth × small		0.037 (0.027)			
Cash flow × small		0.044 (0.033)			
Non-dividend payer			−0.040** (0.019)		
Sales growth × non-dividend			0.059 (0.043)		
Cash flow × non-dividend			−0.034 (0.031)		
High Whited–Wu					−0.014 (0.028)
q × high Whited–Wu					0.003 (0.016)
Cash flow × high Whited–Wu					0.013 (0.037)
Firms	404	404	369	351	339
Observations	4,487	4,487	3,586	2,722	2,636
Within R^2	0.057	0.066	0.058	0.066	0.060

Dependent variable: investment rate I/K. All columns include firm and year fixed effects; standard errors clustered by firm in parentheses. *, **, *** denote p < 0.10, 0.05, 0.01. Columns 1–3 cover 2009–2023 and columns 4–5 cover 2014–2023. Constraint indicators are measured in the previous year; High Whited–Wu = above the yearly median.

The next three columns test whether the cash-flow sensitivity is larger for firms that look constrained. For small firms the sensitivity is larger (0.146 against 0.084 in split samples, Figure 4), but the interaction in column 2 (0.044, standard error 0.033, p = 0.19) is not statistically significant. For dividend status the pattern is reversed: non-dividend payers show a lower sensitivity (0.044 against 0.115 in split samples), although the interaction in column 3 (−0.034, p = 0.27) is again not significant. H5 is therefore supported for the existence of a strong cash-flow sensitivity, but not for a clear gradient across constraint proxies. The higher sensitivity of small firms matches the finding for Pakistani listed firms [21], but we do not find stronger sensitivity for non-dividend payers. The reversed pattern for dividends is consistent with the argument [34] that the most constrained firms need not be the most cash-flow sensitive.

JOURNAL FOR SOCIAL SCIENCE STUDIES
An International Peer-Reviewed Open Access Journal

ISSN (Online): 3006-2071 | ISSN (Print): 3006-2063
Volume 4 • Issue 6 • October 2026



State Bank of Pakistan listed-company data; authors' estimates from Table 10, columns 1–3 and split-sample runs

Figure 4. Cash-flow sensitivity of investment by firm group. The sensitivity is positive and significant for every group, but the intervals for small and large firms overlap, as do those for dividend payers and non-payers.

9.2 The q model

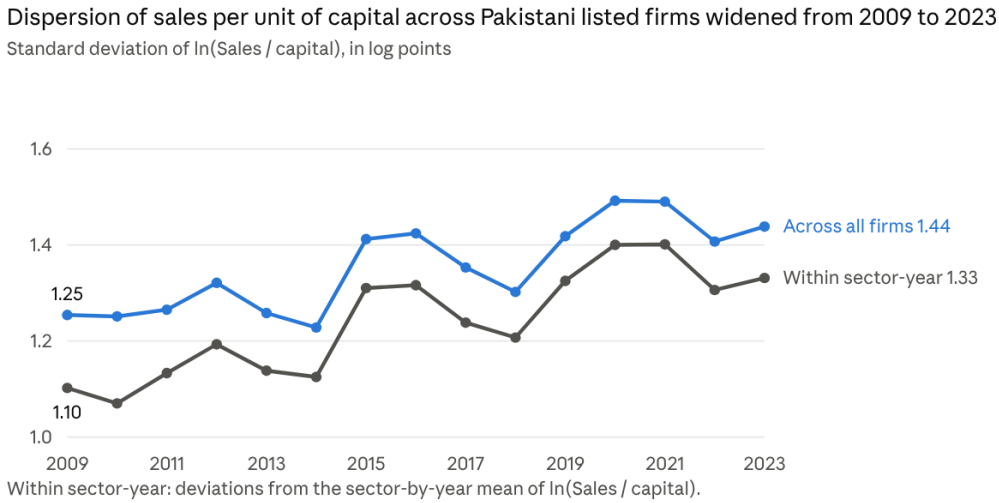
In the 2014–2023 sample, investment responds weakly to lagged q (Table 10, column 4: 0.021, p = 0.035): a one-unit higher q is associated with a 2.1-percentage-point higher investment rate. The cash-flow coefficient is unchanged (0.115). When q and cash flow are interacted with a high Whited–Wu indicator (column 5), neither interaction is significant (q × high Whited–Wu: 0.003, p = 0.85), and using the continuous index gives the same result (p = 0.90). H6 is not supported.

9.3 Returns to capital and their dispersion

The dispersion of ln(Sales/K) rose over the period (Figure 5, Table 11). The standard deviation across all firms increased from 1.27 log points in 2009–13 to 1.45 in 2019–23, and from 1.13 to 1.35 within sector-years, so the dispersion is not an artifact of changing sector composition. The upward trend is 0.016 log points a year across all firms and 0.021 within sector-years (both $p < 0.001$). The variance of log sales per unit of capital, which is the quantity that drives the aggregate productivity losses in the misallocation framework [2], rose by about 30%. Over the same years Pakistan's private credit fell from 17.2% of GDP (2009–13 average) to 14.6% (2019–23). The two series move in opposite directions (correlation −0.49 over 15 years), but with so few observations and common trends this cannot be read as evidence that tighter credit caused the widening. H8 is at most suggestive.

JOURNAL FOR SOCIAL SCIENCE STUDIES
An International Peer-Reviewed Open Access Journal

ISSN (Online): 3006-2071 | ISSN (Print): 3006-2063
Volume 4 • Issue 6 • October 2026



State Bank of Pakistan listed-company data, 2009–2023; authors' calculations
Figure 5. Dispersion of ln(Sales/K) across Pakistani listed firms.

Table 11. Dispersion of ln(Sales/K) and private credit, by period

Period	Std. dev., all firms	Std. dev., within sector-year	Pakistan private credit, % of GDP
2009–13	1.27	1.13	17.2
2014–18	1.34	1.24	14.9
2019–23	1.45	1.35	14.6

Source: State Bank of Pakistan data and World Development Indicators; authors' calculations. Period values are simple averages of the yearly figures.

Table 12 tests whether firms that look more constrained earn higher returns to capital, as H7 requires. They do not. A one-standard-deviation (0.10) higher Whited–Wu index is associated with 0.38 log points lower sales per unit of capital within the same sector and year, and the result holds with firm fixed effects (coefficient −2.0, $p < 0.001$), when the cash-flow and growth terms are removed from the index to avoid a mechanical link with profitability (−3.9), and for higher leverage (−0.70, $p = 0.020$). Non-dividend payers have 0.95 log points lower sales per unit of capital, while small firms do not differ significantly. H7 is not supported: the firms that appear most constrained are those with the lowest average product of capital.

Table 12. ln(Sales/K) and constraint proxies

Constraint proxy (lagged)	Coefficient	Std. error	Fixed effects	Firms	Obs.
Whited–Wu index	−3.83***	0.70	Sector × year	365	2,727
Whited–Wu index, excluding cash-flow and growth terms	−3.92***	0.81	Sector × year	376	2,832

JOURNAL FOR SOCIAL SCIENCE STUDIES
An International Peer-Reviewed Open Access Journal
ISSN (Online): 3006-2071 | ISSN (Print): 3006-2063
Volume 4 • Issue 6 • October 2026

Constraint proxy (lagged)	Coefficient	Std. error	Fixed effects	Firms	Obs.
Leverage	−0.70**	0.30	Sector × year	376	2,832
Non-dividend payer	−0.95***	0.09	Sector × year	390	3,632
Small firm	0.05	0.09	Sector × year	390	3,632
Whited–Wu index	−2.00***	0.43	Firm and year	346	2,708

Dependent variable: ln(Sales/K), winsorized. Non-dividend payer and small firm enter the same regression. *, **, *** denote p < 0.10, 0.05, 0.01. Standard errors clustered by firm.

9.4 A monetary-policy episode

The results above are associations. To move closer to a causal test, we use the interest-rate cycle of 2020–23. The State Bank cut its policy rate to 7% in June 2020 [35] and later raised it in a series of steps to 22% by June 2023 [36]. If financing frictions matter, firms that were more exposed to borrowing costs before the cycle should have invested relatively more when rates fell and relatively less when rates rose, and the effect should be larger for firms with less access to other funds [37].

We measure exposure as total borrowings (long-term, short-term and the current portion of long-term debt) divided by total assets in 2019, before the cycle began, standardized across firms (mean 0.40, standard deviation 0.50, 367 firms). We regress the investment rate on exposure interacted with an easing period (2020–21) and a tightening period (2022–23), relative to 2015–19, with firm fixed effects and either year fixed effects or sector-by-year fixed effects, and controls for 2019 firm size interacted with the periods.

Table 13. Investment response to the 2020–23 interest-rate cycle

	(1) Firm and year effects	(2) Sector × year effects	(3) By firm size
Exposure × 2020–21 (rates cut)	−0.022 (0.020)	−0.033 (0.021)	−0.086** (0.039)
Exposure × 2022–23 (rates raised)	−0.003 (0.029)	−0.018 (0.029)	−0.110** (0.052)
Exposure × 2020–21 × small			0.073 (0.045)
Exposure × 2022–23 × small			0.126** (0.061)
Firms	341	341	341
Observations	2,758	2,758	2,758
Within R^2	0.023	0.085	0.088

Dependent variable: investment rate I/K, 2015–2023. Exposure is standardized total borrowings over total assets in 2019. All columns include firm fixed effects and 2019 size interacted with the periods; standard errors clustered by firm in parentheses. ** denotes p < 0.05.

The table shows no differential response. Highly leveraged firms did not invest more when rates fell or less when rates rose (columns 1 and 2), and sales growth is likewise unaffected. The only significant results are in column 3, where larger firms with higher exposure invested less in both periods (−0.086 and −0.110) and small firms show offsetting positive coefficients, so that their net response is close to zero. That is the opposite of a financial-accelerator pattern in which small firms would be hit hardest [37].

The design also fails a basic check. In an event-study version, the coefficients on exposure for 2015 and 2016 are positive and significant relative to 2019 (0.073 and 0.100), so more leveraged firms were already on a different investment path before the cycle and the parallel-trends assumption is not met. COVID-19 also

JOURNAL FOR SOCIAL SCIENCE STUDIES
An International Peer-Reviewed Open Access Journal
ISSN (Online): 3006-2071 | ISSN (Print): 3006-2063
Volume 4 • Issue 6 • October 2026

struck in 2020, at the same time as the rate cut, and leveraged firms may have been more exposed to it. We therefore do not interpret these estimates as causal. The episode provides no evidence that borrowing-cost exposure changed investment in a way that would indicate binding financial frictions, and it illustrates how hard clean identification is with listed-firm data.

9.5 A credit-access policy change

A cleaner test uses a change in who could obtain subsidized long-term credit. In March 2020 the State Bank introduced the Temporary Economic Refinance Facility, which refinances banks that lend for new plant and machinery to manufacturers in all sectors except power [38]. At the same time it opened its Long Term Financing Facility, which had been restricted to export-oriented projects, to all sectors, and in July 2020 it cut the end-user rate on both facilities to 5% [39]. Firms that already exported could use the Long Term Financing Facility before March 2020, while non-exporters could not. If credit access matters for investment, manufacturers with little or no export sales should have increased long-term borrowing and investment by more in 2020–21 than exporters.

We use the 2019 share of export sales in total sales for 282 manufacturing firms (mean share 15%; 41% report no exports) and define exposure as one minus that share. Energy, communications and other services firms are excluded. The regressions follow Section 9.4, with firm effects and either year effects or sector-by-year effects, 2019 size interacted with the periods, and an event-study version.

Table 14. Investment and borrowing response to the 2020 opening of subsidized long-term finance

	(1) Investment rate, firm and year effects	(2) Investment rate, sector × year effects	(3) Change in long-term borrowing / assets
Non-export share × 2020–21	−0.080* (0.047)	−0.015 (0.054)	0.000 (0.010)
Non-export share × 2022–23	−0.189*** (0.061)	−0.071 (0.071)	0.017* (0.009)
Firms	281	281	282
Observations	2,358	2,358	2,176
Within R^2	0.029	0.081	0.058

Manufacturing firms, 2015–2023. Non-export share = 1 − export sales / sales in 2019. All columns include firm fixed effects and 2019 size interacted with the periods; column 3 also includes sector-by-year effects. Standard errors clustered by firm in parentheses. *, *** denote p < 0.10, 0.01.

The policy does not show up in the data in the predicted way. Non-exporters did not invest more than exporters after March 2020; the coefficients are negative, significantly so with firm and year effects (−0.080 in 2020–21 and −0.189 in 2022–23) but not once sector-by-year effects are included (−0.015 and −0.071). Nor is there a first stage: long-term borrowing relative to assets did not rise more for non-exporters in 2020–21 (0.000, p = 0.96), and the only difference appears in 2022–23 (0.017, p = 0.05). The event-study coefficients for 2015–2018 are small and insignificant (between −0.06 and +0.04), so, unlike the interest-rate test, this design passes the pre-trend check. However, because the facility produced no detectable differential expansion of credit, the exercise cannot test whether better access would have improved allocation, and COVID-19 affected exporters and non-exporters differently. We read it as a null: we find no

JOURNAL FOR SOCIAL SCIENCE STUDIES
An International Peer-Reviewed Open Access Journal

ISSN (Online): 3006-2071 | ISSN (Print): 3006-2063
Volume 4 • Issue 6 • October 2026

evidence that opening subsidized long-term credit to non-exporters changed their investment.

9.6 Summary of the firm-level evidence

The firm-level data deliver three messages. Investment is closely tied to internal funds, which is what financing constraints would produce, but the tie does not become systematically stronger for the proxies we use. Firms that look constrained are not the firms with the highest average product of capital, which does not fit the idea of productive firms starved of capital; it fits better the idea that constraints bind where profitability is low, so that the constraint proxies pick out weak firms. And the dispersion in returns to capital has widened, which is consistent with growing misallocation but is also what one would expect from rising markup dispersion, changing capacity utilization or accounting effects, none of which we can separate from allocation in these data.

10. Evidence from Unlisted Firms: Enterprise Surveys

The listed firms in Section 9 are a small, relatively well-financed part of Pakistan's corporate sector. This section uses the World Bank Enterprise Surveys to examine unlisted formal firms and to follow some of them over time.

10.1 Data

The 2022 Pakistan Enterprise Survey [40] is a stratified random sample of 1,300 formal private establishments with five or more employees, drawn by industry (ten groups), size (small, medium, large) and region (five regions). Interviews took place from May to December 2022 and describe the last completed fiscal year, which ended in 2021 for most firms. All estimates use the survey's sampling weights, and standard errors are clustered by sampling stratum. Of the 1,300 firms, 847 answered the manufacturing questionnaire, which includes the capital measure we use. A linked panel dataset [41] follows firms across the 2007, 2013 and 2022 surveys: it has 3,884 firm-wave observations on 2,870 firms, of which 814 appear in at least two waves, giving 1,014 pairs of adjacent waves.

10.2 Variables and hypotheses

We classify a firm as constrained if it did not apply for a loan because of interest rates, complex procedures, collateral requirements, insufficient loan size or maturity, or because it did not expect approval, or if its application was rejected. We classify it as unconstrained if it reported no need for a loan or if its application was approved in full or in part. Firms giving other reasons or no answer (157) are excluded. This leaves 538 constrained and 605 unconstrained firms. As a check on the measure, constrained firms are 30 percentage points more likely to report access to finance as a moderate or worse obstacle ($p < 0.001$). Investment is an indicator for buying fixed assets in the last fiscal year. The average product of capital is ln(sales / capital), with capital measured as the self-reported cost of re-purchasing all machinery, and we also use ln(value added / capital), where value added is sales less materials and goods for resale. All regressions include sector, region and size controls, and firm age and audit status.

H9. Constrained firms are less likely to invest.

H10. Constrained firms have a higher average product of capital.

H11. Firms that report constraints grow more slowly in subsequent years.

10.3 Results

Finance is almost entirely internal. Table 15 shows that bank finance is nearly absent. About 2% of firms have a loan or credit line, firms finance over 90% of working capital from internal funds, and the 33 firms that report how they paid for fixed assets used internal funds for about three-quarters of the cost. Among firms that did not apply for credit, about 44% said they had no need, and the rest cited interest rates (17%), procedures (13%), collateral (8%), loan size or maturity (4%), or doubts about approval (5%).

JOURNAL FOR SOCIAL SCIENCE STUDIES
An International Peer-Reviewed Open Access Journal

ISSN (Online): 3006-2071 | ISSN (Print): 3006-2063
Volume 4 • Issue 6 • October 2026

Table 15. Finance profile of formal firms, Pakistan 2022 (weighted)

Indicator	Weighted share
Has a bank loan or line of credit	2.1%
Bought fixed assets in the last fiscal year	4.5%
Working capital financed from internal funds	91.5%
Working capital borrowed from banks	0.8%
Working capital from supplier and customer credit	6.4%
Fixed assets financed from internal funds (33 investing firms)	76.4%
Fixed assets financed by banks (33 investing firms)	2.9%
Access to finance is a moderate or worse obstacle	40.8%
Did not apply: no need for a loan	43.6% of non-applicants
Did not apply: interest rates not favourable	16.9% of non-applicants
Did not apply: application procedures complex	13.3% of non-applicants
Did not apply: collateral requirements too high	8.1% of non-applicants
Did not apply: did not expect approval	4.5% of non-applicants
Did not apply: loan size or maturity insufficient	3.8% of non-applicants
Constrained (discouraged or rejected), share of classified firms	51.4%

Source: World Bank Enterprise Survey, Pakistan 2022 [40]; authors' calculations with sampling weights.

Who is constrained. Discouragement is widespread and is not clearly related to size, age or whether the accounts are audited (none of the coefficients is significant at the 10% level).

Investment and returns to capital. Constrained firms are not less likely to buy fixed assets (Table 16, column 1: +1.5 percentage points, p = 0.46), and they do not have a higher average product of capital: the coefficient on ln(Sales/K) is 0.05 (p = 0.84), on ln(Value added/K) 0.10 (p = 0.68), and it remains small (0.10) when interest rates are dropped from the reasons for being constrained. Capacity utilization does not differ significantly. The only suggestive result is for firms that actually have credit: they are 17.5 percentage points more likely to invest (p = 0.08) and have higher sales per unit of capital (0.83, p = 0.06), but only 24 firms have credit, so these estimates are imprecise. H9 and H10 are not supported.

Table 16. Constraints, investment and returns to capital, Pakistan 2022

Dependent variable	Regressor	Coefficient	Std. error	Obs.
Bought fixed assets	Constrained	0.015	0.021	1,121
Bought fixed assets	Has bank credit	0.175*	0.098	1,237
ln(Sales/K)	Constrained	0.051	0.254	700
ln(Value added/K)	Constrained	0.096	0.229	698
ln(Sales/K)	Constrained, excluding interest-rate reason	0.102	0.235	563
ln(Sales/K)	Has bank credit	0.835*	0.437	772
Capacity utilization, %	Constrained	3.31	2.78	703

Weighted least squares with sector and region effects and controls for size, age and audit status; standard errors clustered by sampling stratum. ln(Sales/K), ln(Value added/K) and capacity utilization are for manufacturers. * denotes p < 0.10.

JOURNAL FOR SOCIAL SCIENCE STUDIES
An International Peer-Reviewed Open Access Journal

ISSN (Online): 3006-2071 | ISSN (Print): 3006-2063
Volume 4 • Issue 6 • October 2026

Dispersion among unlisted firms. Among unlisted manufacturers, the weighted standard deviation of ln(Sales/K) is 1.55 log points (1.51 within sector), and the gap between the 90th and 10th percentiles is 3.8. That is higher than among listed firms (1.45 in 2019–23), so the dispersion of returns to capital is at least as wide outside the stock market. It is not wider among constrained firms (1.53) than among unconstrained firms (1.66).

Firms followed over time. In the panel, the share of firms discouraged from borrowing rose from 34% in 2007 and 35% in 2013 to 48% in 2022, while the share saying access to finance is a moderate or worse obstacle stayed between 38% and 42%. The share reporting that they bought fixed assets was 21% in 2007, 22% in 2013 and 5% in 2022. Discouragement is persistent: a firm that was discouraged is discouraged in the next wave with probability 0.50, against 0.42 for a firm that reported no need. Firms that were discouraged at the start of a period did not grow more slowly (Table 17): the coefficient on employment growth is +0.6 log points a year ($p = 0.58$), and it is positive for sales growth (+5.2, $p = 0.09$), the opposite of H11.

Table 17. Initial constraints and subsequent growth, adjacent survey waves

Dependent variable (annual, log points × 100)	Initial constraint measure	Coefficient	Std. error	Pairs
Employment growth	Discouraged from borrowing	0.59	1.07	774
Employment growth	Finance a moderate+ obstacle	−1.04	1.04	876
Sales growth	Discouraged from borrowing	5.18*	3.01	493
Sales growth	Finance a moderate+ obstacle	4.62	2.87	544

Regressions include fixed effects for the survey-wave pair, which absorb inflation and other common shocks, the initial log of employment and the initial log of firm age; standard errors clustered by firm. Sales are nominal. * denotes $p < 0.10$.

10.4 Summary

The survey evidence agrees with the listed-firm evidence on the main point. Pakistani firms of all kinds rely overwhelmingly on internal funds, and many say they are discouraged from borrowing, but those who say so do not invest less, earn higher returns on capital or grow more slowly. H9, H10 and H11 are not supported. The survey adds that the scarcity of external finance is system-wide, which may explain why discouragement does not separate firms by outcomes.

11. Discussion and Limitations

11.1 Interpretation

The evidence does not support the view that, at the macro level, shallow bank credit or high intermediation spreads reduce the growth return on investment in emerging economies. It does not show that frictions are unimportant. Aggregate data average over firms, and a distortion that moves capital from productive to unproductive firms within a sector can leave the country-level investment–growth slope unchanged. Our test is therefore best read as a test of whether frictions leave a visible mark on aggregate investment productivity, and the answer for credit and spreads is that they do not, in this sample and with these measures.

The tentative equity-market result is consistent with the idea that deeper equity markets help direct investment to growing activities [10, 16]. With three moderators tested, one marginal result should be treated cautiously: a single p-value of 0.03 among three tests is not strong

JOURNAL FOR SOCIAL SCIENCE STUDIES
An International Peer-Reviewed Open Access Journal

ISSN (Online): 3006-2071 | ISSN (Print): 3006-2063
Volume 4 • Issue 6 • October 2026

evidence, and the bootstrap and subsample checks confirm that it is fragile.

For Pakistan, the data point to a quantity problem. Investment is lower than in 93% of comparison economies, and the financial system has shrunk relative to GDP over the period. Because credit depth does not measurably alter the payoff of investment in the estimates, the evidence supports focusing on why Pakistan invests so little before concluding that its existing capital is badly allocated. This paper cannot say why investment is low, which would require data on saving, public finance, the exchange rate and the investment climate.

The firm-level evidence adds nuance. Pakistani listed firms invest more when they have more internal cash, which is what financing constraints would produce, but the sensitivity does not rise systematically with size, dividend status or the Whited–Wu index, and firms that look constrained earn lower, not higher, sales per unit of capital. The widening dispersion in returns to capital is the one result that points toward growing misallocation, though markups, capacity utilization and accounting effects could produce it too. Taken together, the data fit a picture of a thin financial system that supports a low level of investment overall, without clear evidence that allocation among the listed firms we observe is worse where the proxies indicate tighter constraints.

The survey of unlisted firms sharpens the picture. Formal bank finance is almost absent: about 2% of firms have a loan or credit line, and firms finance over 90% of working capital and about three-quarters of fixed-asset purchases from internal funds. About half of classified firms say they are discouraged from borrowing, mostly by interest rates, procedures and collateral. Yet discouraged firms do not invest less, do not earn higher sales per unit of capital, and did not grow more slowly in the following survey wave. A plausible reading is that in this setting almost all firms operate with internal funds, so the discouragement indicator does not separate firms that would have invested more with credit from firms that would not, and the binding constraint is the thin supply of external finance to the whole sector.

11.2 Policy implications

These implications are conditional on the evidence and should be read as such. First, policy aimed at raising the investment rate has a larger estimated growth payoff than policy aimed at marginally raising credit depth per unit of investment. Second, the suggestive equity-market result gives some support to measures that deepen capital markets, as a complement to and not a substitute for bank credit reform. Third, the declining credit-to-GDP ratio in Pakistan suggests that restoring private-sector credit is worth studying with loan-level data and data on unlisted firms, where the allocation question can be tested more directly.

11.3 Limitations

Aggregate proxy for allocation. At the country level we measure the growth payoff of investment, not the dispersion of returns across firms [2]. At the firm level, ln(Sales/K) is an average, not a marginal, product and also reflects markups, capacity utilization and the age and valuation of the capital stock. The estimates are associations, not marginal products.

Endogeneity. Investment, growth and financial depth are jointly determined. We lag the friction variables and use country and period fixed effects, but we have no instrument, so the estimates are not causal.

Fixed effects and measurement. Country fixed effects remove permanent differences, such as institutions, but leave identification to within-country changes over at most six windows, which can attenuate the interaction terms. Credit depth also reflects demand as well as supply, and the interest spread reflects risk and bank market power as well as frictions. Gross fixed capital formation includes public investment.

JOURNAL FOR SOCIAL SCIENCE STUDIES
An International Peer-Reviewed Open Access Journal

ISSN (Online): 3006-2071 | ISSN (Print): 3006-2063
Volume 4 • Issue 6 • October 2026

Sample. The sample rule is data-based, includes some very small economies and episodes of conflict and hyperinflation, and the equity-market sample covers 48 countries. Winsorizing and income-range restrictions do not change the credit result, but the equity result is sensitive.

Multiple testing. Three friction measures were tested, and no correction for multiple comparisons was applied.

Data revisions. WDI series are revised; results can change slightly with a later release.

Firm-level limitations. The company data cover listed firms only, which are larger and better financed than typical Pakistani firms. The investment measure is derived from changes in fixed assets and so includes revaluations. Market-based q is available only from 2014. The State Bank repeats the data of non-responding companies, and although we remove identical repeated records, other stale values may remain. The constraint proxies (size, dividend status and the Whited–Wu index) are imperfect and partly reflect profitability, and the cash-flow sensitivity of investment can arise from measurement error in growth opportunities and not only from constraints [34].

Survey limitations. The Enterprise Survey is a cross-section of formal firms with five or more employees, so it cannot show changes over time except for the subset of firms that appear in several waves. Its capital measure is the self-reported cost of re-purchasing machinery, available for manufacturers only, and its sales and costs are self-reported. Only 4.5% of firms report buying fixed assets, which gives the investment tests little power. Discouragement is self-reported and may reflect the high interest-rate environment of 2022 across the board as much as firm-specific constraints. The wave-to-wave comparison of the share of firms that invested (20.5% and 22.3% in 2007 and 2013, 4.7% in 2022) is large enough that differences in timing and conditions should be considered before reading it as a like-for-like decline.

Future research can use data on unlisted firms, such as the World Bank Enterprise Surveys, loan-level credit-registry data, and quasi-experimental variation in credit supply to test allocation more directly.

12. Conclusion

Using open data for 148 emerging and developing economies and State Bank of Pakistan financial statements for about 450 listed companies, we find that investment goes with faster growth across countries, but that link does not change with bank credit depth or the interest spread. Equity-market depth is associated with a higher payoff to investment, though the result is fragile. Among Pakistani firms, investment responds strongly to internal cash flow, but the response does not grow reliably with size, dividend status or the Whited–Wu index, and firms that look more constrained earn lower, not higher, sales per unit of capital. The spread of sales per unit of capital widened from 2009 to 2023 as private credit fell relative to GDP. Pakistan is in the bottom fifth of the sample on investment, credit and equity-market depth, and its biggest gap against peers is the investment rate. Survey data on unlisted firms show that bank credit is almost absent and that about half of classified firms are discouraged from borrowing, but discouraged firms do not invest less or earn higher returns to capital. Two quasi-experimental checks, the 2020–23 interest-rate cycle and the 2020 opening of subsidized long-term refinance to all manufacturers, find no differential response, and the first fails a pre-trend check. The evidence points to a shortage of capital formation and to widening dispersion in returns, but not to a clear pattern of financially constrained firms being starved of capital they could use well. To find out whether capital is misallocated inside Pakistan, the next step is loan-level credit data and panels that follow unlisted firms over time.

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