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Impact of Financial Revenues and Net Financial Payouts on Investment Efficiency: Evidence from U.S. Non-Financial Firms

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ABSTRACT

This study investigates the effects of financial revenues and net financial payouts on investment efficiency among U.S. non-financial corporations with a particular emphasis on underinvesting firms. This study utilized 20 years of panel data of U.S. non-financial corporations from 1999 to 2018 and deployed the cumulant estimator to investigate the study objectives. We found that financial revenues reduce investment efficiency. Financial revenues also increase underinvestment. This reducing effect of financial revenues on investment efficiency is more prominent in financially unconstrained firms when compared to financially constrained firms. In contrast, net financial payouts enhance investment efficiency and decrease underinvestment. The positive relationship of net financial payouts with investment efficiency is more compelling when considering the composite proxy of net financial payouts instead of net shares repurchases and net equity payouts. The relationship is also stronger during uncertainty. These results are robust to an alternative estimation method. This study's implications are important to firms, investors and governments, as investment efficiency is an important factor that enhances corporate long-term growth. Firms and investors looking to improve investment efficiency may reinvest the financial revenues in real assets to reduce underinvestment. They may also consider the net financial payouts instead of financial payouts when determining the real investment behavior.

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1. Introduction

Based on data from the Federal Reserve Bank (2020), U.S. firms' real investments decreased by $400 billion relative to cash flows over the past two decades, highlighting the investment inefficiencies commonly associated with underinvestment issues among U.S. companies. Recent investigations also show that NFCs in the U.S. are substantially

underinvesting concerning investment opportunities (Akcigit & Ates, 2023; Godlin, Koutroumpis, Lafond, & Winkler, 2024; Gutiérrez & Philippon, 2017, 2018). The reduction in real investment in the U.S. is meaningful because it contrasts with high cash flows and considerable earnings in NFCs in recent years.

Nevertheless, the slow real investments are analogous to lower output growth in the era of plentiful investment opportunities (Biden, 2016; Godlin et al., 2024). This phenomenon of lesser output growth and the real investment slowdown substantiates the problem of underinvestment[1]. Hence, underinvestment with potential investment opportunities is a critical problem for NFCs and crucial micro- and macroeconomic questions that U.S. firms face today (Furman, 2015) because underinvestment impairs fundamental organizational goals such as maximizing long-term corporate value and optimal output growth (Chen, El Ghoul, Guedhami, & Wang, 2017).

Figure 1 compares the real investments trend with the trend of Tobin's q[2] from 1999 to 2018 to confirm whether firms are underinvesting with respect to investment opportunities. Figure 1 shows the fitted values of the ratio of real investments to q regressed on time. Figure 1 reflects those real investments reduced[3] compared to q over the sample period. This reduction in the real investments to q ratio confirms that the relationship between real investments and q has weakened since the late 1990s (Gutiérrez & Philippon, 2017; Peters & Taylor, 2017). Besides, the decreasing real investment to q ratio substantiates underinvestment issue.

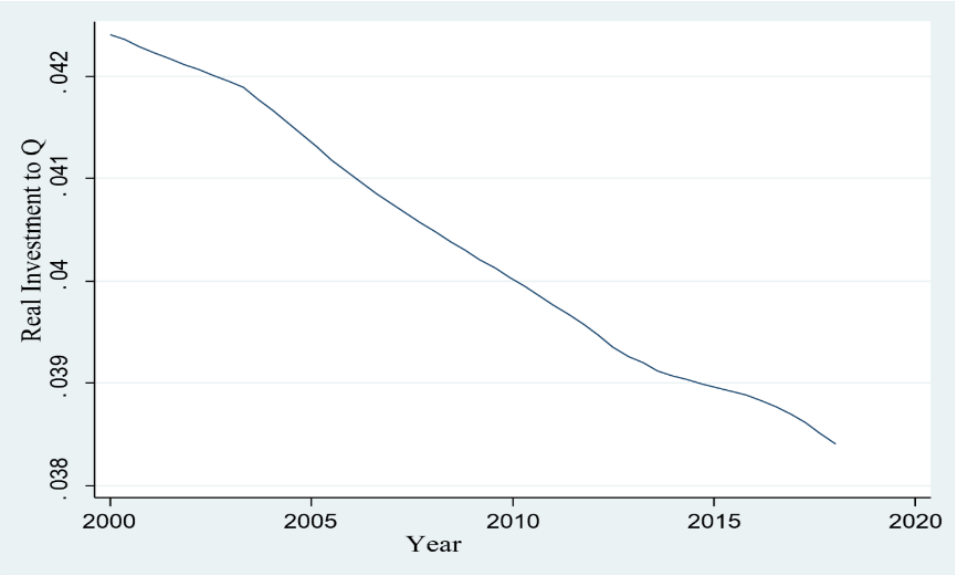

Figure 1: Real Investment to q Over Time

*Author Calculations. q is the proxy for investment opportunities. The firm-level panel time series starts from 1999 to 2018. Real Investments are discounted with the lag total assets. Data Source: Data stream Eikon

[1] For example, Fernald et al. (2017) find that U.S. output growth is discouraging during post financial crisis period, and this reduction in output growth is a result of trend generated during the pre-crisis period. They find that the lower output growth is not related to the financial crisis but the lower growth in total factor productivity and decline in labor force participation. Moreover, Gutiérrez & Philippon (2017, 2018) evidence that these reducing total factor productivity and labor force participation relate to underinvestment.

[2] A considerable number of studies consider Tobin's q for representing investment opportunities (Gutiérrez & Philippon, 2017; Peters & Taylor, 2017).

[3] The reduction of real investments is a relative term throughout the article, as whenever this term is used, it refers to the reduction of real investments in comparison to investment opportunities. This term does not refer to the reduction of aggregate real investments. However, it refers to the increment/ decrement of real investments compared to changes in investment opportunities.

1.1. Role of Financial Revenues

Increasing investment in financial assets justifies the growing underinvestment. Firms invest in financial assets to increase financial revenues, as firms earn financial revenues in the short term[4]. However, the inclination toward short-term financial revenues leads firms to ignore real investment opportunities. Resultantly, firms underinvest in real assets and distort investment efficiency.

The existing literature shows that NFCs have been diverting their cash flows toward investment in financial assets in recent years. Financial revenues are one significant factor for this inclination toward financial assets (Stockhammer, 2004; Tori & Onaran, 2020, 2018; Zeolla & Santarcángelo, 2024). Financial revenues are realized in the short-term; however, firms earn real investment returns in the long run. Hence, they prefer financial revenues over real investments.

1.2. Role of Net Financial Payouts

In addition to financial revenues, financial payouts are one prominent reason for underinvestment. The existing literature highlights that financial payouts ar crucial in explaining the firms' underinvestment (Gutiérrez & Philippon, 2018). Others claim that 91% of profits in the S&P 500 firms are transferred to the shareholders as shares repurchases and dividends, leaving little cash flows for real investments (Lazonick, 2014). This side of the literature strengthens the argument that financial payouts enhance underinvestment.

However, the link between the financial payouts and real investments in isolation misrepresents the relationship between the financing and investing decisions because the financial payout decision is concurrent with the external financing decision. The ignorance of external financing also results in an overestimated effect of financial payouts on investment efficiency. Therefore, an analysis of net financial payouts[5] instead of financial payouts provides a better and more practical meaning to the relationship between financial payouts and investment efficiency (Hecht, 2014).

Fried and Wang (2019) explain that corporations pay out cash flows and issue new shares whenever they find a successful investment opportunity. Consequently, financial payouts may lower investment efficiency, but net financial payouts boost investment efficiency. While Davydiuk, Richard, Shaliastovich, and Yaron (2023) claim that a composite proxy of net share repurchases (share repurchases minus new equity issuances) is irrelevant to growth opportunities. In contrast, Farre-mensa, Michaely, and Schmalz (2024) argue that 42% of American firms are getting external financing mainly to facilitate financial payouts including dividends and shares repurchases. These firms utilize internal cash flows and external finance to make financial payouts. The increasing net financial payouts are critical to real investment behavior and efficiency.

The existing studies provide a mixed indication of the relationship between net financial payouts and underinvestment (Farre-mensa et al., 2024; Fried & Wang, 2019, 2021). Existing studies have shown an acute interest in finding whether financial revenues reduce real investments (Tori & Onaran, 2020). However, investigating investment efficiency, specifically in underinvesting firms, needs to be addressed when examining the relationship of financial revenues and net financial payouts with real investment decisions. Consequently, we

[4]Financial investments refer to the investment in financial instruments of other companies through financial markets, and financial revenues are dividends, interest, and capital gains earned through these financial investments.

[5] Net financial payouts represent financial payouts (dividends, shares repurchase, interest payments and debt repayments) minus new equity and debt issuances.

investigate whether financial revenues and net financial payouts systematically affect the investment efficiency of underinvesting U.S. NFCs.

1.3. Summary of Results and Contribution

This study utilized a panel of 20 years of firm-level data of American Non-financial corporations from 1999 to 2018. We estimated the results through the cumulant estimator (Erickson, Jiang, & Whited, 2014). We reexamine our results through the Generalized method of moment estimator to ensure robustness. This study re-estimates the model after classifying the sample into high and low uncertainty and financially constrained and unconstrained firms.

Our analysis provided seven important findings. 1) Financial revenues reduce investment efficiency; 2) the reducing effect of financial revenues on investment efficiency is stronger in financially unconstrained firms; 3) Financial revenues intensify underinvestment; 4) Net shares repurchases and net equity payouts do not affect investment efficiency; 5) Net financial payouts improve the investment efficiency; 6) Net shares repurchases, net equity payouts and net financial payouts reduce the underinvestment; 7) the positive relationship between net financial payouts and investment efficiency is stronger during uncertainty.

Our study results contribute to two considerable aspects of corporate finance. First, financial revenues reduce investment efficiency and lead to underinvestment. This knowledge will help explain to firms and investors that aggressive enhancement in financial revenues impairs investment efficiency. Second, this study investigates whether net financial payouts impair investment efficiency. This information is also crucial for firms and investors. This study is one of the first studies investigating the effect of a single proxy of net financial payouts, including all the external payouts and external financing, on investment efficiency, explicitly focusing on the underinvesting firms. This knowledge will help firms manage both financial payouts and external financing to simultaneously enhance the short-term stock return and the efficiency of real investments.

The remainder of the article is distributed as follows. Section two discusses the methodology. The third section depicts the results, while section four concludes the study.

2. Methodology

2.1. Data and Sample

We utilize annual panel data of Non-Financial Corporations (NFCs) of the United States of America (U.S.) from 1999 to 2018. The time series of twenty years starting from 1999 to 2018 is considered because real investments were extensively reduced with respect to investment opportunities during these years (Peters & Taylor, 2017).

This study collected data from Thomson Reuters Eikon. We excluded the data of the utility sector because utility firms differently report their financial statements compared to other non-financial corporations (Gunny, 2010). Additionally, we included only those observations where the total assets are more than $1,000,000 (Almeida, Campello, & Weisbach, 2004; Duchin, Ozbas, & Sensoy, 2010). Afterward, the data is winsorized at 1^{st} and 100^{th} percentile, and this study dropped the negative market-to-book ratio and leverage greater than one observation.

Besides, there are missing values; hence, we dropped the cross-sections with less than four non-missing time series in the variables of interest (real investments, Tobin's *q*, financial revenues, net financial payouts and market to book ratio) are dropped. Finally, a maximum of 14,054 panel observations remains for the study (see Table 1, Panel A).

Further, Panel B of Table 1 shows that the data are consistently distributed over the years. The cross-section includes a minimum of 619 firms in 1999 and a maximum of 739 firms from 2011 to 2014, with 736 in 2012.

Moreover, Panel C of Table 1 reflects that among eight broad industries, 24.35% are consumer cyclical, 23.41% are industrial, 11.38% are energy, and 11.04% are technology firms. Subsequently, the other four industries, including basic material, consumer noncyclical, healthcare and telecommunication hold 10.35%, 9.96%, 7.94% and 1.57% of the data, respectively. These statistics show that data are reasonably distributed among various industries.

Table 1
Data

Panel A: Complete Sample				
Total Observations				149080
Less: Firm-Year Observations with less than Rs.1,000,000 Total Assets				-13553
Less: Utility industry				-2370
Less: Negative Market to Book Ratio				-9311
Less: Greater Than 1 Leverage				-73906
				49940
Less: Incomplete values				-35886
Study Sample				14054
Panel B: Year distribution			**Observations**	**Percentage**
1999			619	4.40
2000			640	4.55
2001			645	4.59
2002			665	4.73
2003			680	4.84
2004			699	4.97
2005			711	5.06
2006			714	5.08
2007			721	5.13
2008			715	5.09
2009			722	5.14
2010			728	5.18
2011			739	5.26
2012			736	5.24
2013			739	5.26
2014			739	5.26
2015			721	5.13
2016			710	5.05
2017			709	5.04
2018			702	5.00
Total			14054	100
Panel C: Industry Distribution	**Full Sample**		**Underinvesting Firms**	
	Obs	Percent (%)	Observations	Percent (%)
Basic Material	1454	10.35	864	10.45
Consumer Cyclical	3422	24.35	2138	25.86
Consumer noncyclical	1400	9.96	936	11.32
Energy	1599	11.38	935	11.31
Healthcare	1116	7.94	260	3.14
Industrial	3290	23.41	2102	25.42
Technology	1552	11.04	915	11.07
Telecommunication	221	1.57	119	1.44
Total	14054	100	8269	100
Percentage of Underinvesting firms within the full sample				58.84*

* This percentage is calculated by dividing the total underinvestment observations (8269) by total full sample observations (14054).

This study further categorizes the data for underinvesting firms and finds that underinvesting firms are 58.84% of the total sample. This sample distribution is consistent with the existing literature (Gomariz & Ballesta, 2014). This ratio shows that approximately 59% of U.S. NFCs are underinvesting firms, which substantiates the argument of this study. The current study claims that underinvestment is a significant challenge for U.S. NFCs, and the data reflects that more than 50% of firms are underinvesting. Moreover, the industry weights within the underinvesting sub-sample are analogous to the full sample.

2.2. Model Specification

2.2.1. Specification of Real Investment Model

This study deploys the Goodman, Neamtiu, Shroff, and White (2014) investment model to derive the investment efficiency proxy. Following Goodman et al. (2014), this study includes the beginning of the year *q*, cash flows, beginning of the year asset growth and lagged real investments in the model of real investments, and constructs the investment efficiency measure through equation (1).

$$I_{ijt} = \alpha_{ijt} + \beta_1 I_{ij,t-1} + \beta_2 q_{ij,t-1} + \beta_3 CF_{ijt} + \beta_4 AG_{ij,t-1} + \gamma_t + \mu_j + \varepsilon_{ijt} \quad (1)$$

I reflect the real investments, q represents Tobin's q, *AG* is the asset growth, *CF* is the cash flow, α is the intercept, βs explain the sensitivity of real investments to explanatory variables, ε is the error term, *i* stands for the firm, *j* for industry, t for time, γ represents the time indicator and μ is the industry indicator.

In the model, this study considers the residuals *(IE)* as the measure of investment efficiency. Absolute values of all the residuals are multiplied by (-1) and the product is taken to measure the investment efficiency. With this proxy of investment efficiency, investment efficiency increases from negative to zero.

We consider all firm-year observations with negative residuals to analyze the underinvestment *(UI)*. The absolute of residuals is taken for underinvestment equations so that underinvestment increases with the increase in residuals.

2.2.2. Specification of Investment Efficiency/ Underinvestment Model

This study investigates the proposed framework, initially for the whole investment efficiency sample. Once the investment efficiency equation is determined, the investigation is broadened to the underinvestment sub-sample. Equation (2) analyzes the effect of financial revenues and net financial payouts on investment efficiency.

$$IE_{ijt} = a_{ijt} + \beta_1 FR_{ijt} + \beta_2 NFP_{ijt} + \beta_3 TA_{ijt} + \beta_4 MB_{ijt} + \beta_5 FL_{ijt} + \beta_6 SR_{ijt} + \beta_7 ROA_{ijt} + \beta_8 ROAv_{ijt} + \beta_9 SRv_{ijt} + \mu_j + \gamma_t + \varepsilon_{ijt} \quad (2)$$

IE stands for investment efficiency, *FR* represents the financial revenues, *NFP* means net financial payouts, *TA* reflects log of total assets, *FL* is the financial leverage, *MB* is the market-to-book ratio, *SR* represent stock return, *ROA* means return-on-assets, *SRv* stands for stock-return volatility, *ROAv* represents the return-on-assets volatility, and all other terms are explained under equation (1). This study generates the proxy for investment efficiency from equation (1). Equation (2) investigates whether financial revenues and net financial payouts affect investment efficiency.

2.3. Estimation Method

This study deploys the method of cumulant estimator proposed by Erickson, Jiang, and Whited (2014) for the analysis of data. This estimator is applicable when there are mismeasured regressors in the model. Equation (1) incorporates Tobin's *q*, which comprises measurement error. Tobin's *q* is indulged with measurement error problems because measurable average Q conceptually mismatches with marginal unobservable *q* (Erickson & Whited, 2012).

The error in variables cumulant estimator considers the third and above cumulants and resolves the error of mismeasured proxies of variables (Erickson et al., 2014; Peters & Taylor, 2017).

the cumulant estimator derives in the following form;

$$Q_{ijt} = \gamma + q_{ijt} + \epsilon_{ijt} \quad (3)$$

Where *Q* denotes the observed wrongly measured proxy for the unobserved actual investment opportunities and *q* represents the unobserved actual investment opportunities. According to equation (1), true unobservable *q* should determine real investments; nevertheless, the current study deploys a mismeasured Q because true q is unobservable. The measurable Q depends on the performance of (3). The higher error in (3) represents more deviation of Q from *q*. The cumulant estimator is suitable when errors in (3) are high.

The cumulant estimator finds the slope of Q by abolishing the error in the variable. The elimination of error in variable increases the correlation of slope of observed Q and unobserved *q* while decreases the association of Q, ε and vectors of control variables. Hence, the estimator is preferable where *Q* biases and refrains from reflecting the *q*.

The error in variables cumulant estimator assumes i) there is no Gaussian distribution in the data, ii) *q* is not correlated with ε and coefficients of control variables and iii) ε as well as ϵ are not correlated with each other, *q* and the coefficients of control variables. The cumulant estimator finds the least square results and subtracts them from cumulant results in the first step. While the cumulant estimator finds the coefficient of investment opportunities by investigating the sensitivity of *Q* with the coefficients of control variables and the sensitivity of real investments on the coefficients of control variables independently in the second stage (Erickson et al., 2014; Nasir, Zainudin, & Shahrin, 2022).

In addition to the cumulant estimator, this study uses the generalized method of moment (GMM) estimator to deal with the endogeneity and heteroskedasticity problems to gauge the robustness of the results (Arellano & Bover, 1995; Blundell & Bond, 1998). The existing studies suggest that real investment is a dynamic variable, where the past level of real investments explains the current real investment (Wintoki, Linck, & Netter, 2012). The GMM efficiently considers the dynamic model specification.

The GMM also addresses the dynamic panel bias and fixed effect problem (Roodman, 2009). Tori & Onaran (2020) referred to deploying the GMM while examining the effect of financial revenues and financial payouts on real investment because of the simultaneity (reverse causality) problem. Tori & Onaran (2020) state that real investment may lead to higher financial revenues and payouts. The GMM deals with the reverse causality issue (Arellano & Bover, 1995; Blundell & Bond, 1998). That being the case, we reexamine our results under the GMM estimator for investigating the robustness with endogeneity bias.

This study deploys the system GMM and incorporates the forward orthogonal deviation because of the gaps in data, which cannot be addressed by first differencing (Arellano & Bond, 1991): however, system GMM addresses the issue of missing values by forward orthogonal

deviation (Arellano & Bover, 1995; Jermias & Yigit, 2019). Additionally, we analyzed our data through Stata.

3. Results and Discussion

3.1. Descriptive Statistics

Table 2 presents the descriptive statistics of variables, including the mean, standard deviation, minimum and maximum values. The average real investments are merely 5% of total assets, while the mean Tobin's *Q* (1.8355) data reveals that investment opportunities are approximately 180 percent of replacement cost. These data reveal that, on average, the high level of investment opportunities does not translate into real investments.

Additionally, the cash flow data explains that the mean cash flows are 9% of total assets, which is 4% greater than the size of real investments. This low real investment level shows that firms utilize approximately half of their internal cash flows on real investments. At the same time, firms utilize the remaining 4% on net financial payouts (4% of total assets) and financial investments. Remember that external financing from creditors and shareholders is already subtracted from the financial payouts in the measure of net financial payouts. Therefore, financial payouts utilize all the external financing and approximately half of the internal financing, thus leaving only half of the cash flows for real investments.

Table 2 shows that financial revenues are positive on average (0.0047), representing that firms are earning profits on average on investments in financial assets. Positive average net financial payouts (0.0433) reflect that the size of external financial payouts is greater than external financing. This high value of financial payouts imitates that firms utilize external financing to satisfy the payouts.

The investment efficiency and underinvestment observations are found after regressing the equation (1). The mean investment efficiency and underinvestment values are -0.0323 and 0.0291 with standard deviations of 0.0369 and 0.0268, respectively. These results show that firm level real investments are inefficient on average approximately by 3% of Total Assets.

Table 2
Summary Statistics

	Variables	Obs	Mean	Median	Standard Deviation	Min	Max
I_{ijt}	Real Investment	13148	0.0591	0.0430	0.0709	0.0000	0.5503
q_{ijt}	Tobin's *q*	13508	1.8355	1.6153	1.3578	0.1844	22.244
CF_{ijt}	Cash Flow	13145	0.0926	0.0818	0.1304	-1.8996	0.5224
AG_{ijt}	Asset Growth	13202	0.1058	0.0580	0.3620	-0.5616	3.6602
FR_{ijt}	Financial Revenues	10978	0.0047	0.0029	0.0139	-0.0772	0.1474
NFP_{ijt}	Net Financial Payout	8914	0.0433	0.0516	0.2065	-1.2406	0.8206
SR_{ijt}	Stock Return	11528	0.1625	0.0400	0.5797	-0.94	5.67
ROA_{ijt}	Return on Assets	13898	0.0419	0.0400	0.1263	-1.93	0.48
TA_{ijt}	Firm Size/Log Total Assets	14054	20.959	20.188	2.0651	14.166	24.873
MB_{ijt}	Market-to-Book Ratio	12218	3.3910	3.1300	6.9187	0.0000	124.88
FL_{ijt}	Financial Leverage	14054	0.3374	0.3100	0.2361	0.0000	1.000
SRv_{ijt}	Stock Return Volatility	13062	0.1120	0.1011	0.0814	0.0075	0.7636
ROA_{ijt}	Return on Assets Volatility	13115	0.0401	0.0357	0.0576	0.0000	0.6926
IE_{ijt}	Investment Efficiency	11986	-0.032	-0.028	0.0369	-0.4107	0.0000
UI_{ijt}	Underinvestment	8296	0.0291	0.0151	0.0268	0.0000	0.4107

Variables are defined in Appendix A. The observations of investment efficiency and underinvestment are derived from the residuals of equation (1).

3.2. Empirical Results and Discussion

3.2.1. Results of Real Investment Equation

Table 3 reports the outcomes of equation (1). The model examines the effect of investment opportunities on real investments after controlling for lagged real investments, cash flows and lagged asset growth. The *q* coefficient is negative and insignificant. The results show that Tobin's *q* does not significantly explain the size of real investments.

These results are consistent with claims that investment opportunities affect real investments *(I)* (Furman, 2015; Gutiérrez & Philippon, 2017). According to Gutiérrez & Philippon (2017), real investments have been weak relative to Tobin's *q* since the early 2000s. According to them, short-termism is a significant reason for this weak relationship. This study investigates whether financial revenues and net financial payouts explain the residuals of the real investment – *q* model.

This study finds the residuals after regressing the equation (1). Positive residuals correspond to overinvestment and negative residuals represent underinvestment (Richardson, 2006).

Table 3
Cumulant Estimator: Dependent Variable - Real Investment

Variables	Results
$q_{ij,t-1}$	-0.0170
	(0.0140)
$I_{ij,t-1}$	0.7125***
	(0.0313)
CF_{ijt}	0.0565***
	(0.0200)
$AG_{ij,t-1}$	-0.0139***
	(0.0036)
γ_t	Yes
Industry-Year Demeaned	Yes
ρ^2	0.481
N	11975

*** significant at 0.01. ** significant at 0.05. * significant at 0.1. Standard Error in parenthesis. *q* is Tobin's *q*, *I* is the real investments, *CF* stands for the cash flows, *AG* means asset growth, γ is the time indicator, ρ^2 is the R-squared, *N* is the sample size, *i* stands for firm, *j* for industry and *t* for time.

3.2.2. Investment Efficiency Model Results

Effect of Financial Revenues on Investment Efficiency

Moving forward to the analysis of the study hypotheses, Table 4 reports the outcomes of equation (2). The equation examines the effect of financial revenues *(FR)* and net financial payouts *(NFP)* on investment efficiency (Goodman et al., 2014). Models 1, 2 and 3 report the results of net shares repurchases, net equity payouts and net financial payouts, respectively.

For the financial revenues, the results show that the coefficients of financial revenues are negative but insignificant in all three models. These results differ from the standard literature on financial revenues (Tori & Onaran, 2020, 2018).

Nonetheless, Zhang & Zheng (2020) report similar results, which evidence that financial revenues do not affect the options to invest either in financial or real asset. However, the difference in the risk involved in both types of investments matters the most. According to

Zhang & Zheng (2020), financial revenues should be considered a minor factor for investment portfolio management.

Effect of Net Financial Payouts on Investment Efficiency

While examining the effect of net financial payouts on investment efficiency, this study investigates the effect of three proxies of net financial payouts on investment efficiency. The proxies include net shares repurchases, net equity payouts and net financial payouts.

Model 1 of Table 4 reports the results of net shares repurchases. The coefficient of net shares repurchases in model 1 is positive but insignificant. These results are incompatible with the short-termism claim (Farre-mensa et al., 2024; Gutiérrez & Philippon, 2018; Miller & Rock, 1985; Stein, 1989) since net shares repurchases are not distorting the investment efficiency. Nevertheless, these results complement the studies of Fried & Wang (2019, 2021).

This side of the literature claims that financial payouts might reduce investment efficiency. However, the net financial payouts negate the detrimental effect of financial payouts since firms pay dividends and interest, and buy back their shares through internal cash flows. Nonetheless, whenever they are exposed to an investment opportunity, they exploit it with the help of external financing. In this way, net financial payouts either have an increasing effect on investment efficiency or become irrelevant to investment decisions (Kaplan, 2018).

This literature is also consistent with the finance irrelevance theory, famously called MM theory (Miller & Modigliani, 1961). The theory proposes that financing and payout decisions are independent of investment decisions. According to this literature, firms repurchase their shares with internal cash flows and exploit the investment opportunities by issuing new shares.

In model 2 of Table 4, the current study reports the proxy of net equity payouts. The coefficient of net equity payouts in model 2 is also positive but insignificant, indicating that the net equity payouts and issuance decisions are independent of investment efficiency. These results are again congruent with the same literature that assumes that net financial payouts improve investment efficiency (Fried & Wang, 2019, 2021) or that it is irrelevant to investment efficiency (Miller & Modigliani, 1961).

In model 3 of Table 4, this study reports the composite proxy of net financial payouts *(NFP)*. The coefficient of net financial payouts is positive and significant *(*$\beta=0.0087$, $p<0.05$*)*. Thus, it is found that net financial payouts affect investment efficiency. These results agree with (Fried & Wang, 2019, 2021), which assume that net financial payouts should improve investment efficiency.

These results also show that net equity payouts cannot explain investment efficiency. However, when we consider the interest expense and net debt issuance in the proxy, the results improve, and net financial payouts provide investment efficiency-increasing coefficients. Hence, these results suggest that firms concurrently manage their equity and debt payouts along with the equity and debt issuance to enhance investment efficiency. Additionally, most of the results of control variables are in line with the leading models of investment efficiency (Biddle, Hilary, & Verdi, 2009; Goodman et al., 2014; Richardson, 2006).

3.2.3.Underinvestment Model Results

Once the relationships between financial revenues and net financial payouts with investment efficiency are established, we report the results of underinvestment models discussing their relationships with financial revenues and net financial payouts.

Effect of Financial Revenues on Underinvestment

For financial revenues, Table 5 reports the results of the underinvestment equation. The model examines the effect of financial revenues and net financial payouts on underinvestment. Models 1, 2 and 3 include the net shares repurchases, net equity payouts and net financial payouts.

Table 4
Cumulant Estimator - Dependent Variable: Investment Efficiency

Variables	Model 1	Model 2	Model 3
FR_{ijt}	-0.0369	-0.0686	-0.0371
	(0.0632)	(0.0645)	(0.0663)
NFP_{ijt}	0.0053	0.0056	0.0087***
	(0.0050)	(0.0073)	(0.0033)
TA_{ijt}	0.0022***	0.0017***	0.0018***
	(0.0005)	(0.0004)	(0.0005)
MB_{ijt}	-0.0010***	-0.0005	-0.0012***
	(0.0003)	(0.0008)	(0.0001)
ROA_{ijt}	-0.0131	-0.0148*	-0.0190**
	(0.0080)	(0.0077)	(0.0080)
FL_{ijt}	-0.0082*	-0.0077	-0.0048
	(0.0045)	(0.0068)	(0.0046)
SR_{ijt}	0.0037***	0.0030**	0.0034***
	(0.0009)	(0.0013)	(0.0011)
$ROAv_{ijt}$	-0.0323**	-0.0324**	-0.0305*
	(0.0151)	(0.0166)	(0.0185)
SRv_{ijt}	-0.0188**	-0.0225*	-0.0242*
	(0.0095)	(0.0122)	(0.0136)
γ_t	Yes	Yes	Yes
Industry-Year De-mean	Yes	Yes	Yes
ρ^2	0.049	0.036	0.047
N	7852	6360	5613

*** significant at 0.01. ** significant at 0.05. * significant at 0.1. Standard Error in parenthesis. *FR* stands for financial revenues, *NFP* is the net financial payouts, *FL* stands for financial leverage, *SR* means stock return, *TA* is log of total assets/ firm size, *ROA* represents return-on-assets, *MB* reflects market-to-book ratio, *SRv* stands for stock-return volatility, *ROAv* is the return-on-assets volatility, γ is the time indicator, ρ^2 is the R-squared, *N* is the sample size and *i* stands for firm, *j* for industry and *t* for time. Models 1, 2 and 3 report the net shares repurchases, net equity payouts and net financial payouts respectively. In models 1 and 3 the 5th cumulant is considered since τ^2 is irrational for 3rd cumulant. The Sargan J test is insignificant when using the 5th cumulant.

Results show that financial revenues lead to underinvestment since the coefficient of financial revenues is positive and significant in models 2 (β=0.1379, p<0.01) and 3 (β=0.1179, p<0.05) but positive and insignificant in model 1. These results justify the results reported by (Tori & Onaran, 2020, 2018; Wang, 2019). The results also complement the short-termism theory (Stein, 1989) and confirm that higher financial revenues reduce the investment efficiency of underinvesting firms.

Firms have the option to invest financial resources either in fixed assets or in financial assets. Firms are pressured by the investors or by the managerial career and remuneration desire to enhance the profits in the short term. For this purpose, firms invest in financial assets as a financial choice for earning higher financial revenues in the short term. However, the higher financial revenues trap firms to continuously invest in financial assets by ignoring the investment opportunities that result in underinvestment (Demir, 2009b; Stockhammer, 2004).

Effect of Net Financial Payouts on Underinvestment

The coefficients of net financial payouts in model 1 for shares repurchases and model 3 for net financial payouts are negative and significant (model 1 β=-0.0087, p<0.1, model 2, β=-0.0051, p<0.1). At the same time, it is negative but insignificant in model 2 for net equity payouts. Thus, this study reports that net financial payouts affect underinvestment because the relationship is significant in most models.

These results agree with (Fried & Wang, 2019, 2021), which assumes that financial payouts in isolation increase underinvestment. However, when we consider external financing in the proxy of financial payouts, the resultant proxy of net financial payouts helps firms to reduce underinvestment since firms pay dividends and interest, and repurchase their shares through internal cash flows. Nevertheless, whenever they are exposed to an investment opportunity, they exploit it with the help of external financing. This way, net financial payouts reduce the underinvestment instead of increasing it.

Table 5
Cumulant Estimator - Dependent Variable: Underinvestment

Variables	Model 1	Model 2	Model 3
FR_{ijt}	0.0841	0.1379***	0.1179**
	(0.0695)	(0.0524)	(0.0543)
NFP_{ijt}	-0.0087*	-0.0035	-0.0051*
	(0.0046)	(0.0061)	(0.0028)
TA_{ijt}	-0.0007*	-0.0005	-0.0005
	(0.0004)	(0.0003)	(0.0004)
MB_{ijt}	0.0017***	0.0017***	0.0015***
	(0.0004)	(0.0004)	(0.0004)
ROA_{ijt}	-0.0140*	-0.0186**	-0.0169
	(0.0082)	(0.0078)	(0.0112)
FL_{ijt}	-0.0093**	-0.0110**	-0.0095*
	(0.0046)	(0.0047)	(0.0052)
SR_{ijt}	-0.0058***	-0.0056***	-0.0052***
	(0.0011)	(0.0013)	(0.0013)
$ROAv_{ijt}$	0.0360**	0.0367***	0.0329*
	(0.0141)	(0.0140)	(0.0011)
SRv_{ijt}	0.0034	0.0046	0.0016
	(0.0065)	(0.0072)	(0.0075)
γ_t	Yes	Yes	Yes
Industry Year Demean	Yes	Yes	Yes
ρ^2	0.134	0.159	0.142
N	5316	4346	3797

*** significant at 0.01. ** significant at 0.05. * significant at 0.1. Standard Error in parenthesis. *FR* stands for financial revenues, *NFP* is the net financial payouts, *FL* stands for financial leverage, *SR* means stock return, *TA* is log of total assets/ firm size, *ROA* represents return-on-assets, *MB* reflects market-to-book ratio, *SRv* stands for stock-return volatility, *ROAv* is the return-on-assets volatility, γ is the time indicator, ρ^2 is the R-squared, *N* is the sample size and *i* stands for firm, *j* for industry and *t* for time. Models 1, 2 and 3 report the net shares repurchases, net equity payouts and net financial payouts respectively.

3.3. Additional Analysis

3.3.1. Investment Efficiency Analysis Under Financial Constraints

This study extends the investment efficiency analysis by classifying the sample according to the financial constraints. The existing studies claim that financial constraints lead to underinvestment and impair investment efficiency (Almeida & Campello, 2007; Hecht, 2014; Lewellen & Lewellen, 2016). Firms invest in financial assets instead of real assets since the available internal cash flow may be invested in financial or real assets in financially constrained

firms. The higher financial revenues compel the firms to prioritize financial assets over investment opportunities. Hence, financial constraints might enhance the detrimental effect of financial revenues on investment efficiency and underinvestment (Demir, 2009b, 2009a; Orhangazi, 2008).

Besides, in financially constrained firms, the detrimental effect of financial payouts on investment efficiency would be more prevalent. The limited internal cash flows may either be utilized for financial payouts or exploiting investment opportunities. Firms' eagerness to achieve the short-term earnings benchmarks directs them to increase the financial payouts at the cost of investment efficiency (Almeida & Campello, 2010). Additionally, suppose the net financial payouts are also increasing in financially constrained firms, then it will harm investment efficiency. As firms utilize both limited internal cash flows and external financings on financial payouts, the probability of underinvestment will increase (Almeida & Campello, 2010).

This study considers the KZ index developed by Kaplan and Zingles (1997) to measure financial constraints. The KZ index is the most widely accepted proxy for financial constraints (Schauer, Elsas, & Breitkopf, 2019).

Following Kaplan & Zingles (1997) and Khan, He, Akram, and Sarwar (2017), this study considers the following model of the KZ index.

$$KZ_{ijt} = -\left(1.002\frac{CF_{ijt}}{Capex_{ij,t-1}}\right) + \left(0.283q_{ijt}\right) + \left(3.139\frac{D_{ijt}}{TA_{ij,t-1}}\right) - \left(39.368\frac{Div_{ijt}}{Capex_{ij,t-1}}\right) - \left(1.315\frac{Cash_{ijt}}{Capex_{ij,t-1}}\right) \quad (4)$$

Where *KZ* is the Kaplan and Zingles index, *CF* is the operating cash flows, *Capex* represents the property plant and expenditures, *q* is Tobin's *q*, *D* represents the total debts/liabilities, *TA* is the total assets, *Div* stands for the dividends, *Cash* is the sum of cash holdings and marketable securities, *i*, *j* and *t* show the firm, industry and year representation. The financial constraints increase with the increase in *KZ*.

The sample is divided into high and low financial constraints according to the median value of financial constraints (KZ index). The firm-year observations above median financial constraints are considered financially constrained firms, while the opposite works for the low level of financial constraints (Khan et al., 2017).

3.3.2. Investment Efficiency Model Results

Table 6 reports the results of equation (2) after distributing the sample according to financial constraints. Models 1, 2 and 3 report the net shares repurchases, net equity payouts and net financial payouts, respectively, for financially constrained panels while models 4 through 6 depict the results of financially unconstrained firms in the same order.

The coefficients of financial revenues are insignificant in financially constrained panels, while they are negative and significant in financially unconstrained panels (Model 4, β=-0.1390, p=0.05, Model 5, β=-0.1405, p=0.05, Model 6, β=-0.1295, p=0.1). These results signify that financial revenues reduce investment efficiency in financially unconstrained firms, while financial revenues do not affect investment efficiency in financially constrained firms.

Financial revenues impair the investment efficiency more rapidly in financially unconstrained firms because, as firms get more access to financial markets, they may exploit the financial investment better than the financially constrained firms. Hence, higher financial investments lead to higher financial revenues. Resultantly, the higher financial revenues encourage firms to further increase their financial assets by ignoring real investment

opportunities (Tori & Onaran, 2020). Tori and Onaran (2020) suggest that the ease in financial constraints inclines firms toward real investment destroying financial revenues.

Further, the coefficients of net shares repurchases and net financial payouts are insignificant in models 1 and 3 of financially constrained panels but positive and significant only for net equity payouts in model 2 (β=0.0344, p=0.05) and insignificant in all the models of financially unconstrained panels. These results show that net equity payouts improve investment efficiency with increased financial constraints.

These results justify that as firms become financially constrained, they utilize external financing prudently and exploit investment opportunities. They transfer the funds toward the financial payouts in case of overinvestment (Richardson, 2006). On the other side, they utilize the funds to exploit the positive net present value projects and reduce underinvestment (Fried & Wang, 2019, 2021).

Financially constrained firms prioritize long-term growth on current profits because they do not face extensive financial market pressure to increase short-term profitability (Gryglewicz, Mayer, & Morellec, 2020). This is because financially constrained firms do not have excessive access to the financial markets.

Table 6
Classification by Level of Financial Constraints: Cumulant Estimator - Dependent Variable: Investment Efficiency

Variables	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**
	Financially Constrained Panels			**Financially Unconstrained Panels**		
FR_{ijt}	0.0357	0.0352	-0.0129	-0.1390**	-0.1405**	-0.1295*
	(0.0787)	(0.0833)	(0.1196)	(0.0690)	(0.0698)	(0.0735)
NFP_{ijt}	-0.0029	0.0344**	0.0144	0.0068	-0.0042	0.0031
	(0.0077)	(0.0454)	(0.0104)	(0.0043)	(0.0057)	(0.0028)
TA_{ijt}	0.0033***	0.0029***	0.0028***	0.0004	0.0005	0.0006
	(0.0007)	(0.0007)	(0.0007)	(0.0005)	(0.0005)	(0.0005)
MB_{ijt}	-0.0036***	-0.0026***	0.0023	-0.0012***	-0.0013***	-0.0011***
	(0.0014)	(0.0006)	(0.0043)	(0.0004)	(0.0004)	(0.0004)
ROA_{ijt}	-0.0171	-0.0345***	-0.0477**	0.0003	0.0045	-0.0017
	(0.0117)	(0.0129)	(0.0196)	(0.0080)	(0.0084)	(0.0087)
FL_{ijt}	-0.0018	-0.0034	-0.0255	0.0039	0.0036	0.0026
	(0.0083)	(0.0080)	(0.0231)	(0.0061)	(0.0061)	(0.0066)
SR_{ijt}	0.0061***	0.0044**	-0.0014	0.0044***	0.0045***	0.0039***
	(0.0018)	(0.0018)	(0.0054)	(0.0009)	(0.0009)	(0.0009)
$ROAv_{ijt}$	-0.0314	-0.0401	-0.0922	-0.0104	-0.0102	-0.0175
	(0.0267)	(0.0326)	(0.0601)	(0.0153)	(0.0155)	(0.0147)
SRv_{ijt}	-0.0235**	-0.0264	-0.0200	-0.0031	0.0056	-0.0052
	(0.0117)	(0.0167)	(0.018)	(0.0114)	(0.0108)	(0.0115)
γ_t	Yes	Yes	Yes	Yes	Yes	Yes
Industry Year Demean	Yes	Yes	Yes	Yes	Yes	Yes
ρ^2	0.068	0.052	0.041	0.112	0.109	0.101
N	4778	3286	2983	3074	3074	2630

*** significant at 0.01. ** significant at 0.05. * significant at 0.1. Standard Error in parenthesis. *FR* stands for financial revenues, *NFP* is the net financial payouts explaining the net shares repurchases in models 1 and 4, the net equity payouts in models 2 and 5, and net financial payouts in models 3 and 6,

FL stands for financial leverage, *SR* means stock return, *TA* is log of total assets/ firm size, *ROA* represents return-on-assets, *MB* reflects market-to-book ratio, *SRv* stands for stock-return volatility, *ROAv* is the return-on-assets volatility, γ is the time indicator, ρ^2 is the R-squared, *N* is the sample size and *i* stands for firm, *j* for industry and *t* for time. Models 1-3 report the financially constrained panels, while models 4-6 depict the financially unconstrained panels. In model 1, the 4th cumulant is considered, while in model 2, the 5th cumulant is taken since τ^2 is irrational for 3rd cumulant in these models. The Sargan J test is insignificant when using the 4th and 5th cumulants.

3.3.3. Underinvestment Model Results

For underinvestment models, Table 7 reports the results of underinvestment model for both financially constrained and unconstrained panels. Models 1 through 3 incorporate the net shares repurchases, net equity payouts and net financial payouts, respectively, for financially constrained panels, while models 4 to 6 include the proxies of net financial payouts in the same order for financially unconstrained panels.

The coefficients of financial revenues are insignificant in financially constrained panels, while they are positive and significant for financially unconstrained panels (Model 4, β=0.1768, p=0.05, Model 5, β=0.1789, p=0.05, Model 6, β=0.1496, p=0.1). These results are similar to the investment efficiency results and confirm that financial revenues increase underinvestment only in financially unconstrained firms.

Table 7
Classification by Level of Financial Constraints: Cumulant Estimator - Dependent Variable: Underinvestment

Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
	Financially Constrained Firms			Financially Unconstrained Firms		
FR_{ijt}	0.0081	0.0644	0.0719	0.1768**	0.1789**	0.1496*
	(0.0930)	(0.0500)	(0.0526)	(0.0760)	(0.0764)	(0.0781)
NFP_{ijt}	-0.0098	-0.0329**	-0.0115*	-0.0101***	-0.0028	-0.0042*
	(0.0064)	(0.0166)	(0.0071)	(0.0035)	(0.0042)	(0.0022)
TA_{ijt}	-0.0011*	-0.0003	-0.0004	-0.0004	-0.0004	0.0005
	(0.0006)	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0004)
MB_{ijt}	0.0024***	0.0020**	0.0018**	0.0013***	0.0014***	0.0011**
	(0.0009)	(0.0009)	(0.0008)	(0.0004)	(0.0004)	(0.0005)
ROA_{ijt}	-0.0211**	-0.0390***	-0.0455***	-0.0070	-0.0110	-0.0033
	(0.0101)	(0.0098)	(0.0133)	(0.0096)	(0.0099)	(0.0133)
FL_{ijt}	-0.0102**	-0.0133**	-0.0092*	-0.0076	-0.0080	-0.0064
	(0.0050)	(0.0049)	(0.0051)	(0.0071)	(0.0069)	(0.0081)
SR_{ijt}	-0.0063***	-0.0060**	-0.0053*	-0.0060***	-0.0061***	-0.0054***
	(0.0018)	(0.0027)	(0.0028)	(0.0010)	(0.0010)	(0.0010)
$ROAv_{ijt}$	0.0506**	0.0710**	0.0619	0.0087	0.0089	0.0101
	(0.0231)	(0.0295)	(0.0385)	(0.0138)	(0.0140)	(0.0153)
SRv_{ijt}	0.0103	0.0098	0.0069	0.0065	0.0072	0.0106
	(0.0076)	(0.0083)	(0.0076)	(0.0123)	(0.0118)	(0.0128)
γ_t	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Year						
Demean						
ρ^2	0.151	0.218	0.186	0.169	0.167	0.101
N	2752	1782	1602	2564	2564	2195

*** significant at 0.01. ** significant at 0.05. * significant at 0.1. Standard Error in parenthesis. *FR* stands for financial revenues, *NFP* is the net financial payouts explaining the net shares repurchases in models 1 and 4, the net equity payouts in models 2 and 5, and net financial payouts in models 3 and 6, *FL* stands for financial leverage, *SR* means stock return, *TA* is log of total assets/ firm size, *ROA* represents return-on-assets, *MB* reflects market-to-book ratio, *SRv* stands for stock-return volatility, *ROAv* is the return-on-assets volatility, γ is the time indicator, ρ^2 is the R-squared, *N* is the sample size

and *i* stands for firm, *j* for industry and *t* for time. Models 1-3 report the financially constrained panels, while models 4-6 depict the financially unconstrained panels.

Furthermore, the coefficients of net financial payouts are negative and significant in models 2, 3, 4 and 6 (Model 2, net equity payouts, β=-0.0329, p=0.05, Model 3, net financial payouts, β=-0.0115, p=0.1, Model 4, net shares repurchases, β=-0.0101, p=0.01, Model 6, net financial payouts, β=-0.0042, p=0.1) and insignificant in models 1 and 5. These results show that net financial payouts decrease the underinvestment similarly in financially constrained and unconstrained panels. This information explains that the relationship between net financial payouts and underinvestment is independent of financial constraints.

3.3.4. Investment Efficiency Analysis Under Uncertainty

While studying the relationships between financial revenues and net financial payouts with investment efficiency and underinvestment, this study extends the investigation to the scenario of uncertainty. The existing studies evidence that uncertainty weakens investment efficiency and increases underinvestment (Bernanke, 1983; Bulan, 2005).

As an alternative option, firms either invest their funds in financial assets (Demir, 2009b; Zhang & Zheng, 2020) or enhance the financial payouts (Buchanan, Cao, Liljeblom, & Weihrich, 2017; Lee, Chen, Gupta, & Lee, 2011). Thus, this study expects that the relationship between financial revenues and net financial payouts with investment efficiency and underinvestment will be more prevalent in highly uncertain firms. The return on assets volatility *(ROAv)* is considered the proxy for uncertainty (Bulan, 2005).

In the section, the sample divides among high and low uncertain panels based on the median *ROAv*. Observations above the median value are considered high uncertain panels and low uncertain panels otherwise .

3.3.5. Investment Efficiency Model Results

Table 8 reports the results of equation (2) after classifying the sample by the level of uncertainty. Models 1 through 3 report the high uncertain panels, including the net shares repurchases, net equity payouts and net financial payouts, respectively, and models 4 through 6 show the low uncertain panels in the same order.

Similar to the primary model, the coefficients of financial revenues are insignificant in both high and low uncertain panels. Conversely, this study finds that among the highly uncertain panels, the coefficients of net financial payouts in models 1 and 3 are positive and significant (Model 1, net shares repurchases, β=0.0088, $p<0.1$, Model 3, net financial payouts, β=0.0152, $p<0.01$), and insignificant in model 2 for net equity payouts, but insignificant in all low uncertain panels. These results show that the significant relationship between net financial payouts and investment efficiency prevails in high uncertain firms, but this relationship is weak among low uncertain firms. In uncertainty, firms prioritize investing only in positive net present value projects to enhance investment efficiency and utilize all remaining funds on financial payouts. These funds are generated either by internal cash flows or by external financing. A sophisticated investment strategy during uncertainty will reduce both underinvestment and overinvestment leading to investment efficiency (Baum, Caglayan, & Talavera, 2010).

3.3.6. Underinvestment Model Results

After investigating the investment efficiency according to the level of uncertainty, this study proceeds to the evaluation of underinvestment by distributing the sample into high and low uncertain panels.

Table 9 reports the results of underinvestment for high and low uncertain panels. Models 1 through 3 represent the net shares repurchases, net equity payouts and net financial payouts, respectively, for high uncertain panels, and subsequent models portray the panels of low uncertain firms in the same order.

Table 8
Classification by Level of Uncertainty: Cumulant Estimator - Dependent Variable: Investment Efficiency

Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
	Highly Uncertain Panel			Low Uncertain Panel		
FR_{ijt}	-0.0286	-0.1034	-0.0858	-0.0313	-0.0266	0.1085
	(0.0754)	(0.0743)	(0.0778)	(0.0939)	(0.0887)	(0.3924)
NFP_{ijt}	0.0088*	0.0101	0.0152***	-0.0125	-0.0031	0.0145
	(0.0047)	(0.0089)	(0.0045)	(0.0114)	(0.0076)	(0.0656)
TA_{ijt}	0.0028***	0.0022***	0.0024***	0.0014***	0.0011**	0.0008
	(0.0006)	(0.0006)	(0.0007)	(0.0005)	(0.0004)	(0.0018)
MB_{ijt}	-0.0009	-0.0009*	-0.0008	-0.0041**	-0.0007	-0.0165
	(0.0006)	(0.0005)	(0.0006)	(0.0017)	(0.0017)	(0.0649)
ROA_{ijt}	-0.0052	-0.0037	-0.0072	0.0443	-0.0083	0.4007
	(0.0088)	(0.0076)	(0.0094)	(0.0296)	(0.0253)	(1.7998)
FL_{ijt}	-0.0111**	-0.0081	-0.0101	0.0156	-0.0030	0.1221
	(0.0055)	(0.0062)	(0.0067)	(0.0129)	(0.0137)	(0.5167)
SR_{ijt}	0.0041***	0.0038***	0.0031	0.0057**	0.0018	0.0210
	(0.0013)	(0.0013)	(0.0014)	(0.0025)	(0.0028)	(0.0781)
$ROAv_{ijt}$	-0.0350**	-0.0408**	-0.0392**	0.2901**	0.0636	1.8269
	(0.0167)	(0.0174)	(0.0014)	(0.1211)	(0.1210)	(7.5991)
SRv_{ijt}	-0.0134	-0.0143	-0.0122	-0.0369**	-0.0343*	-0.0695
	(0.0091)	(0.0118)	(0.0127)	(0.0182)	(0.0190)	(0.1404)
γ_t	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Year						
Demean						
ρ^2	0.068	0.061	0.062	0.060	0.029	0.146
N	3462	2622	2276	4390	3738	3337

*** significant at 0.01. ** significant at 0.05. * significant at 0.1. Standard Error in parenthesis. *FR* stands for financial revenues, *NFP* is the net financial payouts explaining the net shares repurchases in models 1 and 4, the net equity payouts in models 2 and 5, and net financial payouts in models 3 and 6, *FL* stands for financial leverage, *SR* means stock return, *TA* is log of total assets/ firm size, *ROA* represents return-on-assets, *MB* reflects market-to-book ratio, *SRv* stands for stock-return volatility, *ROAv* is the return-on-assets volatility, γ is the time indicator, ρ^2 is the R-squared, *N* is the sample size and *i* stands for firm*, j* for industry and *t* for time. Models 1-3 report the high uncertain panels, while models 4-6 depict the low uncertain panels. In model 4, the 4th cumulant is considered since τ^2 is irrational for 3rd cumulant. The Sargan J test is insignificant when using the 4th cumulant.

The coefficients of financial revenues are positive and significant in most of the models in both high and low uncertain panels (Model 1, β=0.0566, p>0.1, Model 2, β=0.1518, p<0.05, Model 3, β=0.1464, p<0.05, Model 4, β=0.1506, p<0.1, Model 5, β=0.0886, p<0.1, Model 6, β=0.0310, p>0.1). These findings match the main model results and show that uncertainty does not alter the relationship between financial revenues and underinvestment, and this relationship is independent of the uncertainty issue.

For net financial payouts, the coefficients in the high uncertain panels are significant for net shares repurchases in models 1 as well as in model 3 for net financial payouts (Model 1, β=-0.0098, p>0.05, Model 3, β=-0.0066, p<0.1), but insignificant in all models of low uncertain panels. These results confirm that the underinvestment-reducing effect of net financial payouts reported in main model is visible only in high uncertain firms, and no significant relationship exists in low uncertain firms.

Table 9
Classification by Level of Uncertainty: Cumulant Estimator - Dependent Variable: Underinvestment

Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
	High Uncertain Firms			Low Uncertain Firms		
FR_{ijt}	0.0566	0.1518**	0.1464**	0.1506*	0.0886*	0.0310
	(0.0846)	(0.0663)	(0.0674)	(0.0868)	(0.0523)	(0.0580)
NFP_{ijt}	-0.0098**	-0.0068	-0.0066*	-0.0049	0.0027	-0.0030
	(0.0047)	(0.0080)	(0.0040)	(0.0089)	(0.0062)	(0.0041)
TA_{ijt}	-0.0010*	-0.0007	-0.0009*	-0.0005	-0.0002	-0.0001
	(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0004)	(0.0004)
MB_{ijt}	0.0016***	0.0015***	0.0014***	0.0021*	0.0023***	0.0037
	(0.0004)	(0.0004)	(0.0004)	(0.0013)	(0.0009)	(0.0048)
ROA_{ijt}	-0.0147**	-0.0157*	-0.0178	-0.0209	-0.0338***	-0.0904
	(0.0092)	(0.0090)	(0.0116)	(0.0209)	(0.0086)	(0.1846)
FL_{ijt}	-0.0105**	-0.0100	-0.0077	-0.0109	-0.0162**	-0.0312
	(0.0048)	(0.0063)	(0.0069)	(0.0116)	(0.0067)	(0.0469)
SR_{ijt}	-0.0060***	-0.0056***	-0.0050***	-0.0051*	-0.0066***	-0.0091
	(0.0012)	(0.0015)	(0.0016)	(0.0028)	(0.0021)	(0.0080)
$ROAv_{ijt}$	0.0333**	0.0394**	0.0292	-0.0250	-0.0364	-0.1776
	(0.0163)	(0.0190)	(0.0219)	(0.0620)	(0.0358)	(0.5018)
SRv_{ijt}	0.0099	0.0110	0.0073	-0.0071	-0.0040	-0.0110
	(0.0084)	(0.0111)	(0.0115)	(0.0100)	(0.0077)	(0.0129)
γ_t	Yes	Yes	Yes	Yes	Yes	Yes
Industry Year Demean	Yes	Yes	Yes	Yes	Yes	Yes
ρ^2	0.146	0.160	0.149	0.137	0.193	0.251
N	2353	1799	1533	2963	2547	2264

*** significant at 0.01. ** significant at 0.05. * significant at 0.1. Standard Error in parenthesis. *FR* stands for financial revenues, *NFP* is the net financial payouts, *FL* stands for financial leverage, *SR* means stock return, *TA* is log of total assets/ firm size, *ROA* represents return-on-assets, *MB* reflects market-to-book ratio, *SRv* stands for stock-return volatility, *ROAv* is the return-on-assets volatility, γ is the time indicator, ρ^2 is the R-squared, *N* is the sample size and *i* stands for firm, *j* for industry and *t* for time. Models 1 and 4 report the net shares repurchases, models 2 and 5 the net equity payouts while models 3 and 6 include the net financial payouts. Models 1-3 report the high uncertain panels, while models 4-6 depict the low uncertain panels.

3.3.7. Endogeneity Issues and Alternative Estimation Method

In this section, this study deploys the generalized method of moment (GMM) estimator to deal with the reverse causality issue (Arellano & Bover, 1995; Blundell & Bond, 1998; Wintoki et al., 2012). This is why the current study investigates whether the GMM estimator improves the effect of financial revenues and net financial payouts on investment efficiency and underinvestment.

3.3.8. Real Investment Model Results

Table 10 reports the results of the equation of generalized method of moment (GMM) estimator for the real investment equation. The coefficient of Tobin's *q* under the GMM estimator is significant and positive (β=0.0055, p<0.01). These results are not in line with our main results.

However, these results signify the fundamental *q* theory (Hayashi, 1982; Tobin, 1969) and the recent empirical studies that claim a significant investment – *q* relationship (Gutiérrez & Philippon, 2017). These results justify that as the reverse causality issue is addressed, the *q* becomes a significant predictor of real investment behavior.

However, the coefficient of *q* is extremely low (β=0.0055). As Gutiérrez and Philippon (2017) and Peters and Taylor (2017) explain, this low level of *q* coefficient shows that U.S. firms have underinvested in investment opportunities throughout the last two decades. Gutiérrez & Philippon (2017) claim that short-termism is a significant reason for this low *q* – real investment sensitivity, while Gutiérrez and Philippon (2018) report that dividends and shares repurchases cause this underinvestment.

Table 10
GMM Estimator: Dependent Variable: Real Investment

Variables	**1**
$q_{ij,t-1}$	0.0055***
	(0.0015)
$I_{ij,t-1}$	0.4189***
	(0.0328)
CF_{ijt}	0.0742***
	(0.0295)
$AG_{ij,t-1}$	-0.0090***
	(0.0018)
λ_t	Yes
η_i	Yes
p (AC)	0.410
p (H)	0.250
F	Yes
N	11975

*** significant at 0.01. ** significant at 0.05. * significant at 0.1. Standard Error in parenthesis. *q* is Tobin's *q*, *I* is the real investments, *CF* stands for the cash flows, *AG* means asset growth, λ is the time indicator, η is the industry indicator, *p(AC)* is the level of significance of 2nd order autocorrelation, *p(H)* is the level of significance of Hensen test, *F* represents the forward orthogonal deviation, *N* is the sample size, *i* stands for firm, *j* for industry and *t* for time.

3.3.9. Investment Efficiency Model Results

Table 11 reports the results of the GMM estimator for the investment efficiency equation. Models 1 – 3 report the net shares repurchases, net equity payouts and net financial payouts, respectively.

The coefficients of financial revenues are negative but insignificant in models 2 and 3, while negative and significant in model 1 (β=-0.0659, p<0.1). These results are mostly similar to the main results, as coefficients in two of the three models are insignificant. However, the GMM results improve the relationship between financial revenues and investment efficiency since the coefficient is significant, at least in one model. The results in model 1 show that financial revenues reduce investment efficiency once we address the reverse causality issue.

Besides, coefficients of net financial payouts, net equity payouts, as well as net shares repurchases are insignificant. These results show that net financial payouts, net equity payouts and net shares repurchases do not affect the investment efficiency under a dynamic setting. We found robust results with insignificant autocorrelation and Hansen J test score.

3.3.10. Underinvestment Model Results

Table 12 reports the results of the GMM estimator for the underinvestment equation. Models 1 – 3 report the net shares repurchases, net equity payouts and net financial payouts, respectively.

The coefficient of financial revenues is significant and positive in model 3 (β=0.2190, p<0.05) while insignificant in models 1 and 2. These results are somehow similar to the main results and this postulate strengthens that financial revenues enhance underinvestment. The current study draws this conclusion after addressing the measurement error issue through the cumulant estimator and after dealing with the reverse causality issue by deploying the GMM estimator.

Table 11
GMM Estimator: Dependent Variable: Investment Efficiency

Variables	Model 1	Model 2	Model 3
FR_{ijt}	-0.0659*	-0.0462	-0.0445
	(0.0377)	(0.0475)	(0.0681)
NFP_{ijt}	0.0016	-0.0046	-0.0006
	(0.0041)	(0.0041)	(0.0021)
TA_{ijt}	-0.0040	0.0007	0.0024
	(0.0029)	(0.0060)	(0.0040)
MB_{ijt}	-0.0002***	-0.0001*	-0.0001**
	(0.0001)	(0.0001)	(0.0000)
ROA_{ijt}	0.0097	0.0059	0.0173
	(0.0113)	(0.0101)	(0.0174)
FL_{ijt}	0.0082*	0.0062	0.0103*
	(0.0044)	(0.0074)	(0.0054)
SR_{ijt}	-0.0006	0.0000	-0.0005
	(0.0007)	(0.0012)	(0.0009)
$ROAv_{ijt}$	-0.0039	0.0020	0.0149
	(0.0117)	(0.0192)	(0.0173)
SRv_{ijt}	0.0034	0.0028	0.0022
	(0.0033)	(0.0039)	(0.0047)
IE_{ijt-1}	-0.5065***	-0.4333	-0.5849***
	(0.0939)	(0.2898)	(0.1197)
λ_t	Yes	Yes	Yes
η_i	Yes	Yes	Yes
p(AC)	0.831	0.930	0.571
p(H)	0.235	0.232	0.130
F	Yes	Yes	Yes
N	7391	5986	5278

*** significant at 0.01. ** significant at 0.05. * significant at 0.1. Standard Error in parenthesis. *FR* stands for financial revenues, *NFP* is the net financial payouts explaining the net shares repurchases in model 1, the net equity payouts in model 2, and net financial payouts in model 3, *FL* stands for financial leverage, *SR* means stock return, *TA* is log of total assets/ firm size, *ROA* represents return-on-assets, *MB* reflects market-to-book ratio, *SRv* stands for stock-return volatility, *ROAv* is the return-on-assets volatility, *IE* reflects the investment efficiency, λ is the time indicator, η is the industry indicator, *p(AC)* is the level of significance of 2nd order autocorrelation, *p(H)* is the level of significance of Hensen test, *F* represents the forward orthogonal deviation, *N* is the sample size and *i* stands for firm*, j* for industry and *t* for time.

In addition, coefficients of net financial payouts and net equity payouts are insignificant, while the coefficient of net shares repurchases is negative and significant (β=-0.0091, p<0.05). These results explain that net shares repurchases reduce underinvestment. In contrast, net equity payouts and net financial payouts are unrelated to the underinvestment issue in a dynamic environment. The results still go with the (Fried & Wang, 2019). They claim that net equity payouts do not impair real investments, and this study finds congruent results.

Table 12
GMM Estimator: Dependent Variable: Underinvestment

Variables	Model 1	Model 2	Model 3
FR_{ijt}	0.1228	0.1924	0.2190**
	(0.0808)	(0.1198)	(0.0997)
NFP_{ijt}	-0.0091**	0.0063	-0.0007
	(0.0043)	(0.0090)	(0.0025)
TA_{ijt}	0.0024	0.0011	0.0025
	(0.0035)	(0.0062)	(0.0052)
MB_{ijt}	-0.0003	-0.0004*	-0.0010**
	(0.0002)	(0.0002)	(0.0004)
ROA_{ijt}	-0.0598***	-0.0696***	-0.0688***
	(0.0177)	(0.0165)	(0.0259)
FL_{ijt}	-0.0004	0.0052	0.0148
	(0.0082)	(0.0067)	(0.0127)
SR_{ijt}	0.0026***	0.0032***	0.0046***
	(0.0009)	(0.0011)	(0.0017)
$ROAv_{ijt}$	0.0476	0.0774	0.0231
	(0.0301)	(0.0518)	(0.0396)
SRv_{ijt}	0.0053	0.0002	0.0038
	(0.0060)	(0.0076)	(0.0064)
UI_{ijt-1}	0.2650*	0.2390*	-0.0054
	(0.1603)	(0.1440)	(0.1838)
λ_t	Yes	Yes	Yes
η_i	Yes	Yes	Yes
p(AC)	0.143	0.281	0.148
p(H)	0.727	0.457	0.118
F	Yes	Yes	Yes
N	2301	1958	1752

*** significant at 0.01. ** significant at 0.05. * significant at 0.1. Standard Error in parenthesis. *FR* stands for financial revenues, *NFP* is the net financial payouts explaining the net shares repurchases in model 1, the net equity payouts in model 2, and net financial payouts in model 3, *FL* stands for financial leverage, *SR* means stock return, *TA* is log of total assets/ firm size, *ROA* represents return-on-assets, *MB* reflects market-to-book ratio, *SRv* stands for stock-return volatility, *ROAv* is the return-on-assets volatility, *IE* reflects the investment efficiency, λ is the time indicator, η is the industry indicator, *p(AC)* is the level of significance of 2nd order autocorrelation, *p(H)* is the level of significance of Hensen test, *F* represents the forward orthogonal deviation, *N* is the sample size and *i* stands for firm*, j* for industry and *t* for time.

4. Conclusion

This study examines the effect of financial revenues and net financial payouts on investment efficiency with a particular focus on underinvesting U.S. non-financial corporations. This study assumes that financial revenues and net financial payouts distort investment efficiency and lead to underinvestment.

This study finds that financial revenues reduce investment efficiency, and the negative relationship between financial revenues and investment efficiency strengthens as the financial constraints reduce. In addition, financial revenues increase the underinvestment within the underinvesting sub-sample. This result is similar across all the models deployed in the current study. Based on these results, this study concludes that higher financial revenues enhance financial investments, and the higher financial investments crowd out the funds. With limited funds, firms refrain from exploiting investment opportunities and underinvesting real assets. Underinvestment in real assets impairs investment efficiency.

In addition, this study finds that net shares repurchases, and net equity payouts are unrelated to investment efficiency. However, net financial payouts are negatively related to investment efficiency. Similarly, the current study evidence that net financial payouts reduce the underinvestment. These results are congruent across all the models and for all the proxies

of net financial payouts including, the net shares repurchases, net equity payouts and the composite proxy of net financial payouts. The positive effect of net financial payouts is stronger during uncertainty. These results show that net financial payouts improve investment efficiency, or they are unrelated to investment efficiency. In contrast, net financial payouts are strongly related to underinvestment since they reduce underinvestment.

Based on these results, the current study recommends that policymakers intervene in controlling financial investments within non-financial corporations. Excessive financial investments impair investment efficiency. An explicit upper bound of financial investments should be defined based on the ratio of financial assets to real assets. Firms should utilize the financial revenues on real investments if they are exposed to positive Net Present Value (NPV) real investment projects; otherwise, they should invest in financial assets in case of negative NPV real investment projects. Long-term investors should also restrain from investing in firms with higher financial revenues compared to real investments specially when financial constraints are low.

Results also suggest that net financial payouts improve investment efficiency and reduce the underinvestment. Therefore, firms and policymakers should make their decisions based on the relationship of net financial payouts instead of financial payouts when investigating the behavior of investment efficiency. Uncertainty may also influence the investment and policy decisions. Firms are more sensible in improving the investment efficiency through net financial payouts during uncertainty. Therefore, investors may opt to invest in uncertain firms, if they intend to improve both financial payouts and investment efficiency.

Future research may consider investigating the underlying motivation to the relationship of financial revenues and net financial payouts with investment efficiency and underinvestment. They may also consider the role of financial markets in determining the nexus between financing, payouts, financial investments and investments efficiency. Researchers may also study the role of corporate governance in this regard. These additional interactions may help improve the knowledge regarding the roles of important market participants in explaining the real investment behavior.

Author's Contribution:
Abdul Majid Nasir: Writing Original Draft, Identification of Problem, Literature Review, Methodology, Data Analysis and Interpretation, Drawing Recommendations
Riaz Ahmed: Supervising the Literature Review, Refining the Problem, Methodology, Interpretation of results and recommendations
Muhammad Ayyoub: Refining the draft and Editing
Mushtaq Muhammad: Refining the data interpretation and Recommendation. Refining the draft and Editing

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Appendix
Table A
Variables Description

Abbreviation	Variables	Definition
I	Real Investments	Fixed asset purchases, intangible acquisitions, and cost of software development, divided by the previous period's total assets
IE	Investment efficiency	Residuals of Goodman et al. (2014) real investment model
UI	Underinvestment	Absolutes of negative residuals obtained from the real investment model by Goodman et al. (2014)
Q	Tobin's *q*	The total market capitalization and total liabilities discounted by the total assets
CF	Cash Flow	Cash flows discounted by the previous year's total assets
AG	Asset Growth	The difference between the current year's total assets and the previous year's total assets divided by the previous year's total assets
FR	Financial Revenues	the total of dividend income, capital gains, and interest income divided by the previous period's total assets.
NFP	Net Financial Payouts	Sum of cash flows from shares repurchases, cash dividends and interest paid minus new equity issuances and net of debt issuance and payments divided by lag total assets
TA	Firm Size/ Log Total Assets	Log of total assets
MB	Market to Book Ratio	Shares price discounted by per share book value
ROA	Return on Assets	Net income discounted by total assets
SR	Stock Return	Annualized average weekly stock return
FL	Financial Leverage	Total debts discounted by Total Assets
ROAv	Return on Assets volatility	Standard deviation of return on assets for previous three years
SRv	Stock Return Volatility	Standard deviation of daily stock return annualized