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Agency Problem and Stock Returns: Combining Measures of Asset Growth and Gross Profit

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Abstract: In this paper, we propose a new factor in predicting stock returns, after taking agency problems into account. Although intensive studies have focused on asset growth and profitability as factors in predicting future returns, very limited attention has been given to their interaction. We construct a measure that combines both asset growth and scaled gross profit in a single measure (defined as AGGP, hereafter), by excluding the change in capital expenditures from gross profit. We demonstrate that our measure of profitability controls for the agency problem from managerial decisions in investment. Our results are also robust to the scaling issues raised by recent studies. Further, consistent with prior literature, our measure produces superior results in the full universe of CRSP stocks, but inferior results when applied to a subset of the 500 largest nonfinancial firms. This is consistent with the fact that those largest firms are less affected by the agency problem, leading to the failure of our new measure in predicting future returns among this subsample. In sum, our new measure sheds new lights on how to price agency issues, by providing a "cleaner" profitability measure free of agency costs and also lending supportive evidence to the mispricing explanation of the asset-growth effect.

Keywords: asset growth; gross profitability; agency problem; future return

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1. Introduction

In their work about anomalies Fama and French (2008) said of asset growth, "there is an asset growth anomaly", and of profitability they said, "higher profitability tends to be associated with abnormally high returns." Evaluating measures such as these has dominated the attention of academics everywhere in recent years. Two important recent measures in asset pricing literature are the Cooper et al. (2008) measure of asset growth and the Novy-Marx (2013) measure of scaled gross profit. Asset growth's negative relationship to future profits perhaps serves as a proxy for agency costs or investor overreaction to growth (Cooper et al. 2008). Scaled gross profit may provide a view of profitability which is less tainted by accounting error than income (Novy-Marx 2013). Regardless, each measure has attracted a great deal of testing and discussion which we explore below.

However, to date, very limited evidence has been provided on how the asset-growth and profitability anomalies are related to each other, especially via managerial discretion in investment and other policies. This paper aims to fill this gap by investigating how their correlation is priced by investors in the market. In our paper, we construct a new measure which separates agency costs from Novy-Marx's profitability measure. More specifically, we use the change in capital expenditure, one component of asset growth, to proxy for agency problems rising from managerial decisions on investment. We exclude the change in capital expenditure from gross profit and then scale by total assets. This allows us to capture highly profitable firms, rewarding those who do not over-invest in assets or who may be confounded by market exuberance from asset growth (Cooper et al. 2008).

Our paper has two main motivations. First, we believe that the correlation between the asset-growth and profitability factors can provide important implications on how to identify a "cleaner" measure of profitability, which can help predict future returns more efficiently. Recently, several studies in this field are looking for a "cleaner" measure of profitability to explain the above anomalies and thus provide more explanatory power on future returns. For example, Novy-Marx (2013) argues that scaled gross profit can achieve such an objective by reducing accounting errors compared to other profitability measures below it in an income statement. In other words, his findings are driven by mitigating the impact of managerial decisions on how to disclose accounting profit via financial statements. On the other hand, investment decisions are also under managerial discretion, which is one of the determinants of asset growth. Therefore, both anomalies/factors could share the issues of managerial discretion, to some degree, if not completely. Thus, a measure of profitability can be "cleaner" and more "efficient" if it is able to take into account the agency problems shared by the asset-growth and gross profitability factors.

Such agency costs are hard to capture when calculating asset-growth and profitability measures in empirical studies because agency issues due to managerial discretion could vary dramatically across companies. The managers may have greatly different traits, including their educations, career paths, personal characteristics, and social networks, that may lead them to make completely different decisions even facing the same circumstances (Graham et al. 2013). Consequently, a profitability measure without controls for agency costs is likely to make asset pricing models less powerful in terms of predicting the future returns. Therefore, our new variable can benefit the asset pricing model in enabling the models to be free of the impact of managerial discretion due to managerial personal traits within each firm. We believe that our new variable can provide a "cleaner" measure of profitability, after controlling for the potential agency costs demonstrated by over-investment.

Second, our study also aims to provide new evidence on the true reason for the asset-growth effect identified by Cooper et al. (2008). Currently, two main competing theories have been proposed by researchers, in order to explain the asset-growth anomaly (Huang and Sun 2014). The first is the mispricing explanation which suggests that investors underreact to the negative information provided by managerial decisions on overinvestment, leading to a negative return in the following periods. The second refers to the efficient pricing theory, arguing that the asset-growth effect is driven by managers' market-timing on the cost of capital, in order to maximize firm value. The essential difference depends on whether there is any agency problem arising from managerial discretion in investment.

We believe that our new measure helps test such hypotheses because managerial discretion could affect a firm's investment and disclosure of accounting information in a similar way, due to the manager's personal characteristics. It is presumably assumed that such agency problems should be priced only once, although affecting different decisions simultaneously. In other words, if our new variable is able to control for the agency cost related to disclosure of accounting profitability, it should also control for that from investment. Doing so would allow us to lend some supportive evidence to the mispricing explanation of the asset-growth anomaly.

We investigate the performance of our new variable following the same methodologies as in prior literature, mainly in Novy-Marx (2013), in sets of both regression analysis of future returns and portfolio analysis. The results show that our new variable outperforms other profitability measures suggested by Novy-Marx (2013) and Ball et al. (2016). First, our new variable has similar explanatory power of future returns to the others. Second, we find that the impact of asset growth on future returns becomes insignificant when our new variable is used, while remaining significant if other profitability measures are used. This suggests that our new measure captures agency problems raised from managerial discretion shared by investment activities and disclosure of accounting profits. We also test this measure over time periods of up to five years and find that its explanatory power persists.

Further, we test a relative version of our measure which compares profitability and investment on a scale relative to other firms. We find that our relative measure of profitability also provides extra explanatory power of future returns in addition to the scaled one and may provide the basis for other relative measures in the future.

Our study contributes to the literature in three aspects. First, our new measure provides a look at firm agency issues that has not been present in factor development. The prior literature has well documented that the identified factors such as asset growth could be driven by agency problems. However, it is difficult to control for the impact of managers' personal characteristics on their decision-making processes, lowering our predicting power of future returns based on the current factor models. Our paper provides an important implication as to how this issue could be addressed by generating a profitability measure free of managerial discretion in firm decisions in investment. Second, our measure integrates the asset-growth and gross profitability factors into a single measure. Therefore, it can help make factor models more efficient by reducing the number of factors needed. Our findings also provide new evidence on the argument that the anomaly of asset growth shown by Cooper et al. (2008) is likely driven by managerial discretion in their decisions on investment. Third, our results show that not only scaled measures but also relative measures of profitability should receive more attention in order to predict the future returns more precisely. It is consistent with the fact that investors in the market find it difficult to collect information on managers' personal characteristics and incorporate such information into their asset-pricing models. By removing capital expenditure, our measure is more positively correlated with those highly profitable companies which do not have exposure to significant agency issues. Alternatively, the relative measures of the factors related to agency problems are implemented to mitigate this issue, leading to the extra power provided by the relative version of our new measure.

The reminder of this paper is organized as follows. Section 2 includes a literature review. Section 3 introduces the data and methodology. Section 4 describes the empirical results. Section 5 concludes this paper.

2. Literature Review

Intensive studies have been performed on identifying factors, in order to improve the predictability of stock returns. Many factors have been proposed by the prior literature, including profitability (e.g., Fama and French (2006); Zhang and Zheng (2011); Chiu and Haight (2020); Chue and Xu (2022)) and asset growth (e.g., Titman et al. (2004); Butler et al. (2011); Stambaugh and Yuan (2017); Fama and French (2017); Gu et al. (2018); Wen (2019); Hou et al. (2020)).

Cooper et al. (2008) use an asset-growth measure which is calculated as the change in total assets divided by beginning assets. Their work suggests that this measure provides an accurate prediction of future profitability, doing so because it "synergistically benefits from the predictability of all subcomponents of growth, allowing asset growth to better predict the cross-section of returns relative to any single component." They demonstrate that their measure outperforms a decomposition of the balance sheet into its component parts which includes cash, operating assets, debt, and equity. It seems counterintuitive that this "blended" and simple measure could have much predictive power. Despite trying several different ways to explain this anomaly they finally offer a simple one. The most intuitive explanation is that investors overreact to the changes in business prospects implied by asset growth and thus create mispricing.

While the intuition behind the asset-growth measure is not particularly straightforward the results are very straightforward. The strong negative correlation between asset growth and profitability is remarkably consistent in testing. Returns on low asset-growth stocks exceed those of high asset-growth stocks by 71% on a value-weighted basis (Cooper et al. 2008). These effects do not just persist for one year but for up to five years after portfolio formation. The authors suggest that this effect is simple mispricing mostly because they find no empirical evidence of risk-based explanations.

Others have tested the measure and found similar results. Using Australian stocks, Gray and Johnson (2011) find that the effect is not limited solely to U.S. stocks and, finding no suggestion of pricing of risk, further support the idea that the effect is due to mispricing.

Lam and Wei (2011) evaluate the anomaly using two prominent explanations, one based on investment frictions and the other on limits to arbitrage. The investment frictions argument relies on the q-theory which argues that managers invest more when expected returns are lower and invest less when expected returns are higher. Thus, realized investment is negatively correlated with subsequent cross-sectional returns.

Lam and Wei (2011) also explore limits to arbitrage as an explanation for the asset-growth anomaly. They argue that if investors truly misprice these investments then the relationship should be stronger in stocks which are difficult to arbitrage. The authors find limited support for each theory but overwhelming support for neither.

Despite reporting the relationship quoted in the opening paragraph of this paper, Fama and French (2008) provide mixed results for the explanatory power of profitability over stock returns. They find that kinds of profitability are not effective in predicting future returns and that they "do not provide much basis for the conclusion that, with controls for market cap and B/M, there is a positive relation between average returns and profitability."

To improve upon this, Novy-Marx (2013) proposes a measure that "moves up" the income statement to provide a cleaner look at profitability. He posits that "moving up" provides less room for accrual, adjustment, earnings management, and other accounting manipulation which may taint earnings quality. With this measure he attempts to identify firms with higher average returns on assets, or more productive assets in general. He does so by using a measure based on gross profit. The "theory" behind this is as follows: "moving up" the income statement provides a truer measure of economic profitability. The gross profit measure captures discretionary cash flows at their source. Novy-Marx indicates that firms with large cash flows below gross margin are able to "invest" these in things which can be capitalized (R&D, capex) or expensed (advertising) which will "unambiguously translate into future profits."

Novy-Marx defines the measure as gross profit scaled by total assets. The assertion made by is that scaling avoids "hopelessly conflating . . . . with book to market" (Novy-Marx 2013). Further, the paper claims that using book assets provides a measure of productive assets that is not reduced by interest payments and is wholly independent of leverage.

The measure is found to be positively and significantly related to future returns. It works most effectively when combined in a portfolio strategy with book-to-market. The combined strategy provides nearly an 8% excess return trading only in the most liquid of listed stocks. However, in contrast to the asset growth work of Cooper et al. (2008), Novy-Marx (2013) re-sorts portfolios annually and does not present results of this measure beyond one year.

Ball et al. (2016) suggest that it is the strength in the Novy-Marx measure lies in the deflating of gross profit by total assets. In fact, they suggest that, when deflated by total assets, net income and other measures are equal to gross profit as a predictor. While not tested by the authors and not tested here, it is possible that the richness in the asset-growth measure may suffer from the same impairment.

Much of what our measure attempts to tackle is agency issues. The idea that asymmetric information can be harmful dates back to Akerlof (1970) and the "lemons" model. Firms may attempt to lower their cost of capital by overcoming asymmetric information through disclosure (Diamond and Verrecchia 1981). One such way is signaling. Signaling models in the literature attempt to explain many corporate behaviors such as capital structure decisions (Ross 1977; Myers and Majluf 1984; John et al. (1992); MacKay 2003; Kalay et al. (2007)), return of capital in the form of dividend policy (Bhattacharya 1979; Miller and Rock 1985), and management as shareholders (Leland and Pyle 1977). As stated by Jensen (1986), "managers have incentives to cause their firms to grow beyond the optimal size." This

increasing size increases "resources under their control" and "changes in compensation are positively related to the growth in sales."

As firms grow larger, the need for disclosure is significantly greater and large firms will disclose greater amounts of information (Diamond and Verrecchia 1981; Hermalin and Weisbach 2012) which may reduce information asymmetry and agency issues.

3. Data and Methodologies

3.1. Definition of New Factor

In this study, our new variable (AGGP) of interest is constructed in two ways, either scaled or relative, in order to integrate agency problems by asset growth to gross profit. The first is computed using the equation below.

$$AGGP_t = ((GP_t + Capex_{t-1}) - Capex_t)/AT_t$$

where GP_t denotes the gross profit at month t, $Capex_t$ and $Capex_{t-1}$ refer to the capital expenditures at month t and $t-1$, respectively. AT_t denotes the total assets at month t. In other words, we exclude any increase in capital expenditure from the gross profitability during the current fiscal year. We believe that such a measure could be "cleaner" in terms of explaining the future returns.

In order to deal with the scaling issue raised by Ball et al. (2016), we also construct our new variable using different deflators, book equity and market equity. Three values are computed for each profitability measure used in this paper, including Novy-Max's, Ball's, and ours. The regression analysis will be built using all three values, and the portfolio analysis is based on the value scaled by total assets, in order to be comparable with Novy-Marx (2013).

The second is calculated as follows. First, following Cooper et al. (2008) we compute the percentage asset growth as $(AT_t - AT_{t-1}))/AT_t$, where AT_t and AT_{t-1} denote the total assets at month t and month $t-1$, respectively. Second, following Novy-Marx (2013), we compute GP as (GP/AT). Third, we compute 10 deciles of percentage asset growth and 5 quintiles of percentage GP at the end of every month. Thus, each firm is assigned a number of AT decile (1–10) and a number of GP decile (1–10) where 1 is the smallest decile and 10 is the largest. Last, the relative measure of our new variable is computed as (GP decile)/(AT decile). Once the relative profitability measure is created, the regression models of future returns is re-estimated by including our new measure.

3.2. Data Construction

We chose to model our testing after Novy-Marx (2013). Therefore, our sample covers July 1963 to May 2023 using stock prices, shares outstanding, and returns from CRSP and COMPUSTAT information from July 1962 to May 2023. For each month the accounting variables were collected from the fiscal year ending at the most recent fiscal ending month. Thus, the same accounting information was assigned to every twelve months following a fiscal year ending month.

Following the prior literature, we exclude financial firms (those with one-digit SIC of 6) from the sample. For instance, Fama and French (1992; 1993) suggest that financial services firms are different from non-financial firms. This is because financial firms normally have much greater leverage and increased sensitivity to financial risks, which could cause the results to be biased.

Because the study is mainly drawn on the findings of Novy-Marx (2013), we want to ensure that our sample is comparable to his. Therefore, we classify the firms into five portfolios based on firm size, using the NYSE breakpoints. The summary descriptives of all five size portfolios are shown in Table 1 as follows.

Table 1. Descriptives of portfolios based on size using NYSE breakpoints.

	(Small)	(2)	(3)	(4)	(Large)
Number of firms	3581	914	611	498	438
Percent of firms	59%	15.12%	10.11%	8.24%	7.25%
Average capitalization (millions of dollars)	43.25	230.68	562.17	1468	9826
Total capitalization (billions of dollars)	107	181	286	553	3849
Total capitalization (percent)	2.15%	3.64%	5.75%	11.11%	77.35%
Portfolio book-to-market	5.56	1.48	1.09	0.93	0.68
portfolio gross profits-to-assets (GP/A)	0.31	0.32	0.37	0.29	0.27
New factor (AGGP)	0.48	0.43	0.46	0.41	0.42

This table shows the time-series averages of the characteristics of quintile portfolios sorted on market equity. Portfolio breakpoints are based on NYSE stocks only. The sample excludes financial firms and covers July 1963 to May 2023.

A comparison of Table 1 to Table 3 in Novy-Marx (2013) indicates our sample substantially replicates the work of Novy-Marx. First, most of the characteristics are closely matching the figures presented by Novy-Marx (2013), indicating that we are working on a similar dataset to his. For example, more than half of the firms are micro-cap firms while the large-firm portfolios are small in number (438) but make up most of the market capitalization (77.35%). Also, as expected there is minimal variation in gross profitability (GP/A). Second, it can be seen that our new factor (AGGP) appears very stable across the size quintiles, a similar pattern as observed for GP/A. Again, Table 1 shows that our data are comparable to those used in Novy-Marx (2013).

3.3. Testing Design

Following Novy-Marx (2013), we implement regression and portfolio analysis throughout this study, using the sample from July 1963 to May 2023. In regression analysis, the baseline model is specified as below.

$$Return_{i,t} = \alpha + \beta_1 AssetGrowth_{i,t} + \beta_2 Profitability_{i,t} + \beta_3 Income_{i,t} + \beta_4 FreeCashFlow_{i,t} + \beta_5 Book\text{-}to\text{-}MarketRatio_{i,t} + \beta_6 MarketCapitalization_{i,t} + \beta_7 Return_{i,t-1} + \beta_8 Return_{i,t-12} + \epsilon_{i,t}$$

Here, the dependent variable in the regressions is the stock return of the i-th firm at month t. The independent variable of interest is profitability. The regression includes controls for asset growth (AG), book-to-market ratio (log(B/M)), size (log(ME)), and past performance over two intervals of last month and 12 to two months (Return_{t-1} and Return_{t-12}), respectively. Independent variables are trimmed at the 1% and 99% levels. For more detail see Novy-Marx (2013).

In portfolio analysis, we build portfolios using factors, including Novy-Marx's gross profitability (GP/A), book-to-market ration (BM), firm size, and our new factor (AGGP). Then, excess returns are compared across each group of portfolios. We also run the Fama–French three-factor model within each portfolio, specified as below.

$$Return_{i,t} = \alpha + \beta_1 MKT_t + \beta_2 SMB_t + \beta_3 HML_t + \epsilon_t$$

Here, the dependent variable in the regressions is the stock return of the i-th firm at month t. The independent variables include market factor, size factor, and value factor, denoted by "MKT", "SMB" (small minus large), and "HML" (high minus low), respectively.

4. Empirical Results

4.1. Regression Analysis

In this paper, both regression and portfolio analysis are implemented to investigate the performance of our new variable. First, we compare our measure to other measures

suggested by prior studies, including Novy-Marx (2013) and Ball et al. (2016), in terms of their explanatory powers of future returns. The results are shown in Table 2.

Table 2. Fama and MacBeth Regressions of Returns on Measures of Profitability.

Panel A																		
	Total Assets						**Book Equity**						**Market Equity**					
Variable	**Novy-Max**		**Ball**		**Ours**		**Novy-Max**		**Ball**		**Ours**		**Novy-Max**		**Ball**		**Ours**	
Intercept	1.61	***	1.83	***	1.22	***	1.95	***	1.98	***	1.83	***	3.26	***	2.53	***	3.32	***
	[4.86]		[5.37]		[3.52]		[5.79]		[5.37]		[4.98]		[9.36]		[6.48]		[7.87]	
Gross Profit	0.92	***					0.15	***					−0.93	***				
	[4.53]						[5.64]						[−37.62]					
Operating Profit			1.89	***					0.76	***					−3.78	***		
			[4.89]						[6.78]						[−8.13]			
AGGP					1.62	***					0.35	***					−1.47	***
					[6.52]						[6.53]						[−6.99]	
Income	−0.11		−0.35	**	1.36		−0.06		−0.58	***	1.36		−0.12		2.35	***	2.46	**
	[−0.87]		[−3.22]		[1.05]		[−0.18]		[−4.58]		[1.21]		[−1.06]		[5.77]		[2.55]	
Free Cash Flow	0.46	***	0.37	***	0.48	***	0.53	***	0.62	***	0.65	***	0.41	***	0.15		0.69	**
	[3.88]		[6.52]		[3.45]		[6.32]		[5.54]		[2.88]		[4.99]		[0.72]		[2.48]	
Book-to-Market Ratio	0.29	***	0.36	***	0.38	***	0.27	***	0.42	***	0.37	***	1.09	***	0.82	***	1.17	***
	[6.89]		[7.99]		[5.68]		[7.82]		[4.88]		[2.98]		[21.55]		[7.68]		[10.65]	
Firm Size	−0.22	***	−0.13	***	−0.25	***	−0.19	***	−0.11	***	−0.27	***	−0.21	***	−0.15	***	−0.31	***
	[−6.85]		[−8.34]		[−4.79]		[−5.38]		[−6.22]		[−5.99]		[−3.87]		[−2.56]		[−3.78]	
Return over last month	−5.89	***	−5.72	***	−6.23	***	−5.66	***	−5.72	***	−6.43	***	−6.52	***	−6.61	***	−6.87	***
	[−18.09]		[−12.66]		[−11.99]		[−17.06]		[−13.10]		[−10.88]		[−19.60]		[−12.87]		[−9.96]	
Return over previous 12 to 2 months	0.64	***	0.45	***	0.61	***	0.75	***	0.64	***	0.63	***	0.58	***	0.62	***	0.32	**
	[3.78]		[4.59]		[3.16]		[3.96]		[4.78]		[3.05]		[3.69]		[4.76]		[3.26]	
Panel B																		
	Total Assets						**Book Equity**						**Market Equity**					
Variable	**Novy−Max**		**Ball**		**Ours**		**Novy-Max**		**Ball**		**Ours**		**Novy-Max**		**Ball**		**Ours**	
Intercept	1.68	***	1.97	***	1.36	***	2.05	***	2.31	***	1.94	***	3.36	***	2.68	***	3.02	***
	[4.58]		[6.30]		[5.06]		[8.29]		[6.32]		[3.67]		[11.20]		[8.62]		[6.38]	
Asset Growth	−0.26	***	−0.31	***	−0.23		−0.28	***	−0.29	***	−0.35		−0.24	***	−3.62	***	−0.28	*
	[−6.99]		[−4.38]		[−0.92]		[−6.30]		[−4.08]		[−0.87]		[−5.68]		[−3.68]		[−1.70]	
Gross Profit	1.13	***					0.21	***					−1.12	***				
	[3.96]						[5.83]						[−24.99]					
Operating Profit			1.95	***					0.82	***					−3.61	***		
			[4.36]						[7.55]						[−9.60]			
AGGP					1.57	***					0.18	***					−1.37	***
					[4.08]						[3.62]						[−5.18]	
Income	−0.05		−0.21	*	1.46	*	0.02		−0.46	***	1.62	**	−0.09		2.21	***	2.17	***
	[−0.91]		[−1.96]		[1.71]		[0.21]		[−3.88]		[2.10]		[−0.70]		[8.53]		[3.05]	
Free Cash Flow	0.69	***	0.52	***	0.37	**	0.49	***	0.52	***	0.64	***	0.28	***	0.08		0.72	*
	[3.88]		[6.52]		[3.45]		[6.32]		[5.54]		[2.88]		[4.99]		[0.72]		[1.84]	
Book-to-Market Ratio	0.46	***	0.28	***	0.52	***	0.35	***	0.46	***	0.41	***	1.21	***	0.65	***	1.16	***
	[7.49]		[6.28]		[6.88]		[5.30]		[7.20]		[3.68]		[13.20]		[4.99]		[25.86]	
Firm Size	−0.09	***	−0.16	***	−0.07	***	−0.26	***	−0.14	***	−0.18	***	−0.15	***	−0.09	***	−0.27	***
	[−5.46]		[−5.68]		[−9.52]		[−4.63]		[−4.61]		[−9.54]		[−6.74]		[−5.63]		[−7.14]	
Retun over last month	−5.26	***	−5.32	***	−6.08	***	−5.27	***	−5.59	***	−6.31	***	−6.34	***	−6.72	***	−7.02	***
	[−9.64]		[−21.99]		[−9.31]		[−6.75]		[−21.45]		[−8.80]		[−8.96]		[−24.69]		[−9.66]	
Return over previous 12 to 2 months	0.48	***	0.52	***	0.57	***	0.51	***	0.59	***	0.61	***	0.55	***	0.62	***	0.45	**
	[4.38]		[9.15]		[6.82]		[4.66]		[9.28]		[4.10]		[4.22]		[5.70]		[7.12]	

This table reports results from the model specified as $Return_{i,t} = \alpha + \beta_1 AssetGrowth_{i,t} + \beta_2 Profitability_{i,t} + \beta_3 Income_{i,t} + \beta_4 FreeCashFlow_{i,t} + \beta_5 Book\text{-}to\text{-}MarketRatio_{i,t} + \beta_6 MarketCapitalization_{i,t} + \beta_7 Return_{i,t-1} + \beta_8 Return_{i,t-12} + \epsilon_{i,t}$. Specifically, Panel A reports results from Fama–Macbeth regression of returns on gross profitability (GP), operating profitability (OP), gross profitability minus change in capital expenditure (AGGP), income before extraordinary items (IB1) scaled by book equity, and free cash flow (FCF) scaled by book equity. GP, OP, and AGGP are scaled by total assets, book equity, and market equity, respectively. Panel B repeats the tests including asset growth (AG) in the regressions. Independent variables are trimmed at the 1% and 99% levels. The sample excludes financial firms. t-statistics are included in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

In Table 2, Panel A looks at our factor as a predictor of average returns showing the results of Fama and MacBeth regressions of returns on GP/A, Earnings/Book and FCF/Book equity. Other control variables include the logarithm of Book-to-Market ratios (LogB/M), the logarithm of market equities six months ago (LogME), and the returns over the interval of last month (Ret1) and previous 12 to two months (Ret12). In Table 2, the specification "Novy-Marx" provides our replication of the results of specification 7 in Table 1 of Novy-Marx (2013). We also replicate other specifications of his tables, although not tabulated here. Our results are generally supportive of the conclusions in that paper except that Free Cash Flow (FCF) remains significant in all specifications.

The specifications "Novy-Marx" and "Ball" provide our replication of the results from Ball et al. (2016). Our results are qualitatively similar to theirs, except that the profitability measures become negatively related to the future returns, in the specifications "Novy-Marx" and "Ball", using market equity as deflator. The first possible reason for such a difference is because our data were collected during a different sample period from theirs. The second is that our results are based on the full sample while they are showing the results in two

subsets, all-but-microcaps and microcaps. In sum, our results provide supportive evidence for their argument that deflator factors are affecting the predicting power of profitability measures on future returns.

The specification "Ours" includes our new variable (AGGP). AGGP is positively and significantly related to returns in specifications using total assets and book equity as deflator, while negatively and significantly to returns in specifications using market equity as deflator. Its pattern exactly follows the patterns we found among the Novy-Marx (2013) and Ball et al. (2016) measures. This suggests that our new measure of profitability is able to provide a similar predicting power of future returns to the other measures.

Table 2, Panel B, provides a similar analysis including the measure of asset growth (AG) to control for the impact of asset growth. The results on all three profitability measures are similar to and supportive of Panel A among all the specifications. However, it is interesting to note that the negative co-efficient of the asset-growth measure becomes insignificant when our new measure is used, whereas remaining significant when the other two are used. In other words, the predicting power of the asset-growth factor mainly comes from agency issues, which the change in capital expenditure proxies for. Therefore, Table 2 allows us to conclude that our measure outperforms GP, after controlling for the agency problems rising from managerial discretion in investment and information disclosure. Our new measure does provide a "cleaner" measure of profitability in asset pricing models, especially making the asset growth redundant.

4.2. Analysis of Univariate Sorted Portfolios

In this section, we implement the analysis of portfolios sorted by univariate. Again, our focus is to examine whether our new factor (AGGP) can outperform Novy-Marx's gross profit factor (GP/A) or not. We perform such a comparison in two steps. First, we construct quintile portfolios using NYSE breakpoints of GP/A. Second, we run the regression of portfolios return on the three Fama–French factors. We also examine the time-series average of the GP/A, B/M and ME and the average number of firms in each portfolio. Then, we repeat the same steps using NYSE breakpoints of AGGP. The results are summarized in Table 3 as follows.

Table 3. Excess Returns to Portfolios sorted on GP/A and AGGP.

Panel A									
		Alphas and three-factor loadings				Portfolio characteristics			
	r	α	MKT	SMB	HML	GP/A	B/M	ME	n
Portfolio sorted on gross profits-to-assets (GP/A)									
Low	0.38	−0.19	1.02	0.01	0.27	0.08	1.82	925	1126
	[1.91]	[2.10]	[46.12]	[0.50]	[6.92]				
2	0.52	−0.07	1.12	0.03	0.09	0.26	1.96	1263	810
	[2.3]	[−0.60]	[75.20]	[0.30]	[6.35]				
3	0.61	0.10	0.09	0.08	0.07	0.37	1.48	1384	913
	[3.10]	[0.80]	[71.22]	[2.69]	[3.66]				
4	0.57	0.15	0.98	0.01	−0.34	0.51	1.06	1467	1073
	[1.98]	[0.90]	[75.23]	[1.10]	[−9.68]				
High	0.68	0.45	1.08	−0.12	−0.39	0.82	0.67	1502	1390
	[4.66]	[4.99]	[78.56]	[−2.98]	[−13.64]				
High-Low	0.30	0.51	0.03	−0.15	−0.56				
	[0.76]	[4.59]	[0.90]	[−1.91]	[−10.99]				
Panel B									
		Alphas and three-factor loadings				Portfolio characteristics			
	r	α	MKT	SMB	HML	GP/A	B/M	ME	n
Portfolio sorted on AGGP									
Low	0.22	−0.25	1.28	0.02	0.07	0.17	4.06	1125	1194
	[2.02]	[−2.99]	[33.64]	[062]	[1.30]				

Table 3. *Cont.*

2	0.37	−0.04	1.18	−0.01	−0.09	0.35	2.67	1562	906
	[6.24]	[−0.10]	[46.82]	[3.10]	[2.96]				
3	0.49	0.08	1.10	−0.06	−0.41	0.43	2.01	1348	1249
	[6.55]	[0.80]	[46.22]	[−4.66]	[−9.20]				
4	0.76	−0.18	0.88	−0.06	−0.08	0.51	2.35	1847	928
	[13.60]	[9.62]	[6.88]	[−3.71]	[−8.43]				
High	0.75	0.24	1.02	0.06	0.12	0.52	2.09	836	1258
	[7.69]	[3.12]	[55.68]	[2.66]	[6.52]				
High-Low	0.53	0.49	−0.26	0.04	0.05				
	[2.99]	[4.20]	[−0.60]	[0.71]	[1.30]				

This table shows monthly value-weighted average excess returns to portfolios sorted on GP/A (Panel A) and AGGP (Panel B), where AGGP is defined as GP minus change in capital expenditure, employing NYSE breakpoints and results of time-series regressions of these portfolio returns on Fama–French factors. The market, size and value factors are denoted as MKT, SMB (small minus large), and HML (high minus low). Test statistics are given in square brackets. It also shows time-series average portfolio characteristics. The sample excludes financial firms and covers July 1963 to May 2023.

Returns are generally increasing in both GP/A (Panel A) and AGGP (Panel B). Sorting on AGGP preserves the linear increase in GP/A and returns while adding a dimension for asset growth. Our results preserve the results in GP/A, more closely match the results from Novy-Marx (Table 2, Panel A) in most characteristics. For example, our B/M numbers and ME figures show an even distribution across quintiles, which are similar to the figures presented by Novy-Marx. The high-low for AGGP (0.53) is greater than high-low for GP/A (0.30). It confirms our main findings from the regression analysis above that our new measure, controlling for the agency problems in asset growth, provides more predicting power of future returns. The GP/A strategy, as described by Novy-Marx, is a growth strategy. He proposes that profitable firms can grow faster. Our strategy expands that concept by penalizing firms which make large jumps in hard assets. Not only does our strategy preserve the linear growth in GP/A but it also maintains nearly the same variation in B/M from low to high as the GP/A strategy. This strategy may also favor extremely small firms which generate income relative to small asset size. This suggests that the combination of asset growth and gross profit and the elimination of the scaling variable results in a lower-variability portfolio.

4.3. Analysis of Double Sorted Portfolios

In Table 4, we can see average excess returns on double sorts of AGGP and Size. Returns increase in AGGP and size, as expected. The size strategies do create a consistent performance in a similar pattern to that presented in Table 4 of Novy-Marx (2013) on the size axis. On the profitability axis the returns are positive and significant and yield consistently positive and significant returns across all size quintiles.

Table 4. Excess Returns to Portfolios sorted on AGGP and ME.

Panel A: Portfolio average excess returns and time series regression results										
	Asset Growth and Gross profit (AGGP) quintiles					Profitability strategies				
Portfolio	Low	2	3	4	High	r	α	MKT	SMB	HML
Size quintiles										
Small	0.43	0.69	0.82	0.95	1.06	0.63	0.03	0.09	0.05	0.21
						[6.24]	[0.10]	[1.81]	[0.92]	[2.99]
2	0.39	0.87	1.06	0.82	1.05	0.66	0.11	−0.04	0.18	0.12
						[9.24]	[0.54]	[0.98]	[6.26]	[3.55]
3	0.58	0.74	0.85	0.87	1.02	0.44	0.03	−0.02	0.25	0.19
						[5.66]	[0.01]	[−0.68]	[6.88]	[4.28]
4	0.64	0.83	0.78	0.59	0.98	0.34	−0.26	0.09	0.18	0.19
						[2.98]	[−3.10]	[4.12]	[4.99]	[6.32]

Table 4. *Cont.*

Big	0.34	0.49	0.58	0.61	0.67	0.33	0.05	0.01	−0.02	−0.02
						[6.96]	[0.50]	[0.68]	[−0.66]	[−0.10]
Samll-minus-big strategies										
r	0.09	0.20	0.24	0.34	0.39					
	(0.34)	(1.97)	(1.84)	(0.86)	(0.17)					
α	−0.46	−0.75	−0.94	−0.83	−0.62					
	[−2.58]	[−5.66]	[−8.12]	[6.54]	[−1.81]					
MKT	−0.18	−0.28	−0.16	−0.23	−0.12					
	[−5.69]	[−3.61]	[−6.10]	[−3.08]	[−3.55]					
SMB	0.46	0.72	0.58	0.64	0.59					
	[8.55]	[4.99]	[13.20]	[9.89]	[3.21]					
HML	−0.18	0.01	0.21	0.12	0.01					
	[−2.89]	[0.50]	[3.62]	[1.56]	[0.20]					

Panel B: Portfolio average number of firms and portfolio book-to-markets

	Asset Growth and Gross profit (AGGP) quintiles					Asset Growth and Gross profit (AGGP) quintiles				
	Low	2	3	4	High	Low	2	3	4	High
	Number of firms					Portfolio book-to-market				
Size quintiles										
Small	574	434	667	490	866	6.13	3.58	3.26	4.67	3.08
2	178	141	168	132	133	2.16	1.82	1.16	2.34	1.52
3	129	106	118	96	72	2.63	1.42	1.02	1.02	1.18
4	109	88	91	82	60	1.02	1.18	1.58	0.91	1.13
Big	90	81	87	87	46	0.96	0.95	1.82	0.76	0.68

This table shows the value-weighted average excess returns to portfolios double-sorted, using NYSE breakpoints, on AGGP and market equity (ME), and results of time-series regressions of both sorts' "high minus low portfolios" returns on the Fama and French factors (the market, size and value factors MKT, SMB (small minus large), and HML (high minus low)). Test statistics are given in square brackets. The table also shows the average number of firms in each portfolio and each portfolio's average book-to-market (the portfolios exhibit little gross profits to asset variation within size quintiles and little size variation within profitability quintiles). The sample excludes financial firms (those with one-digit standard industrial classification codes of six) and covers July 1963 to May 2023.

Table 5, consistent with Novy-Marx shows that trading the corners of a value/profitability sort has high associated returns. Our figures are consistent with the figures presented by Novy-Marx.

Table 5. Excess Returns to Portfolios sorted on AGGP and B/M.

Panel A: Portfolio average excess returns and time series regression results

	Asset growth and gross profit-to-asset (AGGP) quintiles					Profitability strategies				
Portfolio	Low	2	3	4	High	r	α	MKT	SMB	HML
Book-to-market quintiles										
Low	−0.04	0.52	0.56	0.68	0.73	0.77	0.13	−0.25	−0.11	0.26
						[5.24]	[0.91]	[−6.30]	[−2.06]	[4.99]
2	0.46	0.61	0.69	0.89	0.78	0.32	0.08	−0.06	0.05	0.18
						[3.78]	[0.65]	[−0.90]	[0.81]	[2.99]
3	0.51	0.69	0.76	0.93	0.98	0.47	−0.15	0.11	0.28	0.21
						[6.99]	[−0.21]	[2.89]	[8.51]	[8.40]
4	0.62	0.87	0.89	0.94	0.99	0.37	−0.18	0.16	0.23	−0.21
						[2.98]	[1.35]	[5.66]	[4.76]	[−3.56]
High	0.76	0.74	1.08	1.01	1.15	0.39	−0.18	0.12	0.29	−0.06
						[4.78]	[0.10]	[4.58]	[5.22]	[−0.23]
	Low-minus-high strategies									
r	0.80	0.22	0.52	0.33	0.42					

Table 5. *Cont.*

	[6.39]	[2.99]	[2.02]	[0.30]	[0.26]
α	−0.11	−0.32	−0.28	−0.62	−0.31
	[−1.01]	[−2.67]	[−1.16]	[−2.99]	[−1.78]
MKT	−0.21	−0.13	−0.08	1.13	0.09
	[5.85]	[3.66]	[−1.97]	[3.69]	[4.14]
SMB	0.08	0.24	0.46	0.48	0.63
	[2.12]	[2.99]	[5.79]	[12.13]	[10.56]
HML	0.82	0.74	0.76	0.68	0.61
	[14.66]	[13.29]	[11.63]	[13.47]	[7.89]

Panel B: Portfolio average number of firms and portfolio book-to-markets

	Asset growth and gross profit-to-asset (AGGP) quintiles					Asset growth and gross profit-to-asset (AGGP) quintiles				
	Low	2	3	4	High	Low	2	3	4	High
	Number of firms					Portfolio book-to-market				
Size quintiles										
Small	574	434	667	490	866	6.21	4.08	3.69	4.15	3.07
2	178	141	168	132	133	1.87	1.64	1.25	2.36	1.48
3	129	106	118	96	72	2.37	1.56	1.12	1.05	1.08
4	109	88	91	82	60	1.12	1.06	1.82	0.92	1.13
Big	90	81	87	87	46	0.96	0.84	1.69	0.64	0.62

This table shows the value-weighted average excess returns to portfolios double sorted, using NYSE breakpoints, on AGGP and book-to-market ratios, and results of time-series regressions of both sorts' "high minus low portfolios" returns on the Fama and French factors (the market, size and value factors MKT, SMB (small minus large), and HML (high minus low)). Test statistics are given in square brackets. The table also shows the average number of firms in each portfolio and each portfolio's average book-to-market (the portfolios exhibit little gross profits to asset variation within size quintiles and little size variation within profitability quintiles). The sample excludes financial firms (those with one-digit standard industrial classification codes of six) and covers July 1963 to May 2023.

4.4. Portfolio Analysis Using the Largest 500 Non-Financial Firms

Table 6 shows the results of running the portfolio tests solely with the largest 500 non-financial firms. Panel A shows our results. Portfolios prepared using GP/A show a high minus low return of 0.27 (test statistic 2.33) while our portfolios show a return of 0.25 (test statistic 0.52). It is consistent with our main findings here, that our new variable captures the impact of agency problems arising from managerial decisions on investments and information disclosure of accounting incomes. Consistent with Diamond and Verrecchia (1981) and Hermalin and Weisbach (2012), it is reasonable to suppose that the group of largest companies in this subset of our sample have less information asymmetry than those smaller ones, in terms of decision-making process, for example, how the investments were selected, and what accounting rules are in use. When a company becomes more transparent, the growth strategy implied by Novy-Marx (2013) works better because our new measure may provide a downwards-biased estimate of profitability in terms of predicting future returns. Panel B shows our replication of the results in Panel B in Table 7 of Novy-Marx (2013). The excess returns very closely match his figures across the B/M quintile portfolios, indicating that our results are comparable to his. Following Novy-Marx (2013), Panel C shows the results of portfolio tests based on the quintile portfolios classified as the combination of AGGP ranking and B/M ranking. It implies that the trading strategy based on our new variable should be applied with caution if trading on only liquid large-cap stocks. In other words, our new measure of profitability could lose its advantage over other measures if the companies become more transparent, leading to less agency problems through managerial decisions.

Table 6. Excess Returns to Portfolios sorted on AGGP and B/M using the largest 500 non-financial firms.

		Alphas and Three-Factor Loadings				Portfolio Characteristics			
Portfolio	**r**	**α**	**MKT**	**SMB**	**HML**	**GP/A**	**B/M**	**ME**	**n**
Panel A: Portfolio sorted on asset growth and gross profit-to-asset (aggp) quintiles									
Low	0.45	−0.08	1.12	−0.02	0.04	0.15	0.89	4.68	220
	[1.91]	[−0.65]	[9.86]	[−0.68]	[0.76]				
2	0.63	0.24	1.01	−0.03	−0.18	0.38	0.76	6.82	280
	[1.34]	[8.55]	[5.31]	[−2.68]	[3.99]				
High	0.72	0.33	0.92	−0.18	−0.42	0.47	0.66	7.69	207
	[1.61]	[8.66]	[7.54]	[−4.50]	[5.32]				
High-Low	0.25	0.41	−0.20	−0.16	−0.46				
	[0.52]	[4.60]	[−7.90]	[−4.68]	[−7.56]				
Panel B: Portfolio sorted on book-to-market									
Low	0.38	0.16	0.96	−0.21	−0.35	0.51	0.53	8.32	264
	[1.61]	[5.67]	[46.37]	[−8.96]	[−10.38]				
2	0.53	0.21	0.94	−0.06	−0.15	0.38	0.85	7.53	258
	[2.58]	[0.67]	[35.28]	[−5.28]	[0.76]				
High	0.74	0.04	0.91	−0.02	0.52	0.26	1.36	5.38	197
	[3.91]	[0.30]	[72.13]	[−5.66]	[32.52]				
High-Low	0.36	−0.12	−0.05	−0.19	0.87				
	[0.78]	[1.68]	[−0.82]	[−3.77]	[−7.56]				
Panel C: Portfolio sorted on average AGGP and book-to-market ranks									
Low	0.42	0.04	0.98	−0.19	−0.18	0.26	0.91	13.24	217
	[1.81]	[0.41]	[67.30]	[−6.45]	[−6.89]				
2	0.51	0.23	0.95	−0.08	−0.07	0.31	0.80	7.68	281
	[2.29]	[5.32]	[45.27]	[−8.53]	[−3.88]				
High	0.87	0.26	1.06	0.26	0.16	0.62	0.65	2.03	210
	[2.81]	[5.36]	[67.88]	[−26.37]	[6.41]				
High-Low	0.45	0.22	0.08	0.45	0.34				
	[2.54]	[2.99]	[8.26]	[−13.56]	[6.72]				

This table shows the performance of portfolios formed using only the largest 500 non-financial firms for which AGGP and book to market are both available and the results of the time-series regressions of these portfolios returns on the Fama–French factors (the market, size and value factors MKT, SMB (small minus large), and HML (high minus low)). Test statistics are given in square brackets. The table also shows the average number of firms, and the average size of firms, in each portfolio (the portfolios exhibit little gross-profits to asset variation within book-to-market quintiles and little book-to-market variation within profitability quintiles). The sample excludes financial firms (those with one-digit standard industrial classification codes of six) and covers July 1963 to May 2023. This table shows the results of the Novy-Marx tests on our dataset.

4.5. Regression Analysis including Relative Measure of Factors

This paper also investigates the impact of the relative measure of asset growth and profitability on predicting future returns. We include gross-profit decile, asset-growth decile, and the ratio of gross-profit decile over asset-growth decile in the regression analysis of returns. The results are shown in Table 7.

The specification "Ours" includes our new variable, AGGP and our measures of decile. AG decile is inversely related to returns and GP is positively related, as expected. The decile ratio is positively and significantly related to returns in all specifications even when included in all the three specifications with AGGP. This suggests that there is different information in the relative profitability measure than there is in the scaled AGGP measure. Table 7 allows us to conclude that these factors compared to other firms do have some relevance in predicting average returns. It should receive more attention from research in this field.

Table 7. Fama and MacBeth Regressions of Returns on Measures of Profitability.

Variable	Novy-Max		Ball		Ours		Novy-Max		Ball		Ours		Novy-Max		Ball		Ours	
Intercept	1.46	***	1.73	***	1.38	***	1.62	***	2.3	***	1.74	***	1.48	***	1.79	***	1.26	***
	[8.37]		[6.88]		[3.98]		[7.43]		[5.67]		[6.88]		[3.77]		[4.83]		[2.99]	
GP Decile	0.004						0.11	***					−0.04					
	[0.95]						[6.35]						[1.05]					
AG Decile			−0.12	***					−0.13	***					−0.17	***		
			[−5.68]						[−4.88]						[−8.16]			
(GP Decile)/(AG Decile)					0.08	***					0.08	***					0.06	***
					[5.88]						[7.24]						[7.02]	
Asset Growth	−0.18	***	−0.13	***	−0.17	***	−0.24	***	−0.23	***	−0.26	***	−0.18		−0.25		−0.19	*
	[−4.99]		[−3.28]		[−5.92]		[−4.30]		[−3.78]		[−4.87]		[−0.68]		[−0.78]		[−1.71]	
Gross Profit	0.85	***	0.81	***	0.65	***												
	[3.96]		[5.83]		[5.66]													
Operating Profit							1.49	***	1.86	***	1.68	***						
							[5.80]		[6.55]		[5.62]							
AGGP													1.26	***	1.27	***	1.16	***
													[4.99]		[7.60]		[3.18]	
Income	−0.03		0.16		0.06		−0.13		−0.27		−0.14		1.59	*	1.86	***	1.93	***
	[−0.81]		[0.86]		[0.71]		[−0.65]		[−0.78]		[−0.10]		[1.70]		[5.38]		[5.30]	
Free Cash Flow	0.53	***	0.42	***	0.38	***	0.45	***	0.36	***	0.53	***	0.58	***	0.62	*	0.53	
	[5.86]		[3.98]		[4.55]		[3.62]		[3.49]		[6.34]		[6.99]		[1.71]		[0.90]	
Book-to-Market Ratio	0.35	***	0.29	***	0.42	***	0.36	***	0.37	***	0.35	***	0.37	***	0.52	***	0.56	***
	[5.49]		[7.13]		[4.96]		[3.59]		[7.50]		[6.32]		[4.12]		[5.66]		[5.68]	
Firm Size	−0.11	***	−0.15	***	−0.09	***	−0.18	***	−0.15	***	−0.16	***	−0.11	***	−0.13	***	−0.16	***
	[−6.35]		[−6.58]		[−5.99]		[−4.31]		[−4.36]		[−4.59]		[−9.24]		[−6.35]		[−4.32]	
Return over last month	−5.46	***	−5.57	***	−5.92	***	−5.53	***	−5.64	***	−6.61	***	−6.38	***	−6.57	***	−6.85	***
	[−11.46]		[−13.99]		[−8.76]		[−7.54]		[−12.49]		[−18.77]		[−9.18]		[−14.27]		[−12.55]	
Return over previous 12 to 2 months	0.58	***	0.56	***	0.57	***	0.54	***	0.53	***	0.62	***	0.68	***	0.46	***	0.55	***
	[6.83]		[7.51]		[8.62]		[4.87]		[8.29]		[5.30]		[7.24]		[6.75]		[5.12]	

This tables reports results from Fama–Macbeth regression of returns on gross profitability (GP), operating profitability (OP), gross profitability minus change in capital expenditure (AGGP), income before extraordinary items (IB1) scaled by book equity, and free cash flow (FCF) scaled by book equity. GP, OP, and AGGP are scaled by total assets. Independent variables are trimmed at the 1% and 99% levels. The sample excludes financial firms. T-statistics are included in parentheses. ***, and * indicate significance at the 1%, and 10% level, respectively.

Cooper et al. (2008) find that the abnormal return based on the asset-growth anomaly can last for at most five years. In order to check the long-run effect of our new variable, we also test whether there is a long-run excess return from the portfolios by going long on firms with higher AGGP and shorting those with lower AGGP. The results are shown in Table 8 and Figure 1.

Table 8. Excess Returns to Decile Portfolios sorted on GP/A.

Value-Weighted Portfolio Average Monthly Raw Returns												
	AGGP Deciles											
YEAR	1 (Low)	2	3	4	5	6	7	8	9	10 (High)	Spread (10–1)	T (spread)
−5	0.0086	0.0086	0.0090	0.0092	0.0117	0.0105	0.0116	0.0101	0.0104	0.0126	0.004 ***	5.07
−4	0.0080	0.0087	0.0087	0.0089	0.0115	0.0122	0.0109	0.0107	0.0122	0.0123	0.0043 ***	5.80
−3	0.0073	0.0089	0.0089	0.0079	0.0108	0.0125	0.0114	0.0119	0.0133	0.0128	0.0055 ***	6.81
−2	0.0083	0.0085	0.0095	0.0089	0.0097	0.0118	0.0115	0.0117	0.0127	0.0130	0.0047 ***	5.19
−1	0.0074	0.0066	0.0076	0.0076	0.0085	0.0081	0.0090	0.0084	0.0086	0.0102	0.0028 ***	3.05
1	0.0036	0.0041	0.0049	0.0041	0.0052	0.0053	0.0058	0.0045	0.0044	0.0063	0.0027 **	2.87
2	0.0049	0.0042	0.0054	0.0048	0.0057	0.0059	0.0049	0.0053	0.0047	0.0058	0.0009 **	2.64
3	0.0063	0.0044	0.0049	0.0052	0.0060	0.0060	0.0060	0.0049	0.0052	0.0069	0.0006 ***	3.72
4	0.0057	0.0049	0.0055	0.0066	0.0063	0.0071	0.0063	0.0052	0.0061	0.0064	0.0007 **	2.26
5	0.0056	0.0056	0.0061	0.0068	0.0078	0.0064	0.0062	0.0056	0.0065	0.0057	0.0001	0.09
[−5,−1]	0.6078	0.6595	0.6934	0.6975	0.7854	0.8317	0.8679	0.8221	0.8483	0.8703	0.2625 ***	12.09
[1,5]	0.5162	0.4905	0.5088	0.5354	0.5686	0.5459	0.5376	0.5433	0.5169	0.5629	0.0467 **	2.23

This table shows monthly value-weighted average excess returns to portfolios sorted on GP/A, where AGGP is defined as GP minus change in capital expenditure, employing NYSE breakpoints. It also shows time-series average of cumulative returns. The sample excludes financial firms and covers July 1963 to May 2023. ***, and ** indicate significance at the 1%, and 5% level, respectively.

The results show that the excess returns persist for up to five years and show significant results for as long as four years from portfolio formation. The difference of cumulative returns provides supportive evidence of the long-run impact of our new measure on future returns.

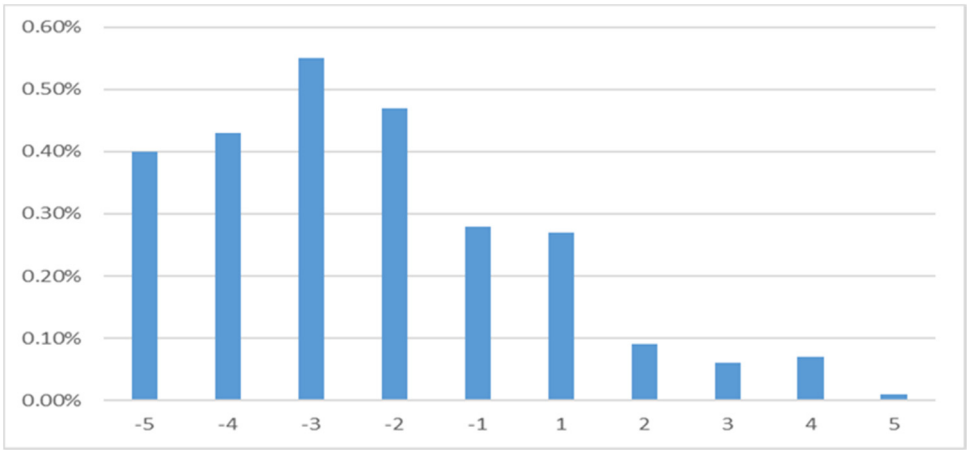

Figure 1. Time−Series Pattern of Excess Returns to Decile Portfolios sorted on GP/A.

5. Conclusions

We test a factor that includes a scale measure of both asset growth and gross profitability. By its construction our variable is able to take into account agency problems related to the asset-growth and gross profitability factors, resulting from managerial discretion over the processes of investment decision and information disclosure of accounting profits. After excluding the change in capital expenditure from gross profit, our new measure provides a cleaner proxy of profitability in terms of predicting future returns. This added dimension to our variable provides superior performance to the scaled gross profit variable alone using the same dataset as Novy-Marx (2013), in two aspects. First, our new variable makes the asset growth redundant in the regression of future returns, maintaining the same explanatory power of future returns as other profitability measures suggested by the prior literature. Second, the outperformance of our new variable is also robust to the scaling issue raised by the prior literature (Ball et al. 2016). As agency issues are key in both of these factors, this implies that combining them correctly can lead to a more efficient factor model.

On the other hand, our new measure failed to outperform among the 500 largest nonfinancial companies. This is consistent with the prior literature and with our main findings because these largest companies should have the least agency problems through managerial decisions on investments and accounting rules. Therefore, our new variable should be applied with caution, depending on the degree of information asymmetry between managers and shareholders.

In sum, our new measure provides a new view of both cash generation and disposition. This variable should provide a more effective portfolio application than scaled gross profit, depending on the information asymmetry issue with the firms. It should be implemented with caution in a sample of larger firms with stronger disclosure mechanisms. Also, our findings could be biased by other factors not covered in this paper. Therefore, the results here should not be interpreted as how to price the agency problem directly. Instead, our study aims to propose a new factor, after considering the agency problem. Future research with direct measurement of agency costs may help address the issue of pricing agency problems directly.

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