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Highlights

- We investigate the stock returns of companies with sustainable competitive advantage (the moat).
- Wide moat firms do not deliver higher raw returns.
- After controlling for risk factors, moat is a positive factor affecting cross-section of stock returns.
- Wide moat firms also seem to be better shielded from mean reversion of profitability.

Is Sustainable Competitive Advantage an Advantage for Stock Investors?

By

Yi Liu[1] and Tomas Mantecon[2]

ABSTRACT

Investing in stocks of companies with sustainable competitive advantage, the moat, does not earn higher raw returns. These companies tend to be larger, financially stronger, and have lower book-to-market ratios (growth stocks). After controlling for size, book-to-market ratio and other risk factors, sustainable competitive advantages is a positive factor affecting cross-section of stock returns. Firms with sustainable competitive advantage also seem to be shielded from mean reversion of higher profitability better than non-wide moat firms.

JEL Classification: G11

Keywords: Investment, Economic Moat, Sustainable Competitive Advantage, Asset Pricing, Cross-section of Stock Returns

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Mean reversion of profitability has long been recognized by scholars. For example, Fama and French (2000, p. 161) states that "in a competitive environment, profitability is mean reverting within as well as across industries. Other firms eventually mimic innovative products and technologies that produce above normal profitability for a firm." Some "investment gurus" like Warren Buffett, however, believe that there are a few firms that are shielded, to some degree, from the erosion of higher profitability. They believe those are firms that have sustainable competitive advantage as the defense against competition. Warren Buffett used the term moat to describe this advantage. The success of Warren Buffett and his peers is often credited with their ability to identify firms with sustainable competitive advantage[3]. Many practitioners believe that investing in stocks with a wide moat is the recipe of long term superior stock performance[4]. In fact, there is even an ETF named "moat" that is created to capture the supposed outperformance of wide moat firms.[5]

Do stocks with a wide moat outperform stocks with no moat? Without an empirical test, it remains an urban legend. First, moat is intangible and difficult to measure. Second, there is no empirical evidence that wide moat firms are free from erosion of higher profitability. Third, even if wide moat firms have enduring higher profitability, this "sustainable competitive advantage" might have been reflected in their stock market price in an efficient market. As a result, stocks with wide moat could be expensive, but do not lead to higher returns[6]. Forth, wide moat firms might be considered safer investment with lower risk

[3] In his 2007 annual letter (Buffett 2008, p. 6) to Berkshire shareholders, Warren Buffett states that "A truly great business must have an enduring 'moat' that protects excellent returns on invested capital. The dynamics of capitalism guarantee that competitors will repeatedly assault any business 'castle' that is earning high returns. Therefore a formidable barrier such as a company's being the low cost producer (GEICO, Costco) or possessing a powerful world-wide brand (Coca-Cola, Gillette, and American Express) is essential for sustained success." In stock investing, Buffett "seeks economic castles protected by unbreachable moats."

[4] For example, Pat Dorsey (2004, p. 3) in his book, *the Five Rules for Successful Stock Investing*, contends that "Economic moats allow a relatively small number of companies to retain above-average levels of profitability for many years, and these companies are often the most superior long-term investments". In his New York Times best seller, *Rule #1*, popular investment author Phil Town (2007, p. 54) writes that "Finding a business with wide Moat is key to finding a successful business to own."

[5] Market Vectors Morningstar Wide Moat ETF (Moat). Fund family: Van Eck. Inception date: April 23, 2012.

[6] For example, Microsoft was rated by Morningstar as a wide moat firm because of its near monopoly in PC operating systems. However, the stock was sold at a trailing price-to-earning (P/E) ratio of nearly 50 in 2001. The

and lower expected return. For example, stocks with wide moat also tend to be large, and empirical work finds big companies have lower average returns.

On the other hand, several studies have suggested that firms with higher quality have positive abnormal returns. Such quality is measured by higher gross profitability (Novy-Marx (2013)), higher earning quality (Chan, Chan, Jegadeesh, and Lakonishok (2001)) or better operating performance (Piotroski (2000), Mohanram (2005)). Those studies suggested such qualities are not efficiently priced by the market. Most of these qualities were measured by financial statement variables and should be easily available to investors to arbitrage. If good quality measured by simple financial statement variables can have enduring stock return premium, then it is possible that moat, not directly observable, might have an even stronger quality premium.

Given the controversial nature of the investment value of a moat, a scientific understanding of the performance of stocks with wide moat would have meaningful implication for both the investment world and academia.

Although sustainable competitive advantage is not an accounting variable reported by the company, the research firm Morningstar rates the "economic moat" for publicly traded companies since 2002. In this paper, we first use Morningstar's moat rating as the measurement of sustainable competitive advantage. We then create an objective measure of wide moat and extend our sampling period from 1964 to 2011.

Overall, our research explores three questions: 1) Do firms with wide moat have higher raw returns on average? 2) Do they have higher risk-adjusted returns? 3) Is the high profitability of wide moat firms better shielded from the general principle of profitability mean reverting than non-wide moat firms?

The rest of the paper is organized as follows: Section I discusses prior research and our motivation. Section II explains data and methodologies. Section III presents empirical results of stock performance of firms with different Morningstar moat ratings and their implications. Section IV investigates the profitability mean-reverse behavior of firms with different Morningstar moat ratings. Section V attempts to identify observable characteristics that determine a firm's moat and then we use these observable characteristics to identify wide moat for a larger universe of firms in the period 1964-2011. Section VI studies the stock performance and financial performance of wide moat firms identified by these objective measures. Section VII concludes the paper.

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next decade, the company continues to deliver double digit revenue and EPS growth; however, its stock underperforms the market.

I. Literature Review and Motivation

A. Mean Reverting of Profitability, Sustainable Competitive Advantage and Moat

Economists have long contended that in a competitive environment, profitability is mean reverting. In the long term, companies can only earn a return close to their cost of capital. For example, Hirschey (2008, p 435) states that "over time, entry and non-leading firm growth in highly profitable competitive markets cause above-normal profits to regress towards the mean. Conversely, bankruptcy and exit allow the below-normal profits of depressed competitive market to rise toward the mean." Fama and French (2000) find strong empirical evidence of profitability mean reversion for US-listed firms. Altunbas (2008) uses the same methodology as Fama and French (2000) and finds the profitability of European-listed firms also follow a mean reverting process.

Mean reversion of profitability could help to explain the poor performance of growth stocks as growth stocks with high profitability see their fortune revert when competitions eventually invade their territory. The stock market is full of such mean reverting examples of previously very profitable firms[7]. Empirical studies have also suggested mean reverting of profitability could be the cause of the underperformance of growth stock over value stock. Lakonishok, Shleifer and Vishny (1994) compare the past growth rate of fundamentals (sales, net income and cash flow) of value stocks and growth stocks. Growth stocks have substantially higher growth rates of fundamentals than value stocks over the 5 years before portfolio formation. However, the growth rate differences between growth and value stocks become much smaller over the 5 post-formation years. In fact, the growth rates of fundamentals for growth firms were often slower than value stocks over post-formation year +2 to +5. Lakonishok, Shifer, and Vishny (1994) argue that this evidence of mean reverting is not fully understood by the stock market because the much higher market price to fundamental ratio in a growth portfolio implies a much higher expected future growth rate of fundamentals. When the expected high future growth rate fails to materialize, growth stocks suffer lower return. Fama and French (1995) also find that the growth rates of earnings in growth and value firms converge in the years after portfolio formation. Fama and French, however, believe that such mean reverting is expected by the market, and stock returns reflect this expectation.

[7] For instance, Dell saw its growth significantly slow down after its competitors successfully duplicated its direct model and efficiency in production. Research in Motion Ltd similarly found that its profitability dropped significantly after Apple Inc. entered into the smart phone market. More recently, HTC found its rising profit reversed when Samsung emerged as a stronger competitor of Android based smart phones.

Although highly profitable firms are subject to mean reverting of profitability because of competition, it prompts the question of whether firms with sustainable competitive advantage can avoid the fate of reverting to mean. The concept of sustainable competitive advantage was pioneered by Michael Porter (1980, 1998). Porter (1980) developed the famous five forces of competitive advantage, and Morningstar acknowledged a debt to Porter in its classification of moat (Boyd 2005). However, no prior study in finance has explored the empirical relationship between sustainable competitive advantage and the sustainability of high profitability. The wide moat firms in our sample have higher past profitability and higher price to fundamental ratios. However, our research will expose that these wide moat firms are able to maintain the high profitability during the 3 post-formation years. The sustainable competitive advantage does offer a wide moat to protect their profitability.

Warren Buffett and many practitioners use the term *moat* to describe this sustainable competitive advantage. Two related papers (Boyd (2005), Boyd and Quinn (2006)) discuss both how Morningstar defines moat and the historical financial performances of wide moat firms. These analyses find that wide moat firms historically have superior operational and stock performance. What was missing from the research was an exploration of the question most critical to investors: what are the future stock and operational performance once firms are assigned wide moat status?[8] Overall, there is a ubiquitous belief that stocks with a wide moat can deliver higher stock return, and it is important to empirically research this widespread notion.

B. Profitability and Cross-section of Stock Returns

In an efficient market, stock returns should only compensate the non-diversifiable risk; yet, many studies find financial variables that have explanatory power of cross-sectional variation of stock returns.

[8] For instance, Boyd (2005) claims that his study confirms that stocks of wide moat firms enjoy structural advantages that create shareholder value, which is predicated upon Value Line's calculation of Price Growth Persistence. The paper reports an average Stock Growth of 84.89 for fifty wide moat stocks with the Value Line Persistence ratings range from 100 (highest) to 5 (lowest). Still, Boyd does not explain how the Stock Growth number is calculated, the actual stock return of these firms, or their comparable benchmark. The Stock Growth measurement, if accurate, only reflects the historical performance of firms that are rated as wide moat at the end of June 2004 quarter – not its forward-looking performance after the stocks are assigned to the wide moat category. Likewise, Boyd and Quinn (2006) claims that moat status is associated with higher returns for a ten-year return, but not a five-year period. Their research uses relative price appreciation calculated by Thomson Baseline, but it does not provide details on how it was calculated. Again, the ten-year price appreciation only reflects the historical stock performance of their sample but fails to answer what the return would be once stocks are rated as wide moat.

Fama and French (1992) declare that size and book-to-market ratio are the most powerful factors that explain cross-sectional stock returns. Wide moat firms are usually bigger and have lower book-to-market ratio. When investigating the stock performance of wide moats firms, we control for size and book-to-market ratio and include beta, leverage, and earnings yield as controlling variables in the regression analysis. [9]

Smaller size, higher book-to-market, higher earnings yield, and higher leverage have been found to have higher cross-sectional stock returns. They might be related to higher risk or they are overlooked by investors. No matter what the explanations are, those are usually labeled as *bad* companies in terms of risk, past stock performance or past financial performance.

Another set of studies try to identify relatively *good* companies that might deliver higher returns. Some of these studies use signals from financial statements to determine the quality of companies. Many of these signals are related with the different profitability measures of the firm. [10]. Asness, Frazzini, and Pedersen (2015) suggest high quality firms (stocks that are safe, profitable, growing and well managed) have higher risk adjusted returns. Fama and French (2006) suggest that higher profitability implies higher expected returns based on dividend discount stock valuation model. More recently, Novy-Marx (2013) finds that firms with higher gross profitability and measured by gross profit-to-assets have higher cross-

[9] The small-size effect, originally documented by Banz (1981), demonstrates that small firms (measured by market capitalization) have higher risk-adjusted returns than larger firms. Rosenberg, Reid, and Lanstein (1984) show that buying stocks with a high ratio of book-to-market, and selling stocks with low ratio of book-to-market earns positive abnormal returns. Similar to the book-to-market ratio, earning yield is also found to be related to cross-sectional stock return. Basu (1977) first documents that, from 1957 to 1971, stocks with low price-earnings ratios (value stocks) earn much higher returns than stocks with high price-earnings ratios (growth stock) even after adjusted for systematic risk. Furthermore, Bhandari (1988) finds that leverage is positively related to average stock return.

[10] Lev and Thiagarajan (1993) use 12 financial signals to find stocks that could outperform. Later, Piotroski (2000) finds that winners could be separated from losers for value stocks by simply using historical financial statement based variables. Most of these variables are signals of improvement of profitability and lower risk of bankruptcy. The F-score based on these nine variables (or ratios) has influenced practitioners. *The Little Book that Beats the Market*, a popular value investment book (Greenblatt, 2005), cites Piotroski (2000) extensively as an example of finding superior stock returns by using financial statement information wisely. Mohanram (2005) uses a similar approach to separate winners and losers for low book-to-market stocks (glamour stocks).

section of average returns. The author suggests that because the profitable firms are less prone to distress than non-profitable firms, it is difficult to reconcile with the common risk-based explanation. Ball, Gerakos, Linnainmaa, and Nikolaev (2015) find that operating profitability has an even stronger link to expected return than gross profitability. Profitability got more attention recently when Fama and French (2015) add a profitability factor to the classic Fama-French three factor model. Fama and French admit that profitability also provides an acceptable description of cross-sectional average returns. Similarly, Hou, Xue and Zhang (2015) claim that a factor model that includes market, size, investment and profitability factor largely captures the cross sectional of average stock returns.

In this study, sustainable competitive advantage, or the moat, is a good quality. Unlike the various good quality studied by previous literature, moat is not measured by certain financial statement related variables. Moat, which is based on the prospects of the underlying business and its competitive positioning against its rivals, should offer insights to the idea that good quality companies might outperform.

II. Data and Methodology

Our sample of firms with moat ratings spans from June 2002 to December 2011. Although the data does not cover an extended period of time, it is comprised of more than one major business cycle. We obtain economic moat ratings from Morningstar's proprietary database. Since June 2002, Morningstar has assigned an economic moat rating to the stocks it covers. Morningstar classifies moat categories as either *wide moat*, *narrow moat*, or *no moat*. According to Morningstar (Morningstar, 2004), an economic moat is defined as "a firm's ability to earn returns above its cost of capital in the future." Additionally, Morningstar notes that "Competition tends to drive down excess profits, but companies that can earn excess profits for an extended time by creating a competitive advantage (or economic moat)." Morningstar assigns its moat rating based on four criteria related to sustainable competitive advantage: switching cost, network effect, cost advantage, and intangible assets (Lopez, 2003). According to Morningstar, switching cost is a barrier to entry that involves a one-time inconvenience or expense that a buyer incurs from changing from one product or service to another. The network effect occurs when the value of a particular good or service increases for both new and existing users as more people use that

good or service.[11] A cost advantage refers to a firm's ability to provide a good or service at a relatively low cost. The last criteria, intangible assets, generally refer to the intellectual property that firms use to preclude other companies from duplicating a good or service.[12]

Morningstar moat ratings cover 420 firms at the end of 2002, and increase to 1484 companies by the end of 2011. The percentage of firms that are rated as wide moat ranges from 9 percent to 20 percent. The distribution by calendar year is shown in Table 1.

We obtain monthly stock return data from the Center of Research in Security Prices (CRSP). Accounting data is collected from COMPUSTAT. All annual accounting data is measured at the end of the previous fiscal year before the formation of the moat portfolio each year. We deleted 315 observations that did not have sufficient accounting data. The deleted observations were approximately 2.6 percent of the sample. Adding back these observations has a very insignificant impact on the stock returns we calculated for the different moat portfolios. The final data set includes 11,511 observations.

From 2003 to 2011, we create three portfolios each year according to Morningstar's moat rating: 1) wide moat, 2) narrow moat and 3) no moat. On January 1st of each calendar year, the moat portfolio is formed based on moat ratings of the firms at the end of December of the previous year. Since the moat rating is known, investors should be able to recreate such a portfolio at the beginning of every year.

We calculate the annual return for each firm as the compounded return for each of the twelve months. If a firm is delisted during a month, we use delisting return for the month if monthly return is not available. We replace the return with CRSP equal weighted index return for remaining months for delisted firms. We then calculate the equal weighted return for the portfolio each year. Every portfolio is rebalanced at the end of each year.

[11] eBay is an example of company with a network effect. The more people that use eBay, the more useful the service is to its users because there are more buyers for each seller and more sellers for each buyer.

[12] Although the components of moats are proprietary for Morningstar, they are similar to the sources of sustainable competitive advantage mentioned by other popular investment books. For example, in "Value Investing: from Graham to Buffett" (Greenwald,2001, p 75 to p 85), by well-known value investor and Columbia Business School Professor Bruce Greenwald, the list of sources of sustainable competitive advantage includes exclusive license granted by government, cost side advantage (from patent, know-how, access to cheap resources), demand side advantage (buyer habit, cost of searching, switching cost) and barriers to entry.

We also calculate the growth rate for the accounting variables revenue and net income. Computing growth rate of these variables could be complicated by negative average earnings for a portfolio during a particular year. (For example, average net income for the no moat portfolio is negative for 2008). Year-to-year growth rates are also highly volatile because some base year earnings could be close to zero and produce extreme high growth rate the following year. Because of these issues, Lakonishok , Shleifer and Vishny (1994) suggest using average portfolio earnings across all formation periods as a base to calculate growth. We will illustrate our procedure for calculating growth rate using the case of net income growth from year -3 to year 0 relative to wide moat portfolio formation. For average net income for base year 0, we average the net income of all wide moat firms during year 0 across all the nine formation periods (from 2003 to 2011). We do the same for year -3. The geometric average annual growth rate is then calculated from year -3 to year 0, based on the average net income for year -3 and year 0 just obtained. We do the same for the other growth rates.

III. Empirical Results and Implications

A. Raw Return of Portfolio by moat

<Insert Table 1 about here>

Table 1 reports the raw returns of portfolios based on moat ratings by calendar year as well as the time-series average returns of the three moat portfolios. At first glance, the results are surprising. The no moat portfolio delivers the best average returns, followed by stocks with narrow moat. Stocks with wide moat have the worst average returns. The arithmetic average return is 21.3 percent for the no moat portfolio, 14.4 percent for the narrow moat portfolio and only 11.2 percent for the wide moat portfolio. The geometric average (compounded return) is 14.9 percent, 11.6 percent and 9.5 percent, for portfolios of no moat, narrow moat and wide moat, respectively. The difference between arithmetic and geometric average return is largely due to the higher time-series variation of average returns for no moat and narrow moat portfolio. The wide moat portfolio underperforms the no moat portfolio in six out of the nine years in our sampling period. To illustrate, $1 invested in a wide moat portfolio at the beginning of 2003 and rebalanced each year became $2.27 at the end of 2011 while $1 invested in a no moat portfolio became $3.5.

B. Anatomy of "superior returns" of no moat stocks

B.1 Extreme returns

The superior raw return of no moat stocks are driven by a few extreme performances of microcap stocks. For example, the best performer of no moat stock saw its stock price dropped below $1 and failed to meet the minimum market capitalization requirement set by NYSE in late 2008, but during the next 12 months produced the best annual returns in our sample, 2,249.5 percent.[13] All eight observations with annual returns higher than 1,000 percent were no moat stocks in 2009. Their highest price at the end of fiscal 2008 was $2.12, with an average price of $0.82, and the lowest price of $0.21. For observations with annual returns higher than 100 percent, 404 are no moat stocks, 141 are narrow moat stocks, and only 18 are wide moat stocks. If the portfolio excludes those observations with returns higher than 100 percent, the geometric average return for the no moat portfolio drops to 5.5 percent, lower than the 8.9 percent geometric average return for wide moat portfolio. On the downside, 32 of the 35 losses worse than negative 90 percent happened in 2008. Of losses worse than negative 90 percent, only one is a wide moat firm.

The distribution of annual returns for no moat stocks is more asymmetric than returns for wide moat stocks. As reported in Table 1, the difference between mean and median is larger for no moat stocks, which is an indication that the average return of no moat stocks is skewed by the extreme high return at the far right tail of the distribution. The difference between mean and media for no moat stocks is around 10 percent, while the difference for wide moat stocks is only about 3 percent. Because of that, the difference of the median between no moat and wide moat stocks is only 2.7 percent, far less than the 10 percent difference between the mean. The no moat stock return distribution by year has a larger standard deviation, a higher degree of skewness and kurtosis than the wide moat stocks in general, and, particularly, in 2009.

The implication for investors is that buying an average no moat stock does not guarantee a higher return. Only buying the complete no moat portfolio allows investors to capture the very few exceptional

[13] Dollar Thrifty Automotive Group Inc., stock price was $23.68 on Dec 31, 2007, $1.09 on Dec 31, 2008, and $25.61 on Dec 31, 2009

high returns. Additionally, to capture the extreme returns of no moat stocks, investors would be required to rebalance their portfolio every year.[14]

B.2 Risk by traditional measures

Figure 1 shows the time-series fluctuation of wide moat and no moat firms. Although a portfolio of wide moat stocks underperforms on average, it does outperform during bad years (bear market). In 2008, wide moat stocks lost only 30.9 percent, compared with a 45.2 percent loss of no moat stocks. Lakonishok, Shleifer, and Vishny (1994) suggest that during bad years, the marginal utility of wealth is high and high risk stocks would be less attractive to risk-averse investors. The underperformance of no moat stocks during bad years suggests no moat stocks might carry higher risk.

<Insert table 2 about here>

In Table 2 Panel A, we present evidence that the wide moat portfolio has lower risk by traditional measures. Following Lakonishok, Shleifer, and Vishny (1994), we use the time-series annual return of each portfolio to calculate its annual standard deviation and beta. To calculate beta, we use the value-weight CRSP index annual returns as the market return and the one-month T-bill return from the Fama and French Database. Compared with wide moat stocks, the no moat portfolio has a much higher beta and standard deviation. The wide moat portfolio has a beta less than 1 and an annual standard deviation of 19.2 percent, while the no moat portfolio has a beta of 1.77 and an annual standard deviation of 40.2 percent. The Sharpe ratio of the wide moat portfolio is 0.49, which is slightly higher than the no moat portfolio.

B.3 The risk of losing money

In an imperfect world, the risk for investors might not just be beta or standard deviation. For example, some investors consider "risk is – first and foremost – the likelihood of losing money" (Marks, 2011, p. 36). The no moat stocks have a higher chance of losing money in our sampling period. On average, no moat firms lost money (had a negative annual return) 44 percent of the time, while wide moat stocks lost money only 37 percent of the time.

[14] For example, an investor who holds the no moat stock of the company Dollar Thrifty Automotive Group Inc. for two years from 2008 to 2009 without rebalancing will have total return of 8.2%, when the price changes from $23.68 by the end of 2007 to $25.61 by the end of 2009. However, an annual rebalancing strategy would require the investor to increase the weight of the company in 2009 more than 20 folds when stock priced drop to $1.09 by the end of 2008 to significantly benefit from the 2249.5% appreciation in 2009.

C. Size and Book-to-market Effects?

Although the results initially seem to be a blow for believers of sustainable competitive advantage, they may be consistent with empirical literature in finance. Companies with a wide moat are normally larger and have a lower book-to-market value. Companies are not born with sustainable competitive advantages. The competitive advantage often grows when the firm grows its size, takes market share, and becomes dominant in its industry. Such a company is also likely to a have better financial performance, which could lead to higher stock valuation as measured by the low book-to-market ratio.

Fama and French (1992) suggest that size and book-to-market ratio are the two most important dimensions that explain the cross-sectional variation of stock returns. Big firms and firms with lower book-to-market ratio (growth firms) have lower average returns.

Table 2 Panel B compares the size and book-to-market ratio among firms before the formation of portfolios with different moat ratings. Stocks with no moat have an average market value of $4,736 million, while stocks with narrow moat have an average market value of $14,616 million and stocks with wide moat have an average market value of $44,107 million. On average, stocks with wide moat are almost ten times bigger than stocks with no moat, measured by the market value.

Stocks with wide moat also have lower book-to-market ratio. The average book-to-market ratio for no moat stock is 0.57, for narrow moat stock is 0.46, and for wide moat stock is 0.31.

Table 2 Panel B also reports the percentage of firms that are big or growth firms for different moat ratings. Stocks that have a market valuation higher than the 50th percentile breakpoint at the end of December of previous year before portfolios formation are classified as big firms, and lower than the 50th percentile breakpoint are classified as small firms. Stocks with book-to-market ratio lower than 30th percentiles are classified as growth stocks, and stocks with book-to-market ratio higher than 70th percentiles are classified as value stocks. 94 percent of wide moat stocks are big stocks, compared with only 47 percent for no moat stocks. Wide moat stocks are also more likely to be growth stocks. 74 percent of wide moat stocks are growth stocks, while only 34 percent of no moat stocks are growth stocks.

To control for size and book-to-market effect, we use Fama and French (1992) approach in the informal test. We split our sample into one-dimensional deciles by size or by book-to-market ratio. This one-dimensional approach should help to reduce the size or book-to-market effect, but it won't eliminate them.

<Insert Table 3 about here>

Table 3 demonstrates the stock returns and other characteristics for portfolios formed on a one-dimensional sort of size. Panel A reports the distribution of observations, and each observation represents one year for a firm. Wide moat and narrow moat firms are concentrated in bigger size deciles. 54 percent of wide moat firms are in the largest size decile (decile 10). Panel B demonstrates that although wide moat firms still are larger than no moat firms in each decile, the difference is very small (except decile 10, the largest size decile), suggesting that the moat is not a reclassification of size in each decile. However, Panel C shows wide moat firms still have a much lower book-to-market ratio than no moat firms. Clearly, the one-dimensional sort by size reduces the size effects but fails to control for book-to-market effects. Panel D reports average stock return. Although wide moat stocks for most size deciles still have lower returns than no moat firms, the difference is smaller now. In fact, wide moat stocks now have higher returns in decile 2 and decile 7. Panel E reports median stock returns. It is worth noting that the median return for wide moat stocks is higher than the median return of no moat stocks in most deciles. Overall, Table 3 suggests that after controlling for size, the return difference between wide moat and no moat stocks become smaller. Panel D also confirms on average that there is a negative relation between size and stock return. However, most of the higher returns are concentrated in the smallest three deciles. Banz (1981) also find that the small size effect occurs only for very small firms while there is little difference in return between average sized and large firms.

<Insert Table 4 about here>

Table 4 attempts to control for book-to-market effect by allocating stocks with positive book value to ten book-to-market deciles, and allocates stocks with negative book value to the book-to-market negative portfolio. Besides controlling for the common risk factor, there is another reason to control for book-to-market ratio. Wide moat investors might argue that people should not just buy wide moat stocks, but they should do so only when stocks are cheap. It is interesting to see whether "wide moat" stocks with cheap valuation, those in the higher book-to-market ratio deciles, have better stock performance.

Panel A reports the distribution of observations. Narrow moat firms, and especially wide moat firms, are distributed towards growth firms. 41 percent of wide moat firms are in the lowest book-to-market decile. According to Panel C, we are able to control for book-to-market effects very well except for the two highest book-to-market (value firms) deciles. However, Panel B suggests wide moat firms are much larger than no moat firms under this one-dimensional sort by book-to-market ratios. In most low book-to-market (growth firms) deciles, wide moat firms are often ten times bigger than no moat stocks. Panel D

shows that the one-dimensional sort by book-to-market ratios still effectively lowered the return differences between no moat and wide moat firms. However, wide moat stocks still underperform no moat stocks except for decile 6. Wide moat stocks with cheap valuation (higher book-to-market ratio from decile 7 to decile 10) underperform the no moat stocks with similar book-to-market ratios. Buying wide moat stocks when they are cheap does not change the underperformance of wide moat stocks. Panel E reports median stock returns. The median return for wide moat stocks is higher than the median return of no moat stocks in six out of eleven book-to-market groups. Panel D also suggests that the general positive relationship between book-to-market value and stock return is non-linear in our sample. The return of value stock is dominated by the decile with the highest book-to-market value and those with negative book value.

Overall, the one-dimensional control of size or book-to-market effect was able to reduce the underperformance of wide moat stocks compared with no moat stocks. The results strongly suggest removing both size effect and book-to-market effect would reveal the real impact of moat on stock performance. We address this in the formal regression tests. [15]

D. Fama-Macbeth regression

In the formal test, we use Fama-Macbeth regressions to test the statistical relationship between moat and stock return while controlling for factors that are well documented to be related to risk or anomalies. These variables include size, book-to-market ration, beta, earnings yield, and leverage.

<Insert Table 5 about here>

Table 5 reports the results from the Fama-Macbeth regressions. ME is the market value of common equity, denominated in millions of dollars. Ln(ME) is the natural log of firm size ME. Ln(BM) is the natural log of book-to-market ratio. Book-to-market ratio is the ratio between the book value of common equity and the market value of common equity. If earnings are positive, E+/P is the ratio of total earnings to ME, and the E/P dummy is 0. If earnings are negative, E+/P is 0, and the E/P dummy is 1. A/BE is the ratio of total assets to book value of common equity. A/BE is an equity multiplier and measures leverage.

[15] A two-dimensional sort by both size and book-to-market deciles and then by moat ratings (not reported here) was also performed to try to control for both size and book-to-market effects simultaneously. However, some of the intersections among size, book-to-market and moat had just one observation and made the results not meaningful.

Ln(A/BE) is the natural log of A/BE. Moat is a dummy variable that is 1 if the moat rating is wide moat and 0 if the moat rating is no moat. All variables, including book value of common equity, market value of common equity, total earning, and total assets are obtained from COMPUSTAT and measured at the end of previous fiscal year. We calculate individual stock beta from the market model using daily stock return from day -250 through day -1, preceding the formation of the moat portfolio each year. We use the daily CRSP value weighted return as the market return. We used various alternative methods to estimate beta, and the regression coefficient of beta is similar.

We run the regression for each calendar month, and then use the empirical derived time-series standard deviation of the slope to calculate the t-statistics. From January 2003 to December 2011, we run 108 regressions, which resulted in 108 observations of slope for each independent variable. Table 5 shows the time-series average of the slopes and t-statistics from the regressions.

Table 5 model 1 shows that when moat is the only independent variable: it is negative with a t value of -1.71 and is consistent with the previous analysis that wide moat stocks have lower raw returns. The coefficient is -0.63 percent, suggesting wide moat stocks underperform no moat stocks by an average of 0.63 percent monthly, which is about 7 percent annually and consistent with the previous results.

We also tested the explanatory power of other independent variables separately or combined (not reported here). Overall, these results are consistent with Fama and French (1992) when their sampling period is 1963 to 1990.

Next, we combine moat with these variables to analyze the real impact of moat when firm characteristics are controlled. In the regression of stock returns on size and moat (model (2)), the monthly average slope for moat now becomes positive at 0.11 percent with an insignificant t-statistic of 0.41. When regressing on book-to-market ratio (LnBM) and moat (model (3)), the average monthly slope of moat is still negative, but the absolute value of the slope and t-value both drop. The slope is -0.22 percent with t-value of -0.69. Those results are consistent with Table 3 and Table 4 when we use the one-dimensional sort on either size or book-to-market ratio. Both regressions and the average return by decile confirm that if we control for size or book-to-market ratio, the underperformance of wide moat stocks is reduced. In model (4), we include both size and book-to-market with moat as the independent variables. After controlling for both size and book-to-market effects, moat now shows a positive slope of 0.24 percent, with a t-statistic of 0.83. Further, in model (5), we include all independent variables including moat. The slope of the moat remains positive at 0.24 percent, with a t-statistics increasing to 0.94.

Overall, after controlling for size, book-to-market and other risk related variables, the slope of the moat is positive but not statistically significant. The lack of significance for moat variable could be related with the short sampling period and smaller number of monthly portfolio when we calculate t-statistics based on the time-series variation of slopes for each month. We address this later in section VI, which significantly extends sampling period.

IV. Moat and financial performance

"Standard economic arguments say that in a competitive environment, profitability is mean reverting" (Fama and French (2000), p. 174); yet, this statement begs the question of whether stocks with a "wide moat" are immune to the general rule of profitability mean reverting. In this section, we investigate the persistence of financial performance of companies with different moat ratings.

A. Mean reverting of Profitability

<Insert Table 6 about here>

Table 6 shows the average change of profitability and growth rate before and after a firm is assigned to moat portfolio. Panel A reports profitability changes. Profitability ratios of year 0 are measured at the end of the previous fiscal year before the formation of moat portfolio. Panel A says wide moat stocks are financially stronger firms with higher profitability when they assigned to wide moat portfolio. They have higher operating margins, profit margins, and returns on equity. Wide moat firms have an average operating margin of 21.7 percent, profit margin of 11.1 percent and return on equity of 17.7 percent. On the other hand, no moat firms have an average operating margin of 7.5 percent, profit margin of 2.0 percent and return on equity of 4.4 percent. Narrow moat firms have an average profitability between wide moat and no moat firms.

Panel A also reports the average profitability of firms up to three years after assignment to a moat portfolio. The key finding here is that firms with a wide moat are able to defend their high profitability and avoid mean reversion. After all, the essential idea of wide moat is a defense against competition from erosion of high profitability. The average operating margin for no moat firms improves from 7.5 percent to 8.6 percent after three years. The average profit margin for no moat firms improves from 2.0 percent to 3.5 percent after three years, and return on equity almost doubles from 4.4 percent to 8.1 percent. Although there seems to be a mean reversion of profitability for no moat firms, there is no sign of mean reversion for wide moat firms. The average profit margin remains at 11.1 percent three years later, the operating margin decreases slightly from 21.7 percent to 20.6 percent, and the average return on equity

decreases from 17.7 percent to 16.2 percent. The operating margin, profit margin, and return on equity of wide moat firms are consistently much higher than no moat firms up to three years after formation of the moat portfolios.

Fama and French (2000) calculate that the estimated average rate of mean reversion of profitability is about 38 percent per year. They also find that mean reversion is faster when profitability is below its mean and when it is further from its mean in either direction. The mean reversion is obvious with no moat firms. However, the wide moat firms seem protected from the erosion of high profitability by its defense—the moat.

B. Pre and Post-formation Growth Rate of Sales and Net income

Table 6 Panel B compares the past and future growth rate of fundamentals for wide moat and no moat firms. For the geometric average growth rate of sales and net income during the three preformation years, wide moat firms are higher than no moat firms. However, no moat firms exhibit a rise of sales and a sharp rise of net income growth rate during the three post-formation years. Average sales growth rate for no moat firms increases from 3.9 percent to 4.7 percent, while net income growth rate jumps from -7.4 percent to 27.6 percent. For wide moat firms, there is no obvious slowing down of growth during the three post-formation years. Sales growth rate declines from 6.9 percent to 5.3 percent, but net income growth rate increases from 5.0 percent to 5.4 percent. Narrow moat firms exhibit a reversal of both sales growth rate and net income growth rate. The average sales growth rate for narrow moat firms declines from 8.4 percent to 6.1 percent, while the average net income growth rate declines from 10.1 percent to 3.9 percent. Overall, it seems there is a strong mean reversion of growth rate of fundamentals for no moat firms, but not for wide moat firms.

V: Objective Moat Rating and Sustainability of Profitability

A caveat with the analysis in the prior sections is that the measure of moat provided by Morningstar is based on undisclosed models using unknown qualitative and quantitative variables, which may or may not reflect sustainable competitive advantages. This measure is only available since 2002, which casts doubts on the generalization of the results. Any conclusion of stock performance based on a short period may only have limited value. Cycles during which small or value stocks outperform big or growth stocks can last for a long period of time. So could be the stock performance of firms with wide moat, because they are relatively larger and have higher valuation than no moat firms.

In the first part of this section we attempt to identify observable characteristics that determine a firm's moat. We then use these observable characteristics to identify wide moat for a larger universe of firms in the period 1964-2011. In the second part of this section we investigate whether the classification of moat used in our study reflects a firms' sustainable competitive advantage. In Section VI we test the robustness of our main findings by replicating the analysis in section IV for a sample consisting of all firms in non-regulated industries with information in the CRSP and COMPUSTAT databases during the period 1964-2011.

A. The Determinants of Moat

The goal of this section is to construct a parsimonious model to identify firms classified as wide moat by Morningstar analysts. The building blocks of the model are observable firm characteristics that are likely to affect a firm's competitive position. For simplicity in the exposition, and because the main goal of the study is to explore whether wide moat stocks outperform non-wide moat stocks, in this section we classify firms in only two groups: wide moat and non-wide moat firms. We exclude from the analysis financial firms and firms in industries that were regulated during a substantial part of the period of study.

We include firms' size and profitability in the model as proxies for firms' competitive position and performance. Because the distribution of public firms has changed over the period of study, with smaller firms going public in the later years of the analysis, instead of using a continuous measure of size we include the qualitative variable *Lag Large* to identify firms with total assets above the 75th percentile of all firms in the COMPUSTAT database in the fiscal year prior to the Morningstar assignment of a moat rating. We also include *Lag Profitability,* which equals 1 if the firm has above industry profitability for each one of the prior three years; we classify each firm in one of the 49 industries in Fama and French (1997). A firm's profitability can be predicted, at least partially, for the firm's Tobin's Q and its status as dividend payer (i.e. Fama and French 2000). *Lag Tobin's* is the average of the Tobin's Q over the three years prior to the assignment of the moat.[16] *Lag Dividend Dummy* equals 1 if the firm has paid dividends in each of the three years prior to the reporting of the moat. *Lag Sales Growth*, the average of the growth in sales in the prior three years, is included in the model as a proxy for growth opportunities. We also include *Lag CAPEX,* the average of the ratio of capital expenditures to firm sales during the three years

[16] Tobin's Q, is computed as the book value of assets plus the market value of common equity less the sum of the book value of common equity and balance sheet deferred taxes, divided by the book value of assets. This is the definition used, among others, by Kaplan and Zingales (1997) and Desai and Dharmapala, (2009).

before the assignment of moat, because the level of capital requirements can act as a barrier to entry, protecting the firm from external competition (e.g. Lev, 1985).

Morningstar proposes that a firm's competitive position is likely to depend on switching costs for customers, network effects and strong brands or long-lasting patents. It is difficult to assess these intangibles with accuracy, which is likely to diminish the power of our models in identifying moat. We investigate several measures used in prior literature as proxies for the value of intangibles: the ratio of intangible to total assets, and the ratios of R&D and advertising to sales (e.g. Chan, Lakonishok and Sougiannis, 2001). In non-tabulated results, we find that the level of R&D and advertising do not add explanatory power to our model. The results are not altered if we include all the proxies, but for the sake of parsimoniousness, we include only the variable *Lag Intangible to Assets,* the average of the ratio of intangible to firm asset in the three years prior to the assignment of moat. Other variables were considered in alternative models, but they were excluded from the analysis for their lack of statistical significance.[17] The final model estimated in this section is the following:

$$\textit{Wide moat} = \upsilon_0 + \upsilon_1 \textit{Lag Profitability} + \upsilon_2 \textit{Lag Large} + \upsilon_3 \textit{Lag Tobin's Q} + \upsilon_4 \textit{Lag Intangibles} + \upsilon_5 \textit{Lag CAPEX} + \upsilon_6 \textit{Lag Dividend Dummy} + \upsilon_7 \textit{Lag Sales Growth} + £ \quad (1)$$

As in Fama and MacBetch (1973), we estimate this model for every year and compute the average slope of the regressions; *t*-values are computed using the time-series standard errors of the average slopes.

<Insert table 7 about here>

The results in Table 7 indicate that firms with profitability above industry median for the last three years, large firms, firms with higher levels of Tobin's Q, higher level of intangibles, and firms that have paid dividends in the prior three years are more likely to be assigned a wide moat rating by Morningstar. Contrary to the predicted positive sign, the coefficient of *Lag CAPEX* of capital expenditures is negative. Firms with higher levels of sales growth are also less likely to be assigned a

[17] We investigate the degree of competition by the Herfindahl-Hirschman index (HHI), measured by the degree of concentration of a firm's sales. We also investigate the HHI as s dummy variable that equals 1 if the HHI is more than 1800 as the Department of Justice Merger Guidelines (49 Federal Register 26, 823), which suggest that HHI of more than 1800 identifies high concentration industries. These two measures of competition lack statistical significance. We examined the inventory turnover ratios and the level of operating leverage as proxies for negotiating power over suppliers (Petersen and Rajan, 1997; Nissim and Pennan, 2001), as well as the receivable turnover as proxies for the bargaining power over customers. These proxies also show lack of explanatory power.

wide moat rating, perhaps because these firms are in the early growth stage of their product life cycle.

We investigate the power of our model to identify firms classified as wide moat by Morningstar. We first calculate the value of the predicted log-odds ratio of model (2).

$$E(\text{Wide moat}) = 5.7050 + 1.1417\text{Lag Profitability} + 1.2642\text{Lag Large} + 0.6702\text{Lag Tobin's Q} + 1.9883\text{Lag Intangibles} - 2.4736\text{Lag CAPEX} + 1.0123\text{Lag Dividend Dummy} - 1.1066\text{Lag Sales Growth} \quad (2)$$

We then compute the expected probabilities as $e^{E(\text{Wide moat})}/(1+ e^{E(\text{Wide moat})})$ and contrast them with the Morningstar classification of moat. We find that the percentage of cases correctly classified is maximized when the predicted probabilities are more than 10%, a cut-off point that coincides with the proportion of firms with wide-moat in our sample. We find that, in spite of the difficulty to measure unobservable intangibles, investors using publicly available information embedded in our model could have correctly identified 78% of the firms that Morningstar analysts classified as wide-moat firms.[18] In section VI we use equation (2) to identify wide moat firms in the period 1964-2011.

B. Moat and Mean Reversion

We now investigate whether firms identified as wide moat sustain abnormally longer periods of profitability, a measure of sustainable competitive advantages. We follow the analysis of the predictability in profitability implied by mean reversion in Fama and French (2000). We use a two-step approach to estimate the following cross-sectional partial adjustment regression for changes in profitability:

$$Y_{t+1}/A_{t+1} - Y_t/A_t = a + b[Y_t/A_t - E(Y_t/A_t)] + + c[Y_t/A_t - Y_{t-1}/A_{t-1})] + e_{t-1} \quad (3a)$$

$$CP_{t+1} = a + bDFE_t + cCP_t + e_{t-1} \quad (3b)$$

Where Y_t/A_t is the return in assets; A_t is the total book of assets and Y_t is the earnings before interest and taxes, plus interest expenses, plus deferred taxes and investment tax credits. $E(Y_t/A_t)$, the expected profitability, is obtained by the fitted value of Y_t/A_t estimated in a first stage cross-sectional regression:

$$Y_t/A_t = d_0 + d_1V_t/A_t + d_2DD_t + d_3D_t/BE_t + e_{t-1} \quad (4)$$

Where D_t are the dividends paid during fiscal year *t*. DD_t is a dummy variable that equals 1 when the firm does not pay dividends and 0 for dividend payers. V_t is the total market value of the firm's common stock,

[18] We also use discriminant analysis to classify firms into wide and non-wide moat. The linear discriminant functions from this analysis do not improve the accuracy of the classification using logistic regression analysis: 71.25% of the wide-moat firms 74.21% non-wide moat firms were correctly classified.

plus total assets (A_t) minus the book value of equity (BE_t). BE_t is computed as a firm's assets, minus total liabilities, minus preferred stock (measured by the redemption, liquidating or par value, by this order), plus the balance sheet of deferred taxes and investment tax credit. To contrast our results with those in Fama and French (2000), we perform the analysis for all firms in the COMPUSTAT database, starting in the year 1964. Financial firms (3-digit SIC = 600-699) and utilities (3-digit SIC = 481 and 491-494) are excluded because they may exhibit abnormal behavior in profitability during part of the period of study.

<Insert table 8 about here>

For clarity in the presentation, we only report the estimation of the second stage of the partial adjustment models in Table 8. Panel A reports the analysis using the Morningstar classification of moat. The average slope of Y_t/A_t is -0.3823 and statistically significant.[19] This coefficient is similar to the results in Fama and French (2000) and provides strong evidence of mean reversion, which in our sample is about 38% per year. The negative coefficient of CP_t, indicates that lagged change in profitability provides additional explanation to the negative autocorrelation in changes in profitability.

In models specifications (3) and (4) we interact the variables in model (1) and (2) with dummy qualitative variables that identify wide moat (Y_t/A_tWM) and non-wide moat (Y_t/A_tNWM). In model (3), the coefficient of Y_t/A_tWM is -0.2135 and not reliable, whereas the coefficient of Y_t/A_tNWM is negative (-0.3663) and more than 3 standards errors from zero. Similar estimates are reported in model (4). Thus, the rate of mean reversion of profitability per year is 10% to 15% lower for wide-moat than for non-wide-moat firms.

Similar results are reported in Panel B of Table 8, when we use Equation (2) to identify wide moat firms in the period 1964-2011. The rate of mean reversion is around 30% per year. The coefficients of Y_t/A_tNWM and Y_t/A_tWM are negative and statistically significant, indicating that both, wide and non-wide moat firms experience mean reversion. However, the rate of reversion in profitability is 13% to 17 % larger for non-moat firms than for wide moat firms, depending on the model specification.[20]

[19] We require that the t-statistics around 2.8 to infer reliability because the first order autocorrelations are about 0.5 and the variances of the slopes are too small by about 50%. We also *calculate t*-values and levels of significance based on the adjustment by the Newey-West's estimator.

[20] Brooks and Buckmaster (1976) show evidence of strong reversal in earnings for extreme values of earnings and when the changes in earnings are negative. Fama and French (2000) report a similar finding in the reversal of profitability. We analyze the present of non-linearity in the autocorrelations of changes in ROA. In untabulated results, we find that mean reversion is stronger for negative changes in earnings and for extreme values, but there is

These results indicate that both wide and non-wide firms experience mean reversion in earnings, but the profitability of wide moat firms declines at a significantly lower rate towards the mean. In untabulated results we find that, on average, 79% of wide-moat firms have a ROA above the industry median ROA; 45% of these firms have above industry ROA in each of the subsequent 5 years and 25% in each of the subsequent 10 years. In the sample of non-wide moat firms, only 49% show above the industry median ROA; 18% sustain above industry profitability during the subsequent 5 years, and only 6% of these firms have above industry median ROA in a period of 10 years.

In the next section we investigate the performance of wide and non-wide firms using our classification of moat.

VI. Objectively Rated Moat and Stock and Financial Performances

In this section, we study the stock performance and financial performance of wide moat firms identified by these objective measures. In section V, we assign "wide moat" or "non-wide moat" ratings to firms by the end of each year from 1964 to 2011. We rebalance the "wide moat" portfolio and "non-wide moat" portfolio each year. We investigate the post formation stock performance and financial performance from 1965 to 2012.

A.1. Moat and Stock Return, Preliminary Tests

<Insert table 9 about here>

Consistent with our results using Morningstar sample from 2003 to 2011, Table 9 shows that wide moat firms measured by objective metrics have lower raw returns from 1965 to 2012. Wide moat portfolio has an arithmetic average return of 10.6% while non-wide moat portfolio has 17.9%. In section III, we reported 11.2 percent and 21.3 percent arithmetic average return for Morningstar wide and no moat portfolios, respectively. The compounded average return for wide moat firm is 8.8 percent and for non-wide moat firm is 14.9 percent, compared with 9.5 percent for wide moat and 14.9 percent for no moat portfolio using Morningstar rating. Table 9 also reports that wide moat portfolio has lower beta and lower standard deviation. Figure 2 illustrates the smaller time-series fluctuation of wide moat firms' returns.

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no significant differences between moat and non-moat firms. The difference between the coefficients of *Yt/AtNWM* and *Yt/AtWM* shrinks to 10%, but these coefficients are significant at the 1% level.

Traditional asset pricing models have difficulty explaining stock returns of small firms or penny stocks. These stocks could be driving the higher raw returns of the non-wide moat portfolio. In panel B of Table 9, we excluded small stocks and penny stocks from both wide and non-wide moat firms. Small stocks are defined as the smallest size decile stocks of that year. Penny stocks are stocks with end of fiscal year price lower than $2. Excluding those stocks decreases non-wide moat portfolio average return for about 2 to 3 percent, while increases wide moat portfolio return for about 1 percent. Still there is about 3 percent difference between average return of wide moat and non-wide moat stocks. In panel C of Table 9, we also report the average holding period return for up to five years. Wide moat underperforms non-wide moat for each holding period.

Table 9 Panel A also reports characteristics of objectively rated "wide moat" and non-wide moat firms. Similar to the Morningstar sample, wide moat firms are much larger than non-wide moat firms, with lower book-to-market ratio. 67 percent of wide moat firms are classified as big firms and 80 percent of wide moat firms are growth firms. The absolute size of both wide moat and non-wide moat firms are smaller than Morningstar sample because Morningstar data covers only recent years and firm size in general gets larger over time.

<Insert Table 10 and 11 about here>

Table 10 and 11 report stock returns and other characteristics for moat portfolios formed on a one-dimensional sort of size or book-to-market ratio. Table 10 shows that the average returns of wide moat firms are still lower for each size deciles after controlling for size factor, but the difference between wide moat and non-wide moat is much narrowed for bigger size deciles. For the biggest size decile, wide moat firms have an average return of 11.1 percent, while non-wide moat firms have an average return of 11.5 percent. When we control for book-to-market ratio in table 11, wide moat firms actually outperform for decile 6, 7 and 9. The median returns for wide moat firms are actually higher for most of the deciles. Our results in general are consistent with results reported in Section III with Morningstar sample and suggest that size and book-to-market factors are driving the higher return for non-wide moat stocks.

In Table 10 panel C indicates that controlling for size, wide moat firms have much lower book-to-market ratio for all size deciles. Similarly, Table 11 Panel B indicates that controlling for book-to-market ratio, wide moat firms are much bigger for all book-to-market deciles. To better control for both size and book-to-market ratio, we analyze three different matching procedures.

a. For every wide moat firm/year we find the non-wide moat firm (or no moat firm for Morningstar sample) that is closer in market capitalization.
b. We repeat the matching procedure by book-to-market ratio.
c. In a third analysis we match using both size and book-to-market ratio.

In the third approach we follow the matching methodology used by Fernando, May and Megginson (2012). For every wide moat firm/year we find a non-wide moat firm such that the sum of the absolute percentage differences between the sizes (market value of equity) and book-to-market ratios of the sample firm and matched firm is minimized.

<Insert Table12 about here>

The results of matching, summarized in Table 12, are very revealing. After matching with a no moat firms with similar size and book-to-market, Morningstar wide moat firms actually outperform their matches from 2003 to 2011. Table 12 Panel A reports that the average annual return for Morningstar wide moat firms is 9.2 percent, higher than the 8.0 percent average annual return of no moat firms matched by size and book-to-market. Panel B reports the average annual return for our objectively rated wide moat firms and their matches. Matching by size and book-to-market reduces the spread between wide moat firms and non-wide moat firms. Average return for wide moat firms is 10.7 percent, for their non-wide moat matches is 12.3 percent. Overall, when we use one dimensional sort by size or by book-to-market, or match wide moat firms with size and book-to-market simultaneously, the underperformance of wide moat firms are diminishing. Sometimes, wide moat firms even outperform for some deciles or for some matching method. However, there is limitation of sorting or matching method. They cannot control for size and book-to-market precisely. Within each size decile, wide moat firms still have lower book-to-market ratio. Within each book-to-market decile, wide moat firms have much larger size. When matched by size and book-to-market, wide moat firm are still larger and have lower book-to-market ratio. Next, we use Fama-Macbeth regression to better control for size, book-to-market ratio and other factors that have been found to affect cross-sectional stock returns.

A.2. Fama-Macbeth Regression

<Insert Table 13 about here>

Table 13 reports the results of Fama-Macbeth regression that we detailed in Section III, D. In terms of coefficient of independent variables, our regression results for 1965 to 2012 are very similar to the regression results in Table 5 when sampling period is from 2003 to 2011. When moat is the single

independent variable (model (1)), the average slope is -0.44 percent, indicating an annual underperformance of wide moat firms for about 6 percent compared with non-wide moat firms, confirming our prior results in Table 9. When regressing on moat and size (model (2)), the slope of moat becomes almost 0 and size has a very significant slope of negative 0.17 percent. When regressing on moat and book-to-market ratio (model (3)), the slope of moat becomes positive, but insignificant. When we put moat, size and book-to-market ratio together as independent variables (model (4)), the slope of moat becomes significantly positive at 0.25, with t value at 2.81. It suggests that after controlling for major risk factors, on average wide moat firms have 0.25 percent higher monthly stock return than non-wide moat firms. It is clear that after controlling for size and book-to-market effect, sustainable competitive advantage measured by moat is a positive factor explaining cross-sectional stock return. The slope is about the same when we use just Morningstar short sampling period. However, by extending to a much longer period, we have more power to detect the significance of moat. Finally model (5) reports the regression results when we include more variables. Moat is still positive and significant after controlling for those factors.

B. Moat and Financial Performance

We duplicate studies in Section IV to study the profitability mean reverting of wide moat firms measured with objective variables.

<Insert Table 14 about here>

Table 14, panel A shows that wide moat firms have higher margins and return on equity. Wide moat firms also have higher market-to-book ratio. Panel B confirms that firms with a wide moat are able to defend their high profitability and avoid mean reversion. Wide moat firms consistently have higher profitability than non-wide moat firms three years after portfolio formation. There is a slight downward trend of return on equity for wide moat firms, declining from 18.7 percent at year 0 (measured at the beginning of portfolio formation) to 17.2 percent. But operating margin and net profit margin are holding up very well during the three post formation years. None-wide moat firms see their lower profitability revert upward a little for the three years following portfolio formation. Panel C shows wide moat firms have higher growth rate of sales and net income during the three pre-formation years than non-wide moat firms. The growth rate of wide moat firms slows down during post formation period. Non-wide moat firms have higher sales and net income growth rate than wide moat firms during the three post-formation

years. These results are similar to results from Morningstar samples. Overall, wide moat firms show relative consistent higher profitability and slower profitability mean reverting. The conclusion confirms our findings in Table 9 when we use Fama and French (2000) profitability mean reverting regressions method.

VII. Conclusion

We asked three questions at the beginning of the paper: 1) Do firms with wide moat have higher raw returns on average? 2) Do they have higher risk-adjusted returns? 3)Is the high profitability of wide moat firms better shielded from the general principle of profitability mean reverting than non-wide moat firms?

The answer to the first question is no. The compounded annual return of the wide moat portfolio is more than 6 percent lower than the none-wide moat portfolio from 1945 to 2012. For investors looking for absolute return, holding a portfolio with a wide moat will be disappointing. The answer to the second question is yes. Wide moat portfolio strategy is oriented towards growth and large market capitalization strategy. Wide moat firms are larger, and have lower book-to-market ratios, and such firms tend to have lower stock return. However, after controlling for factors that affect cross-sectional variation of stock returns (Table 13), wide moat is a significant positive factor describing cross-section of average returns. Model 4 of Table 13 suggests that, on average, wide moat firms have 0.25 percent higher monthly stock return than non-wide moat firms. The answer to the third question is also yes. Wide moat firms have consistently higher operating margin, profit margin, and return on equity than non-wide moat firms three years after portfolio formation. The speed of reverting to mean is much lower for wide moat firms. Our result is difficult to reconcile with risk-based explanations. The wide moat portfolio has lower time-series standard deviation and beta. It is difficult to contribute the positive excessive stock return of wide moat to higher risk. It is possible that moat, which captures sustainable competitive advantage and sustainable high profitability, is difficult to measure for average investors. If the merits of wide moat have not been fully priced in the market, wide moat firms could deliver higher return than non-wide moat firms with similar size and book-to-market ratios.

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Table 1: Raw Return and Market Adjusted Return of Wide Moat, Narrow Moat and No Moat Portfolio

This table examines the time-series performance of portfolios based on different moat ratings. From 2003 to 2011, each year we create three portfolios according to Morningstar moat ratings: 1) wide moat, 2) narrow moat and 3) no moat. The moat portfolios are created on January 1st of every calendar year based on their moat rating by the end of December from the previous year. Every portfolio is rebalanced at the end of each year. The raw return is the equal weighted annual return for the portfolio each year. The market adjusted return is the raw return minus the value weighted CRSP return. Arithmetic and geometric averages are the time-series averages of annual portfolio returns.

		2003	2004	2005	2006	2007	2008	2009	2010	2011	Arithmetic average	Geometric average
No Moat	Raw return (%)	71.1	18.6	15.1	18.4	5.2	-45.2	89.7	28.5	-10.1	21.3	14.9
	Market adj. return (%)	38.0	5.6	7.8	2.2	-2.0	-7.0	58.4	10.7	-9.0	11.6	
	Standard Deviation (%)	68.5	47.5	37.1	35.4	48.2	32.5	172.7	45.8	34.2		
	Kurtosis	3.0	10.6	1.9	7.4	12.4	3.1	66.2	11.8	0.9		
	Skewness	1.6	2.5	1.0	1.5	2.2	1.4	6.8	2.2	0.4		
	Median return (%)	50.3	10.7	10.4	15.0	-2.6	-51.3	53.6	21.8	-11.2	10.7	
	Number of firms	141	120	430	525	632	819	941	716	687		
Narrow Moat	Raw return (%)	43.2	18.0	9.9	19.5	6.7	-36.1	47.6	23.1	-2.0	14.4	11.6
	Market adj. return (%)	10.1	5.0	2.6	3.3	-0.6	2.1	16.3	5.4	-0.9	4.8	
	Standard Deviation (%)	39.7	27.7	26.3	25.5	39.0	27.9	62.5	28.1	26.0		
	Kurtosis	6.8	6.9	3.3	1.5	5.1	1.5	20.7	5.2	0.4		
	Skewness	2.0	1.1	1.0	0.6	1.5	0.5	3.1	1.2	0.0		
	Median return (%)	34.2	16.2	6.1	17.4	3.1	-36.5	35.3	20.8	-0.4	10.7	
	Number of firms	198	242	561	646	719	770	748	681	653		
Wide Moat	Raw return (%)	33.8	15.7	5.1	13.2	9.7	-30.9	34.8	14.2	5.5	11.2	9.5
	Market adj. return (%)	0.6	2.7	-2.2	-3.0	2.4	7.3	3.5	-3.5	6.5	1.6	
	Standard Deviation (%)	31.3	37.6	20.2	21.7	29.3	24.5	35.8	21.9	22.7		
	Kurtosis	6.4	15.6	0.8	0.2	3.1	0.6	1.4	0.6	0.5		
	Skewness	2.0	3.3	0.7	0.1	1.1	0.5	1.1	0.5	0.4		
	Median return (%)	27.8	9.1	4.3	13.3	7.3	-31.5	27.6	10.7	3.4	8.0	
	Number of firms	81	92	129	135	149	174	161	153	144		
Market return	CRSP Value weighted (%)	33.1	13.0	7.3	16.2	7.3	-38.2	31.3	17.7	-1.1	9.6	7.4
	CRSP Equal weighted (%)	72.6	21.7	5.6	18.8	-3.2	-43.2	64.3	25.2	-9.0	17.0	11.7
	S&P 500 with dividends(%)	28.7	10.9	4.9	15.8	5.5	-37.0	26.5	15.1	2.1	8.1	6.2

Table 2: Risk Measures and Characteristics of Portfolios with Different Moat Ratings

Panel A presents the traditional risk measures of three portfolios: no moat, narrow moat and wide moat. We use the time-series annual return of each portfolio to calculate its annual standard deviation and beta. In the calculation of beta, we use value-weight CRSP index annual return as the market return, and the one-month T-bill return from Fama French Database.

Panel B examines the size and book-to-market ratio of firms with different moat ratings. We create moat portfolios on January 1st of every calendar year based on their moat rating by the end of December of previous year. Size is the market value of common equity. The average size is the average of market value of all observations in each moat portfolio. Book-to-market ratio is the ratio between book value of common equity and market value of common equity. Average book-to-market ratio is the sum of the book value divided by the sum of market value of all observations in each moat portfolio. Both book value of common equity and market value of common equity are obtained from COMPUSTAT and measured at the end of previous fiscal year. We use Fama and French data library's U.S. Research Breakpoints to divide stocks into big/small and growth/value groups. Size breakpoint is calculated at the end of December. Stocks that have a market valuation higher than the 50th percentile breakpoint at the end of December of previous year before portfolios formation are classified as big firms, and lower than the 50th percentile breakpoint are classified as small firms.

For book-to-market breakpoints, the book value used in year t is the book equity for the last fiscal year end in t-1. Market value is price multiplied by the shares outstanding at the end of December of t-1. Stocks with book-to-market ratio lower than 30th percentiles are classified as growth stocks, and stocks with book-to-market ratio higher than 70th percentiles are classified as value stocks.

Panel A: Risk Measures

Moats	Beta	Standard Deviation	Reward-to-volatility ratio(Sharp Ratio)
No moat	1.77	40.2%	0.48
Narrow moat	1.17	24.9%	0.51
Wide moat	0.90	19.2%	0.49

Panel B: Characteristics

Moats	Average Size ($Millions)	Average book-to-market ratio	% of firms that are big	% of firms that are growth
No moat	4,736	0.57	47%	34%
Narrow moat	14,616	0.46	79%	46%
Wide moat	44,107	0.31	94%	74%
All moat	13,429	0.42	67%	44%

Table 3: Stock Return and Financial Characteristics by Moat and Size Decile

The moat portfolios are created on January 1st of each calendar year based on their moat rating by the end of December of the previous year. Size is the market value of common equity. Book-to-market ratio is the ratio between book value of common equity and market value of common equity. Average size is the average of market value of all observations in each moat portfolio. Average book-to-market ratio is the sum of the book value divided by the sum of market value of all observations in each moat portfolio. Both book value of common equity and market value of common equity are obtained from COMPUSTAT and measured at the end of previous fiscal year. We use Fama and French data library's U.S. Research Breakpoints to allocate stocks to 10 size deciles. Size breakpoint for year t is calculated at the end of the previous December. Average of all moats is a weighted average using the number of observation as the weight.

Panel A: Number of Observations											
Moats	decile1 (small)	decile2	decile3	decile4	decile5	decile6	decile7	decile8	decile9	decile10 (big)	all size
No moat	324	573	559	582	594	548	501	499	527	304	5,011
Narrow moat	44	147	234	300	386	518	640	858	995	1,096	5,218
Wide moat		5	17	20	34	57	76	133	220	656	1,218
Total	368	725	810	902	1,014	1,123	1,217	1,490	1,742	2,056	11,447
Panel B: Average Size ($millions)											
No moat	152	395	661	1,036	1,567	2,201	3,303	5,440	10,752	33,917	4,736
Narrow moat	169	437	696	1,131	1,601	2,274	3,368	5,393	11,072	51,184	14,616
Wide moat		489	753	1,117	1,647	2,225	3,210	5,455	11,675	76,164	44,107
Average of all moats	154	404	673	1,070	1,582	2,236	3,331	5,414	11,052	56,601	13,429
Panel C: Average Book-to-Market Ratio											
No moat	0.77	0.64	0.62	0.58	0.53	0.56	0.52	0.51	0.50	0.63	0.57
Narrow moat	0.51	0.56	0.52	0.48	0.49	0.50	0.48	0.46	0.42	0.46	0.46
Wide moat		0.50	0.37	0.30	0.41	0.38	0.32	0.26	0.25	0.31	0.31
Average of all moats	0.73	0.62	0.59	0.54	0.51	0.52	0.49	0.46	0.42	0.41	0.42
Panel D: Average Stock return (%)											
No moat	71.9	20.8	19.3	15.0	11.1	16.6	13.5	11.4	12.6	10.2	18.5
Narrow moat	11.2	17.0	15.6	5.9	6.9	14.7	7.6	11.5	13.7	10.1	11.1
Wide moat		29.4	10.3	13.3	2.2	14.1	16.8	9.3	8.3	8.3	9.2
Average of all moats	64.6	20.1	18.0	11.9	9.2	15.6	10.6	11.3	12.7	9.6	14.1
Panel E: Median Stock return (%)											
No moat	10.5	-1.4	3.5	5.0	4.2	9.6	8.7	6.7	8.2	10.9	6.6
Narrow moat	-21.7	12.8	6.1	3.9	2.8	9.0	6.2	10.7	12.5	11.8	9.5
Wide moat		19.2	8.6	12.0	9.4	13.1	7.1	10.9	6.6	7.2	7.8
Average of all moats	5.4	2.3	4.9	4.6	3.5	9.5	7.4	9.7	10.7	10.3	8.2

Table 4: Stock Return and Financial Characteristics by Moat and Book-to-market Decile

The moat portfolios are created on January 1st of every calendar year based on their moat rating by the end of December of the previous year. Size is the market value of common equity. Book-to-market ratio is the ratio between book value of common equity and market value of common equity. Average size is the average of market value of all observations in each moat portfolio. Average book-to-market ratio is the sum of the book value divided by the sum of market value of all observations in each moat portfolio. Both book value of common equity and market value of common equity are obtained from COMPUSTAT and measured at the end of previous fiscal year. We use Fama and French data library's U.S. Research Breakpoints to allocate stocks with positive book value to 10 book-to-market deciles, and allocate stocks with negative book value to the BM-negative portfolio. For book-to-market breakpoints, the book value used in year t is the book equity for the last fiscal year end in t-1, market value is price times shares outstanding at the end of December of t-1. Average of all moats is a weighted average using the number of observation as the weight.

Panel A: number of observations												
Moats	BM-1 (growth)	BM-2	BM-3	BM-4	BM-5	BM-6	BM-7	BM-8	BM-9	BM-10 (value)	BM-negative	all group
No moat	594	610	522	547	503	477	462	467	353	320	156	5,011
Narrow moat	882	845	659	639	550	466	400	353	236	99	89	5,218
Wide moat	503	246	153	109	71	37	30	23	12	4	30	1,218
Total	1,979	1,701	1,334	1,295	1,124	980	892	843	601	423	275	11,447
Panel B: Average Size ($millions)												
No moat	4,112	6,468	4,305	4,587	4,361	4,532	5,660	4,808	4,302	4,628	2,388	4,736
Narrow moat	14,485	14,297	16,666	15,550	17,579	15,156	14,039	11,484	10,931	9,693	6,191	14,616
Wide moat	42,347	49,341	50,590	42,533	41,144	58,928	30,019	62,745	16,226	10,401	7,515	44,107
Average of all moats	18,453	16,558	15,720	13,191	13,153	11,637	10,237	9,184	7,143	5,868	4,178	13,429
Panel C: Average Book-to-Market Ratio												
No moat	0.16	0.27	0.36	0.45	0.53	0.63	0.73	0.84	1.13	1.50	(0.29)	0.57
Narrow moat	0.16	0.28	0.36	0.45	0.53	0.61	0.73	0.83	1.07	1.58	(0.14)	0.46
Wide moat	0.16	0.27	0.36	0.43	0.55	0.60	0.82	0.79	1.34	1.96	(0.06)	0.31
Average of all moats	0.16	0.27	0.36	0.45	0.54	0.61	0.74	0.83	1.11	1.54	(0.18)	0.42
Panel D: Average Stock return (%)												
No moat	11.9	14.0	11.6	12.8	13.8	13.6	15.4	16.6	17.2	64.3	58.0	18.5
Narrow moat	12.2	11.7	11.4	10.9	9.9	9.6	8.6	9.9	4.7	26.2	26.5	11.1
Wide moat	9.4	11.1	6.8	11.8	9.5	14.5	(5.5)	(5.7)	1.7	28.6	14.1	9.2
Average of all moats	11.4	12.4	11.0	11.8	11.6	11.7	11.6	13.2	12.0	55.1	43.0	14.1
Panel E: Median Stock return (%)												
No moat	(2.7)	6.9	8.1	4.1	6.9	6.8	10.7	7.1	4.3	14.8	11.3	6.6
Narrow moat	11.4	10.0	11.0	10.7	9.5	8.2	9.4	5.6	6.4	12.8	12.2	9.5
Wide moat	8.0	8.0	7.1	10.8	7.2	6.5	(7.0)	(8.6)	(8.0)	32.2	11.9	7.8
Average of all moats	7.9	8.6	9.5	8.2	7.9	7.3	9.7	5.7	5.3	14.8	11.4	8.2

Table 5: Fama-Macbeth Monthly Regressions of Sample Stock Return on Moat and Other Financial Variables

From January 2003 to December 2011, each month, we run a cross-sectional regression with monthly return as dependent variables. There are 108 monthly regressions total. The independent variables are: 1) Moat, the dummy variable that is 1 if moat rating is wide moat and 0 if moat rating is no moat; 2) Beta, the individual stock beta from market model using daily stock return from day -250 through day -1 preceding the formation of moat portfolio each year; 3) Ln(ME), the natural log of firm size ME, and ME is the market value of common equity, denominated in millions of dollars; 4) Ln(BM), the natural log of book-to-market ratio. Book-to-market ratio is the ratio between book value of common equity and market value of common equity; 5) E+/P, equal to the ratio of total earnings to ME, if earning are positive, and 0 if earnings are negative; 6) E/P dummy, equal to 1 if earnings are negative, and 0, if earnings are positive; 7) Ln(A/BE) the natural log of A/BE.A/BE is the ratio of total assets to book value of common equity, a measurement of leverage. All variables including book value of common equity, market value of common equity, total earning, total assets are obtained from COMPUSTAT and measured at the end of previous fiscal year. The reported coefficients are averages of the 108 regressions. The reported t-statistics are based on the time-series variation of the 108 coefficients.

Models		MoatDummy	Beta	Ln(ME)	Ln(BM)	E+/P	E/P dumm	Ln(A/BE)
(1)	Coefficients (%)	-0.63						
	t-Statistics	(-1.71)						
(2)	Coefficients (%)	0.11		-0.30				
	t-Statistics	(0.41)		(-2.89)				
(3)	Coefficients (%)	-0.22			0.34			
	t-Statistics	(-0.69)			(1.85)			
(4)	Coefficients (%)	0.24		-0.22	0.24			
	t-Statistics	(0.83)		(-2.55)	(1.43)			
(5)	Coefficients (%)	0.24	-0.02	-0.24	0.16	-0.79	-0.16	0.19
	t-Statistics	(0.94)	(-0.06)	(-2.78)	(1.02)	(-0.58)	(-0.74)	(1.17)

Table 6: Pre and Post-formation Profitability and Growth Rate of Firms by Moat

Table 6 reports profitability and growth rate of firms before and after the formation of moat portfolio. Panel A presents pre and post-formation profitability of firms by moat. Operating Margin is the ratio of the sum of earnings before interest and tax to the sum of revenues of all the observations in each moat portfolio. Profit margin is the ratio of the sum of net income to the sum of revenues of all the observations in each moat portfolio. Return on equity is the ratio of the sum of net income to the sum of book value of common equity of all the observations in each moat portfolio. All the variables are obtained from COMPUSTAT at the end of the fiscal year. Data for year 0 is measured at the end of the fiscal year prior to the formation of the moat portfolio. Data for year 1, 2 and 3 are measured at the end of the post-formation year 1, 2 and 3, respectively. In panel B, Average net income growth rate for "wide moat" portfolio is calculated as following: We average the net income of all "wide moat" firms during year 0 across all the nine formation periods (from 2003 to 2011) to obtain average net income for year 0. We do the same for year -3. We then calculate the geometric average annual growth rate from year -3 to year 0. We do the same for the other growth rates.

Panel A: Pre and Post-formation Profitability of Firms by Moat

Average Operating Margin				
	Year0	year1	year2	year3
No Moat	7.5%	8.4%	8.7%	8.6%
Narrow Moat	14.9%	14.8%	14.7%	14.3%
Wide Moat	21.7%	21.2%	20.8%	20.6%
Average Profit Margin				
	Year0	year1	year2	year3
No Moat	2.0%	3.1%	3.8%	3.5%
Narrow Moat	7.8%	7.7%	7.5%	7.3%
Wide Moat	11.1%	11.3%	11.2%	11.1%
Average Return on Equity				
	Year0	year1	year2	year3
No Moat	4.4%	6.9%	8.4%	8.1%
Narrow Moat	13.3%	13.0%	12.8%	12.6%
Wide Moat	17.7%	17.7%	17.1%	16.2%

Panel B: Pre and Post-formation Growth Rate of Firms by Moat

Moats	Pre-formation 3 Years Average Growth		Post-formation 3 Years Average Growth	
	Sales	Net Income	Sales	Net Income
No moat	3.9%	-7.4%	4.7%	27.6%
Narrow moat	8.4%	10.1%	6.1%	3.9%
Wide moat	6.9%	5.0%	5.3%	5.4%

Table 7: The determinants of Moat

Logistic regression to estimate Equation (1). The dependent viable is Wide moat, which equals 1 if the firm is classified as a wide moan firm by Morningstar, and zero otherwise. The independent variables are measured before the Morningstar determination of moat. Lag Large is a qualitative variable that identifies firms above the 75th percentile of total assets the fiscal year prior to the reporting of moat. Lag Profitability equals 1 if the firm has above the industry median profitability for each one of the 3 prior years. Lag Tobin's is the average of the Tobin's Q the three years prior to the assignment of the moat. Tobin's Q, computed as the book value of assets plus the market value of common equity less the sum of the book value of common equity and balance sheet deferred taxes, divided by the book value of assets. Lag Dividend Dummy equals 1 if the firm has paid dividends in each of the three years prior to the reporting of the moat. Lag Sales Growth is the average growth in sales during the prior three years. Lag CAPEX, the average of the ratio of capital expenditures to firms' sales during the prior three years. In parenthesis are the t-values computed using the time-series standard errors of the average slopes of the annual regressions.

	(1)	(2)	(3)
Intercept	2.7667	-3.3641	5.7050
	(24.59)	(-33.16)	(12.33)
Lag Profitability	1.7576	1.7781	1.1417
	(43.74)	(44.89)	(14.59)
Large Firms		0.9059	1.2642
		(22.25)	(12.33)
Lag Tobin's Q			0.6702
			(9.33)
Lag Intangibles			1.9883
			(6.49)
Lag CAPEX			-2.4736
			(-3.42)
Lag Dividend Dummy			1.0123
			(11.59)
Lag Sales Growth			-1.1066
			(-3.20)
R^2	0.0624	0.0806	0.1452
% of firms correctly classified as wide moat	60.65%	65.00%	77.93%
Likelihood Ratio	616.2772	759.4534	1344.45
Obs	6,629	6,629	6,629

Table 8: Analysis of the reversals in profitability for wide moat and non-wide moat firms

Panel A presents the reversal in profitability for a sample of firms with the following characteristics: firms have information about moat provided by Morningstar, with information in CRSP and COMPUSTAT, with assets more than $10 million and book of common equity greater than $5 million. The Table presents the average slopes of the regressions run for each year during the period 2003-2011. The dependent variable is $CP_{t+1,}$ the change in ROAs from year *t* to *t+1* ($Y_{t+1}/A_{t+1} - Y_t/A_t$). Y_t is the earnings before interest and taxes, plus interest expenses, plus income statement deferred taxes and investment tax credits and A_t is the total book of assets. $E(Y_t/A_t)$ is the expected value of $Y_t/A_{t,}$ proxied by the fitted value of Y_t/A_t estimated in a first stage from the cross-section estimation of Equation (4). CP_t is computed as $Y_t/A_t - Y_{t-1}/A_{t-1}$ the difference between the profitability in years *t* and *t-1*. Several variables are created to analyze the difference between moat and non-moat firms: Yt/AtWM equal Yt/At for wide moat firms and zero otherwise; E(Yt/At)WM equal E(Yt/At) for wide moat firms and zero otherwise CPtWM equal CPt for wide moat firms and zero otherwise; Yt/AtNWM equal Yt/At for non-wide moat firms and zero otherwise; E(Yt/At)NWM equal E(Yt/At) for non-wide moat firms and zero otherwise; CPtNWM equal CPt for non-wide moat firms and zero otherwise.
Panel B presents the same analysis for the period 1964-2011. The classification into wide-moat and non-wide moat firms is used using the parameters estimated from the logistic regression analysis of Equation (2).
In parenthesis are the t-values computed using the time-series standard errors of the average slopes. In braces are the t-values using the Newey-West adjustment for standard errors.

Panel A. Analysis of firms with moat information by Morningstar during the period 2003-2011

Model	Intercept	Y_t/A_t	$E(Y_t/A_t)$	CP_t	Y_t/A_tWM	$E(Y_t/A_t)$ WM	CP_tWM	Y_t/A_tNWM	$E(Y_t/A_t)$NWM	CP_tNWM	Adj R^2
(1)	0.0001	-0.3823	0.2231	-0.1324							0.1527
	(0.01)	(-4.03)	(4.10)	(-2.30)							
	{0.01}	{-3.47}	{5.46}	{-2.81}							
(2)	0.0029	-0.3504		-0.3225							0.1506
	(0.32)	(-3.71)		(-1.98)							
	{0.39}	{-3.32}		{-2.45}							
(3)	0.0022				-0.2135		2.1697	-0.3663		-0.1461	0.1518
	(0.25)				(-1.66)		(0.94)	(-3.94)		(-2.64)	
	{0.31				{-2.20}		{1.03}	{-3.45}		{-3.40}	
(4)	-0.0005				-0.2990	0.1771	-0.1226	-0.3927	0.2221	-0.1364	0.1534
	(0.05)				(-2.33)	(1.27)	(-2.94)	(-4.17)	(3.99)	(-2.45)	
	{0.07}				{-2.05}	{1.51}	{-3.57}	{-3.57}	{5.19}	{-3.19}	

Panel B. Analysis for the period 1964-2011 for firms with predicted moat inferred from the logistic analysis in Equation (2)											
Model	Intercept	Y_t/A_t	$E(Y_t/A_t)$	CP_t	Y_t/A_tWM	$E(Y_t/A_t)$ WM	CP_tWM	Y_t/A_tNWM	$E(Y_t/A_t)$NWM	CP_tNWM	Adj.R^2
(1)	0.0017 (0.65) {0.65}	-0.3818 (-12.60) {-10.31}	0.3005 (13.47) {12.36}	-0.7416 (-1.09) {-1.10}							0.1623
(2)	0.0094 (3.16) {2.30}	-0.3183 (-12.06) {-9.62}		-0.7043 (-1.11) {-1.12}							0.1505
(3)	0.0100 (3.31) {2.66}				-0.21785 (-7.93) {-6.92}		-0.6440 (-1.03) {-1.12}	-0.3440 (-9.80) {-7.66}		-0.1783 (-6.48) {-5.93}	0.1616
(4)	-0.0021 (0.77) (0.81)				-0.2280 (-6.13) (-5.46)	0.1822 (4.51) (4.07)	-0.7569 (-1.14) (-1.15)	-0.3971 (-8.64) (-7.30)	0.2700 (7.69) (7.61)	-0.1595 (-4.69) (-4.41)	0.1719

Table 9: Return, Risk and Other Characteristics of Objectively Rated 'Wide Moat", and "Non-wide Moat" Portfolio

This table examines the time-series performance of portfolios based on different moat ratings. From 1965 to 2012, each year we create two portfolios: 1) wide moat, 2) non-wide moat. The moat rating is based on objective measures specified in model (2) in section V. The moat portfolios are created on January 1st of every calendar year based on their moat rating by the end of December from the previous year. Every portfolio is rebalanced at the end of each year. The raw return is the equal weighted annual return for the portfolio each year. Arithmetic and geometric averages are the time-series averages of annual portfolio returns. We use the time-series annual return of each portfolio to calculate its annual standard deviation and beta. In the calculation of beta, we use value-weight CRSP index annual return as the market return, and the one-month T-bill return from Fama French Database.

Size is the market value of common equity. The average size is the average of market value of all observations in each moat portfolio. Book-to-market ratio is the ratio between book value of common equity and market value of common equity. Average book-to-market ratio is the sum of the book value divided by the sum of market value of all observations in each moat portfolio. Both book value of common equity and market value of common equity are obtained from COMPUSTAT and measured at the end of previous fiscal year. We use Fama and French data library's U.S. Research Breakpoints to divide stocks into big/small and growth/value groups. Size breakpoint is calculated at the end of December. Stocks that have a market valuation higher than the 50th percentile breakpoint at the end of December of previous year before portfolios formation are classified as big firms, and lower than the 50th percentile breakpoint are classified as small firms. For book-to-market breakpoints, the book value used in year t is the book equity for the last fiscal year end in t-1. Market value is price multiplied by the shares outstanding at the end of December of t-1. Stocks with book-to-market ratio lower than 30th percentiles are classified as growth stocks, and stocks with book-to-market ratio higher than 70^{th} percentiles are classified as value stocks.

In Panel B, small stocks are defined as the smallest size decile stocks of that year. Penny stocks are stocks with end of fiscal year price lower than $2. In Panel C, average holding period return is arithmetic average of all available observations for the holding period.

PanelA: Raw Return, Risks and Other Characteristics									
	Arithmetic average	Geometric average	Beta	Standard Deviation	Reward-to-volatility ratio(Sharp Ratio)	Average Size ($Millions)	Average Book-to-market ratio	% of Firms That are Big	%of Firms That are Growth
Non-wide Moat	17.9%	14.9%	1.18	25.7%	0.49	1,522	0.56	23%	28%
Wide Moat	10.6%	8.8%	0.97	19.4%	0.27	11,140	0.27	67%	80%

Panel B: Raw Return When Small Stocks or/and Penny Stocks are Excluded						
	Small Stocks Excluded		Penny Stocks Excluded		Small and Penny Stocks Both Excluded	
	Arithmetic average	Geometric average	Arithmetic average	Geometric average	Arithmetic average	Geometric average
Non-wide Moat	14.8%	12.7%	15.9%	13.4%	14.7%	12.6%
Wide Moat	11.4%	9.7%	10.7%	9.0%	11.4%	9.7%

Panel C: Average Holding Period Returns for up to five years after Portfolio Formation		
	Holding period	Average Holding Period Return
non-wide Moat	1Year	18.5%
	2Year	39.1%
	3Years	59.5%
	4Years	85.0%
	5Years	114.9%
Wide Moat	1Year	10.7%
	2Year	22.8%
	3Years	35.2%
	4Years	48.9%
	5Years	66.9%

Table 10: Stock Return and Financial Characteristics by Objective Measures of Moat and by Size Decile

The moat portfolios are created on January 1st of each calendar year based on their moat rating by the end of December of the previous year. Size is the market value of common equity. Book-to-market ratio is the ratio between book value of common equity and market value of common equity. Average size is the average of market value of all observations in each moat portfolio. Average book-to-market ratio is the sum of the book value divided by the sum of market value of all observations in each moat portfolio. Both book value of common equity and market value of common equity are obtained from COMPUSTAT and measured at the end of previous fiscal year. We use Fama and French data library's U.S. Research Breakpoints to allocate stocks to 10 size deciles. Size breakpoint for year t is calculated at the end of the previous December. Average of all firms is a weighted average using the number of observation as the weight.

Panel A: Number of Observations											
Moats	decile1 (small)	decile2	decile3	decile4	decile5	decile6	decile7	decile8	decile9	decile10 (big)	all size
Non-wide Moat	52,526	15,487	10,839	8,885	7,800	6,855	6,174	5,741	5,173	5,286	124,766
Wide moat	1,586	790	559	554	635	783	1,065	1,570	2,040	2,980	12,562
Total	54,112	16,277	11,398	9,439	8,435	7,638	7,239	7,311	7,213	8,266	137,328
Panel B: Average Size ($millions)											
Non-wide Moat	40	167	289	467	698	996	1,498	2,521	4,941	22,021	1,522
Wide moat	67	209	368	605	945	1,372	2,104	3,535	7,459	38,367	11,131
Average of all firms	41	169	292	475	716	1,035	1,587	2,739	5,653	27,914	2,401
Panel C: Average Book-to-Market Ratio											
Non-wide Moat	1.04	0.79	0.74	0.71	0.69	0.67	0.66	0.67	0.66	0.65	0.85
Wide moat	0.14	0.14	0.23	0.24	0.27	0.30	0.32	0.32	0.31	0.29	0.27
Average of all firms	1.02	0.76	0.72	0.68	0.65	0.63	0.61	0.59	0.56	0.52	0.80
Panel D: Average Stock return (%)											
Non-wide Moat	23.2	16.9	16.7	15.1	14.4	15.3	13.7	14.8	13.1	11.5	18.5
Wide moat	7.5	7.9	7.9	7.6	10.0	13.4	12.9	11.6	12.8	11.1	10.7
Average of all firms	22.7	16.4	16.2	14.6	14.1	15.1	13.6	14.1	13.0	11.4	17.8
Panel E: Median Stock return (%)											
Non-wide Moat	4.6	7.1	9.8	10.1	10.3	10.7	10.4	11.2	10.0	10.6	8.0
Wide moat	(8.4)	(3.8)	0.3	5.1	8.9	9.9	8.2	9.8	10.7	9.7	7.2
Average of all firms	4.3	6.6	9.2	9.7	10.1	10.6	10.1	10.8	10.2	10.3	8.0

Table 11: Stock Return and Financial Characteristics by Objective Measures of Moat and by Book-to-market Decile

The moat portfolios are created on January 1st of every calendar year based on their moat rating by the end of December of the previous year. Size is the market value of common equity. Book-to-market ratio is the ratio between book value of common equity and market value of common equity. Average size is the average of market value of all observations in each moat portfolio. Average book-to-market ratio is the sum of the book value divided by the sum of market value of all observations in each moat portfolio. Both book value of common equity and market value of common equity are obtained from COMPUSTAT and measured at the end of previous fiscal year. We use Fama and French data library's U.S. Research Breakpoints to allocate stocks with positive book value to 10 book-to-market deciles, and allocate stocks with negative book value to the BM-negative portfolio. For book-to-market breakpoints, the book value used in year t is the book equity for the last fiscal year end in t-1, market value is price times shares outstanding at the end of December of t-1. Average of all firms is a weighted average using the number of observation as the weight.

Panel A: Number of Observations												
Moats	BM-1 (growth)	BM-2	BM-3	BM-4	BM-5	BM-6	BM-7	BM-8	BM-9	BM-10 (value)	BM-negative	all group
Non-wide Moat	12,176	12,405	12,585	12,685	12,189	11,552	10,768	10,666	11,579	15,376	2,785	124,766
Wide moat	5,968	2,710	1,363	796	463	329	222	141	107	60	403	12,562
Total	18,144	15,115	13,948	13,481	12,652	11,881	10,990	10,807	11,686	15,436	3,188	137,328
Panel B: Average Size ($millions)												
Non-wide Moat	1,631	2,125	2,233	1,905	2,088	1,711	1,533	1,318	783	341	503	1,522
Wide moat	11,465	11,993	10,732	9,954	12,091	12,663	12,371	11,714	5,363	9,732	2,558	11,131
Average of all firms	4,865	3,894	3,063	2,380	2,454	2,014	1,752	1,453	825	377	763	2,401
Panel C: Average Book-to-Market Ratio												
Non-wide Moat	0.21	0.38	0.50	0.61	0.70	0.81	0.93	1.08	1.34	2.37	(2.37)	0.85
Wide moat	0.16	0.30	0.39	0.47	0.56	0.65	0.72	0.90	1.08	1.66	(0.67)	0.27
Average of all firms	0.19	0.36	0.49	0.60	0.70	0.80	0.93	1.08	1.34	2.37	(2.16)	0.80
Panel D: Average Stock return (%)												
Non-wide Moat	12.9	14.6	14.5	15.4	14.9	16.2	18.1	20.4	21.2	31.7	28.1	18.5
Wide moat	8.2	11.4	11.1	12.5	14.8	16.7	18.7	16.0	29.1	24.8	16.4	10.7
Average of all firms	11.4	14.0	14.1	15.2	14.9	16.2	18.1	20.3	21.2	31.6	26.6	17.8
Panel E: Median Stock return (%)												
Non-wide Moat	1.1	5.9	7.5	8.1	8.7	9.6	10.1	9.7	10.0	9.8	(1.4)	8.0
Wide moat	5.0	8.9	9.4	8.2	14.3	11.1	15.0	5.5	20.2	7.0	7.2	7.2
Average of all firms	2.6	6.6	7.7	8.1	8.9	9.7	10.2	9.6	10.0	9.8	(0.0)	8.0

Table 12: Average Annual Return Using Matching Method for Firms with Different Moat Ratings

We analyze three different matching procedures: a, for every wide moat firm/year we find the non-wide moat firm that is closer in market capitalization. b, we repeat the matching procedure by market to book. c, in a third analysis we match using both size and market to book. In this third approach we follow the matching methodology used by Fernando, May and Megginson (2012). For every wide moat firm/year we find a non-wide moat firm such that the sum of the absolute percentage differences between the sizes (market value of equity) and book-to-market ratios of the sample firm and matched firm is minimized. Average of annual return is the simple average of all observation.

Panel A: Morningstar Moat Ratings			
	Average Size ($Millions)	Average Book-to-market ratio	Average Annual return
Morningstart Wide Moat Firms	44,107	0.31	9.2%
No Moat Firms Matched by Size	35,351	0.63	9.6%
No Moat Firms Matched by Book-to-market	4,882	0.31	13.5%
No Moat Firms Matched by Size and Book-to-market	26,527	0.35	8.0%
All No Moat Firms	4,736	0.57	18.5%
Panel B: Objetive Moat Ratings			
	Average Size ($Millions)	Average Book-to-market ratio	Average Annual return
Objective Rated Wide Moat Firms	11,140	0.27	10.7%
Non-wide Moat Firms Matched by Size	11,667	0.61	12.2%
Non-wide Moat Firms Matched by Book-to-market	2,002	0.30	14.8%
Non-wide Moat Firms Matched by Size and Book-to-market	11,042	0.31	12.3%
All Non-wide Moat Firms	1,522	0.56	18.5%

Table 13: Fama-Macbeth Monthly Regressions of Sample Stock Return on Objectively Rated Moat and Other Financial Variables

From January 1965 to December 2012, each month, we run a cross-sectional regression with monthly return as dependent variables. There are 576 monthly regressions total. The independent variables are: 1) Moat, the dummy variable that is 1 if moat rating is wide moat and 0 if moat rating is non-wide moat; 2) Beta, the individual stock beta from market model using daily stock return from day -250 through day -1 preceding the formation of moat portfolio each year; 3) Ln(ME), the natural log of firm size ME, and ME is the market value of common equity, denominated in millions of dollars; 4) Ln(BM), the natural log of book-to-market ratio. Book-to-market ratio is the ratio between book value of common equity and market value of common equity; 5) E+/P, equal to the ratio of total earnings to ME, if earning are positive, and 0 if earnings are negative; 6) E/P dummy, equal to 1 if earnings are negative, and 0, if earnings are positive; 7) Ln(A/BE) the natural log of A/BE.A/BE is the ratio of total assets to book value of common equity, a measurement of leverage. All variables including book value of common equity, market value of common equity, total earning, total assets are obtained from COMPUSTAT and measured at the end of previous fiscal year. The reported coefficients are averages of the 576 regressions. The reported t-statistics are based on the time-series variation of the 576 coefficients.

Models		MoatDummy	Beta	Ln(ME)	Ln(BM)	E+/P	E/P dummy	Ln(A/BE)
(1)	Coefficients (%)	-0.44						
	t-Statistics	(-3.68)						
(2)	Coefficients (%)	-0.003		-0.17				
	t-Statistics	(-0.03)		(-4.16)				
(3)	Coefficients (%)	0.06			0.41			
	t-Statistics	0.58			5.61			
(4)	Coefficients (%)	0.25		-0.13	0.28			
	t-Statistics	(2.81)		(-3.15)	(3.96)			
(5)	Coefficients (%)	0.21	-0.12	-0.15	0.16	2.12	-0.14	-0.02
	t-Statistics	(2.49)	(-0.83)	(-3.71)	(2.52)	(6.22)	(-1.34)	(-0.28)

Table 14: Profitability, Valuation ratios and Operational Growth of Objectively Rated 'Wide Moat", and "Non-wide Moat" firms

Operating Margin is the ratio of the sum of earnings before interest and tax to the sum of revenues of all the observations in each moat portfolio. Profit margin is the ratio of the sum of net income to the sum of revenues of all the observations in each moat portfolio. Return on equity is the ratio of the sum of net income to the sum of book value of common equity of all the observations in each moat portfolio. Total assets turnover is the ratio of the sum of revenues to the sum of total assets of all the observations in each moat portfolio. Leverage is the ratio of the sum of total assets to the sum of book value of common equity of all the observations in each moat portfolio. PE is ratio of the sum of market value of common equity to the sum of net income of all the observations in each moat portfolio. Market-to-book is the ratio of the sum of market value of common equity to the sum of book value of common equity of all the observations in each moat portfolio. All the variables are obtained from COMPUSTAT and measured at the end of fiscal year prior to the formation of moat portfolio. Average net income growth rate for "wide moat" portfolio is calculated as following: We average the net income of all "wide moat" firms during year 0 across all the formation periods to obtain average net income for year 0. We do the same for year -3. We then calculate the geometric average annual growth rate from year -3 to year 0. We do the same for the other growth rates.

PanelA: Profitability and Valuation							
	Operating Margin	Profit Margin	Total Asset Turnover	Return on Equity	Leverage	PE ratio	Market-to-book
Non-wide Moat	11.3%	4.2%	0.4	8.7%	5.7	20.6	1.8
Wide Moat	14.9%	8.9%	0.9	18.7%	2.3	20.0	3.7

Panel B: Profitability of Firms Up to Three Years After Assigning to Moat Porfolio				
Average Operating Margin				
	Year0	year1	year2	year3
Non-wide Moat	11.3%	11.3%	11.3%	11.9%
Wide Moat	14.9%	14.7%	14.5%	15.0%
Average Profit Margin				
	Year0	year1	year2	year3
Non-wide Moat	4.2%	4.2%	4.2%	4.4%
Wide Moat	8.9%	8.5%	8.4%	8.8%
Average Return on Equity				
	Year0	year1	year2	year3
Non-wide Moat	8.7%	8.6%	8.8%	8.9%
Wide Moat	18.7%	17.6%	17.2%	17.2%

Panel C: Past and Future Growth Rate of Fundamentals					
	Pre-formation 3 Years Average Growth			Post-formation 3 Years Average Growth	
	Sales	Net Income		Sales	Net Income
Non-wide Moat	7.2%	6.7%		6.9%	9.7%
Wide Moat	7.9%	9.7%		5.3%	8.0%

Figure 1: Annual Return (%) of Wide Moat and No Moat Firm Rated by Morningstar

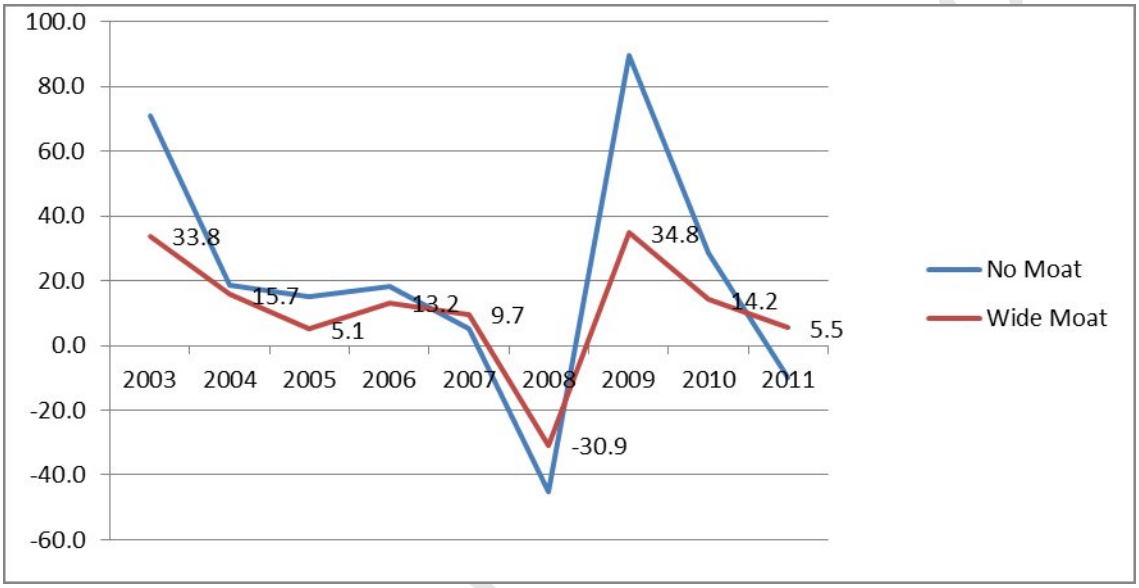

Figure 2: Annual Return (%) of Wide Moat and Non-wide Moat Firm Rated by Objective Measures