A Critical Long View of Capital Markets and Institutions: Realized Returns from Corporate Assets, 1950-2003

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Abstract

It is often taken for granted that: 1) capital markets and institutions allocate funds to firms where realized returns on real assets are highest; 2) the net gains to the economy from investments by corporations have improved in the last 30-50 years due to innovations and better risk management techniques in the financial markets; and 3) the agency cost-reducing role of markets and institutions ensures that real assets funded with external funds would earn higher returns. However, corporate real assets are long lived, and realized returns have to be tracked over a long period to verify these assertions. We perform large-scale calculations of the realized returns on real assets to all firms available in the Compustat database for periods of 10, 20, 30, 40, and 50 years. Our methodology relies only on cash flow between the firms and all their fund providers. In particular, we focus on capital markets, institutions and non interest bearing liability holders. It circumvents the potential problem in using market expectations of future cash flows if markets are inefficient over long periods as suggested by Shiller (1981). We found several new and surprising results. Returns on real assets by corporations derived from actual cash flow over long periods are, on the whole, lower than expected by the fund providers. They suffer a long-term decline, and have been below the yields of 10 year Treasury bonds since 1973. Real assets that received more external financing (from capital markets and institutions) actually report even lower realized long-term returns. These unexpected results may stimulate fresh debate on the roles and long-term performance of capital markets and institutions.

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1. Introduction

We evaluate the long-term performance of capital markets and financial institutions based on the actual returns on the funds they allocated to the corporate sector. Specifically, we report the findings of a large-scale and long-term study of the realized returns to U.S. corporations on the total funds employed, and on the funds supplied by the capital market participants.

Well functioning capital markets and financial institutions are generally considered to be the mechanisms that allocate the supply of funds (savings) to the demanders of funds who yield the highest returns. This suggests that one should judge how well capital markets and institutions perform their resource allocation role by examining the long-term realized returns of the real assets they financed. Since the U.S. is reputed to have the most developed capital markets and institutions, one would assume that its markets and institutions, via price signals and monitoring, play a major role in deciding the amount of funds allocated to corporations for investment in real assets. Thus, a study of the long-term realized returns to U.S. corporations is a natural starting point to investigate the long term allocational efficiency of the capital markets and institutions in general.

We examine three predictions for an economy with a system of well functioning capital markets and institutions. First, U.S. corporations as a whole, using funds and investment guidance (through market prices) provided by the capital markets, earn adequate if not superior realized returns. Second, because allocational efficiency is expected to increase due to visible improvements in the operations of the markets and institutions (better risk management, information disclosure, corporate governance, and regulations, etc.) in the last 30-50 years, funds allocated to the corporate sectors are expected to earn increasingly higher realized returns over the period. Third, due to the monitoring role of markets and institutions in reducing agency costs, corporate investments financed with external funds are expected to yield higher realized returns than those financed with internal funds, or free cash flows.

We measure realized returns from long-lived corporate investments by considering only cash flows that are distributed to the capital suppliers and cash flows contributed by capital suppliers to fund corporate real investments. These cash flows are then summarized by the familiar internal rate of return (IRR) measure to enable comparison among firms, over time, and against the yield of newly issued 10-year Treasury bonds. The procedure yields true returns on investments, unlike calculations based on reported earnings or market values of securities. Reported earnings have several known shortcomings, as they are prone to manipulation by the management and there is no guarantee that earnings not distributed as cash flows to capital providers would be able to maintain their present value due to waste or poor reinvestments. Finally, we use book value[1] of assets instead of market value to approximate the terminal value, because calculation of returns on corporate real assets that involves market values of corporate securities captures expectations, which may be biased if the market is not efficient[2],[i]. In effect, we are testing market efficiency; therefore, we *cannot* use market value. In robustness studies we calculate IRRs using replacement values for the subset of firms that has all of the required data. These IRRs are shifted downward by an average of 0.7 percent when compared to IRRs computed using book values (see Figure A4). Thus, this and other robustness studies strengthen our conclusions.

The three principal findings are:

1. Realized internal rates of return on all assets utilized by U.S. corporations, as a whole, are not only less than expected but are also consistently less than the 10-year Treasury bond yield since 1973. We compute a 10-year IRR for all Compustat firms. We

[1]. Ideally we would use replacement value to calculate IRR; however, the data necessary to calculate replacement value is not available for many firms and is not available at all until about 1975, so we use the book value of total assets instead. We observe that replacement value is primarily calculated by adjusting the book value of fixed assets for inflation. In unreported results we show that fixed assets as a proportion of total assets has declined through time. Thus the adjustment for inflation affects a smaller portion of fixed assets as time goes on. The net results is that, since 1975, realized IRRs calculated using book value are, on average, greater than that calculated from replacement value; we show this in Figure A4

[2] One could be ensnared in a paradox when market values of corporate securities are included in the calculation of realized or ex post returns. This is because if market value is a rational unbiased estimate of future realizable cash flows, then q ratio, or market value to cost of investments, should be a sufficient statistic to infer realized returns.

count only the actual inflow to and outflow from the firms, and use total assets[3] as the terminal value. Each year we then compute the total asset weighted IRR for all firms that survive for the subsequent ten years. This yearly cross-sectional weighted average IRR shows a steady decline, from nearly 10 percent in the early 1950s to 4.8 percent in late 1980s and 1990s. Since 1973, this IRR has not been able to exceed the newly issue 10-year Treasury bond yield[4]. *This fact alone provides strong evidence that many corporations made suboptimal use of the funds they have.* We further compute IRRs having horizons of 10, 20, 30, 40 and 50 years. The long horizon IRRs should largely incorporate the cash flow consequence of growth options (exercised or expired), and so these IRRs are expected to equal to or exceed the cost of capital if firms make profitable investments. Surprisingly, as horizon lengthens, the total firm IRRs are consistently lower than the short horizon IRRs, which are less than the risk-free rate starting in 1973.

2. To cross check the observed decline in realized returns over the period, we calculate the cross sectional median rate of return on assets (ROA) of S&P500 firms, every year from 1950-2003 and find a steady decline in ROA in every decade. Median ROAs in recent years are less than half of their values at the beginning of the period. More importantly, the decline in median ROA is not attributable to decreasing risks, as we also find the standard deviations of ROA actually increase steadily during this period. Because the S&P 500, through its process of addition and deletion, has a survival bias in favor of the strong, we calculate an aggregated economy wide ROA for all publicly traded firms. We find the decline in ROA is even larger; ROA is reduced by three-quarters, while standard deviation has steadily increased by a factor of about eight since the early 1950s. Moreover, aggregate return on equity (ROE)

[3] If a firm exits Compustat before the end of the database and is not a target firm, in the exit year we assign it a terminal value equal to the market value of equity plus the book value of total liabilities. This situation occurs for 10,039 of the 20,354 firms in our database. In cases of bankruptcy etc, this procedure biases the IRR upward. For robustness, we also assign exiting firms a terminal value equal to the maximum of (a) the book value of total assets or (b) the market value of equity plus the book value of total liabilities. By doing so, the result should go against our finding of low realized returns. However, our conclusions do not change.

[4] For reference purposes we also compute the 10-year total firm IRRs by setting the terminal value equal to the market value of equity plus the book value of total liabilities rather than setting it equal to the book value of total assets. These IRRs do not exceed the 10-year Treasury bond rate starting in 1973 but do attain equality with it starting in 1986.

declines by about one-third while the variability in ROE, economy wide and for individual firms, increases even more than it does for ROA. The decline in net profit margin since the early 1960s is largely attributable to an increase in selling, general, and administrative costs. Over time, these costs have more than cancelled out large improvements in (a) gross profit margin and (b) operating efficiency attributable to improving inventory turnover. However, because of U.S. corporations' increasing utilization of long-term other liabilities[5] as a source of funds[6], these mostly non-interest bearing 'involuntary' capital contributors have been subsidizing equity holders to make up for the low overall returns on total corporate assets.

3. As a group, companies that obtain the highest external financing as a percent of total assets, from financial institutions (bank loans), and capital markets (bonds and stocks) earn a lower IRR on corporate investments than those that mainly use internal funds. The result holds for all levels of new investment, and the IRRs are particularly low for the firms that had the highest investment and mainly financed externally.

The paper is structured as follows: Section 2 discusses the issues in measuring realized returns and presents our procedure. Section 3 specifies the data and discusses the main empirical results. Section 4 then contains a series of robustness tests and alternative measures of return on real assets, followed by the summary of Section 5.

2. Methodology

2.1 Why measure realized returns?

To know whether funds are allocated to their best use, one needs to know the realized, not expected cash flows. After all, ex ante, all investments are expected to yield superior returns. Although corporate investments are inherently risky, a well functioning system that allocates funds for corporate investments should produce adequate, if not superior, realized returns in the aggregate of the economy. Unfortunately, corporate investments have a long life and take 10, 20, or more years to fully realize all their cash

[5] See the appendix for a description of long term other liabilities.
[6] In 1950 1.7 percent ($1.4 billion) of total assets was financed by long term non interest bearing liabilities, by 2003 it had increased to 9.8 percent ($2.3 trillion). See the Appendix, Figure A1, for details.

flows. Realized returns on invested capital, however, are not commonly tabulated and studied.

2.2 *Measurement Issues*

There are three technical problems that have to be overcome in order to correctly calculate realized returns: 1) Reported earnings or reported cash flows are both noisy, due to accounting convention and other measurement errors, and probably biased, due to firms' attempts to manage earnings or even to manipulate accounting statements; 2) For a finite period estimation, a terminal value has to be imputed, and 3) All capital contributors need to be included when calculating realized returns. The first problem is well known; we now elaborate on the other two problems.

Market value of securities is often a convenient choice for terminal value; however, using market values assumes that it is an unbiased estimate of the present value of future cash flows, yet there may be deviation due to market inefficiency. Further, using market values to determine whether the market efficiently allocates resources involves an inherent contradiction. If the market price at a later date is assumed to be an unbiased estimate of the present value (at that point) of all subsequent cash flows, then the calculation of realized returns is not necessary. This follows since the current market price, by iterative expectations, should also be an unbiased estimation of all cash flows henceforth. Then a comparison of market value to asset costs (or book value of the security) is the only information needed to judge whether real assets earn adequate returns.

Not only is the measurement of realized returns to capital suppliers vaguely understood, but the measurement of capital supplied often excludes the set of 'involuntary contributors.' Examples are employees in the case of under-funded pensions, the government in the case of deferred taxes, and suppliers and other liability holders that are not paid yet. Analysis of firm performance is incomplete without explicitly determining returns on the assets that 'involuntary contributors" finance. General Motors' projected difficulty with funding retiree liabilities is but one example of the consequence of financing assets through 'involuntary contributors' without creating sufficient matching assets to pay the liabilities. *Without explicit analysis of these*

'involuntary' fund providers, it is impossible to determine how much of the realized returns to equity and bond holders come at the expense of the 'involuntary contributors.'

2.3 Internal rate of return (IRR) calculation – overall approach

We take a new approach to calculate realized returns to corporate investment. First, we take the corporate sector as a black box, and count as inflows only new sources of funds contributed by capital providers to the corporations, and count as outflow only actual funds distributed to the capital providers. This way, reported but undistributed earnings, regardless of the amount, stay in the black box and have no cash flow consequence. This approach sidesteps the vagaries in accounting earnings, such as the timing of recognition of revenues and costs.

IRR is calculated using the capital budgeting procedure for two different groups of fund providers: (a) capital markets (bond and stock holders); (b) all fund providers to the firm including bond holders, stock holders, as well as non-interest-bearing liability holders. We call the former the capital market IRR, and the latter the total firm IRR.

We emphasize here that the total firm IRR incorporates funds provided by non-interest bearing liability holders; they financed 3.3 trillion dollars (i.e., 13.9 percent) of assets in 2003. Figure A1 in the Appendix shows that the percentage of assets financed by long term other liabilities starting at about 1.7 percent ($1.4 billion) in 1950 and steadily increased to 9.8 percent ($2.3 trillion) in 2003. Fama and French (1999) assume non-interest bearing liabilities earn an implicit return, which shows up in a firm's net income. Since our approach uses actual cash flows rather than accounting estimates of net income, we are able to explicitly determine the returns earned by non-interest bearing liability holders.

The standard textbook approach calls for determining the initial investment made by each fund provider and all the subsequent funds received by each, including the terminal value. This means that the replacement cost should be used as the initial value and the terminal value should be the discounted sum of all future cash flows.

2.4 Estimation of initial values and terminal values for realized IRR computation

2.4.1 Initial value estimation

The firm's initial value includes all items on the balance sheet and, therefore, does not include unreported items such as the value of some intangibles (ex. brand equity). Replacement value of balance sheet assets is then the best estimate of the initial value. However, the data to compute replacement values is not available till 1975 and even then many firms do not have sufficient data. Therefore, we use book value in most of our analyses to approximate replacement value. If possible, we compare those IRRs to ones computed using replacement values.

2.4.2 Terminal value estimation

The objective in estimating terminal value is to determine the present value of all future cash flows. Some researchers assume that market value is an unbiased estimate of the terminal value; see for example, Fama and French (1999). However, the estimation will be biased if the market is inefficient (See LeRoy and Porter (1981), Shiller (1981), Shiller (2003)). Shiller argues that the deviation may last for long periods of time. Moreover, our objective is to determine what investors actually realize, and we have already pointed out there is an inherent contradiction if we use market values. Therefore, we seek an alternative approach.

To reduce the need to rely on market value, first we compute the IRR on assets employed, ignoring the value of future growth options. Thus, the appropriate terminal value is the replacement value of assets. We will show that the IRR on assets declines over time and declines as the horizon of computation goes beyond 10 years. In particular, after 1973, the short horizon (10 year) IRR on assets is less than the risk free rate (which is less than firms' cost of capital). Therefore, the net present value (NPV) in the corporate sector is negative. Observe that NPV must be greater than zero at some point if the present value of future cash flows is to ever exceed the replacement value of the firm. Thus, replacement value is likely to be an upper bound on the present value of future cash flows (which does not equal the market value if the market is inefficient).

Admittedly, it is possible that the increase in IRR occurs beyond the end of our database. We address this issue in two ways. First, we use horizons as long as 50 years. Over such a long period, whatever is realizable from growth options or intangibles should

have largely been realized. Second, in unreported results (available upon request) we focus on firms that survive. We find surviving firms have higher IRRs than firms that cease to exist due to mergers, bankruptcy, etc.; in other words, the strong survive. For cohorts of these surviving firms we observe that IRRs[7] consistently decline as the horizon increases. It is well known that firms mature; so if the cohort of surviving[8] firms has not realized an IRR above the risk free rate in 10 or 20 years (which is what we observe starting in the early 1970s), there is no reason to think it ever will. Therefore, it is reasonable to conclude that unfulfilled growth is unlikely be realized after the end date of the database for surviving firms.

2.5 Fund flows for individual firms

We first calculate realized IRRs for individual firms. Then, we calculate value-weighted realized IRRs for the corporate sector. Notice that results are similar if we calculate the aggregate IRR directly.

Our procedure in calculating total firm IRR is based on the 'closed system fund flow' approach, in which only funds that providers actually contribute and funds that firms actually distribute to these providers are counted. Thus, inflows are fresh funds from two sources: all fund providers or just capital markets. Fund outflows are fresh funds received by the fund providers; the funds received depend upon the claims made by the fund provider. We do not count non-distributed earnings. Nor do we consider the type and amount of investment. That is subject to classification and estimation error (whatever cash is not paid out has to be invested, however efficiently or inefficiently). We also exclude conversion or call of convertibles as they have no cash consequence.

We apply the same principle in dealing with mergers, and more specifically firms that are acquired. For the acquiring firm, an acquisition is like any other investment. If it is financed by issuing debt or stock, these cash flows from fund providers are

[7] Some portion of the declining realized IRR that we observe as horizon is lengthened is due to the effect of Jensen's inequality. We quantify this effect in a number of ways. In unreported results, each year we compute both total asset weighted IRR and aggregate IRR for cohorts of surviving firms; our conclusions are unchanged. Next, we observe that the annual aggregate return on assets declines steadily through time as does the short horizon IRR for cohorts of surviving firms; therefore, the decline in IRR as horizon lengthens is likely due to declining firm performance over time, not Jensen's effect.

[8] In unreported results (available upon request), we show that the performance of firms that do not survive is on average lower than that of surviving firms, so survival bias free IRRs would be lower than the IRRs for cohorts of survivors.

incorporated in the yearly cash flow analysis. Acquisitions involving securities (stocks and bonds, etc.) are counted as an inflow to the acquirer; acquired assets are valued at the market price of equity less the cash paid plus the book value of liabilities. This approach is not affected by the accounting treatment of merger premiums. For target firms, the terminal value of shareholder equity is estimated as the market value of equity as reported by Security Data Corporation; liabilities (interest bearing debt) are valued at their book value.

2.5.1 Itemized fund flows

The initial investment from capital market participants is the sum of interest bearing debt and shareholders' book equity. Yearly cash flows are then the sum of the following four items less the market value of acquired firms: (a) dividends, (b) repurchase minus new stock issues (Seasoned Equity Offering, SEO, and Initial Public Offering, SEO), (c) cash flows to debt holders (i.e., repayment of interest bearing debt), and (d) interest paid. Finally, at the end of the analysis horizon, shareholder book equity plus the book value of debt becomes the terminal value received by debt holders and shareholders[9].

We use the book value of total assets to measure the initial investment from all fund providers. Yearly fund flows include all cash flows, not only from the capital markets but also funds from other stakeholders retained by the corporations (e.g., suppliers, employees, federal and state governments). Significant fund flows occur due to changes in non-interest bearing liabilities[10]. These other liabilities finance assets of the firm[11]. Therefore, the yearly fund flow for the firm is the cash flows to equity holders (i.e., dividends plus repurchase minus new stock issues) plus interest payment minus the change in total liabilities minus acquired firm's market value of equity plus cash paid for

[9] If a firm exits the Compustat database and is not identified as a target by the Security Data Corporation Mergers and Acquisitions database, its terminal value is set equal to the market value of equity plus the book value of debt. This upward biases the IRR computation in the case of bankruptcies.

[10] For instance, we find that long-term non-interest-bearing liabilities (data75) have steadily increased from less than two percent of total assets in 1950 to 9.8 percent (i.e. $2.3 trillion dollars) of total assets in 2003.

[11] Non-interest-bearing long term liabilities are commitments made by the firm. Examples are given in the Appendix; these commitments were rare in the 1950s and 1960s, but have become a major liability since then. Not paying for them in the current year frees that cash for use by the firm and so is a source of cash to the firm. On the other hand changes in equity [excluding changes due to (a) stock purchases, (b) stock issuances, or (c) dividends paid)] caused by reclassifying equity as a liability are not a commitment to pay stockholders, so they are not counted as a fund outflow.

the firm and minus its book value of total liabilities. Finally, at the end of the analysis horizon, the book value of total assets becomes the terminal value.

Table A1 (see Appendix) shows the yearly cash flows and variables used to calculate them at individual firms for capital markets and for all fund providers.

2.6 Computation of IRR for individual firms

Our objective is to determine the internal rate of return (IRR) that managers actually produce by making investments. We look at realized IRR from the fund providers' point of view, which is simply the return that equates all the funds contributed by the providers to all the subsequent fund flows, including the terminal value of the company at the end of the analysis horizon. Algebraically, IRR[12] is the discount rate that solves:

$$INV_{i,0} = \sum_{t=1}^{T} \frac{CF_{i,t}}{(1+IRR_i)^t} + \frac{TV_{i,T}}{(1+IRR_i)^T} \qquad (1)$$

where:

$INV_{i,0}$ is the initial investment shown in Table A1 for the fund provider at time 0;

$TV_{i,T}$ is the terminal value for the fund provider at the analysis horizon;

T is the number of years over which IRR_i is computed, ranging from 10 to 50 years;

$CF_{i,t}$ is net cash flow from firm i at time t to the fund provider shown in Table A1. The timing in the calculation corresponds to the period funds are actually paid or received.

Thus, IRR is the rate of return that equates the discounted sum of net fund flows to fund providers over the analysis horizon to the initial investment made by the fund providers at time zero.

2.7 Summary of the closed system approach to calculate IRR calculation

The advantages of the closed system approach to measure returns to fund providers are: (1) it includes all fund provider, such as non interest bearing liability holders, that

[12] A common issue associated with IRR is that multiple solutions may be found. We take the root closest to a 100 percent return. Thus our results are biased upward if multiple roots occur. We do check for multiple roots greater than negative 100 percent and find it occurs very rarely, even though there are cash flow sign changes. The reason is that large terminal values almost always drive any multiple roots to be either imaginary or less than negative 100 percent. See Fernández (2004) for a broad discussion of issues encounter in computing IRR for firms.

support the profitability of the firm; (2) it is insensitive to accounting manipulations, or arbitrary designation (as regular or extraordinary incomes), and (3) it is not biased by mergers.

3. **Results and Analysis**

3.1 Data

Our sample includes all U.S. firms (excluding firms in the insurance industry[13]) with the required Compustat[14] data. Our sample period starts in 1950 and concludes in 2003. Due to the calculation procedure used, firms must survive at least two years to be included in the analysis. Since the analysis starts in 1950, certain data are not always available; however, for all qualified firms we require that total assets (data6) be greater than one million and total liabilities are not missing. Other missing values used in computations are derived from other available data or approximated; see the Appendix for the approximations.

In the Appendix, Table A1, we show the sample sizes used in the calculation of IRR for all fund providers. The second column shows the number of firms used in the computation. Using this information, IRRs of various horizons are computed each year for analysis of trends. Returns are reported by year as IRR from adjoining years may share overlapping data and are therefore correlated. The remaining columns in Table A1 show the number of firms that survived from the year given (1950, 1951, …) through the horizon given (10 years, 20 years, …) for which an IRR could be computed. These IRRs are used to compute both total asset weighted IRRs for surviving firms, and returns to surviving firms as a function of investment and amount of external financing.

3.2 *Realized returns for the total firm*

We analyze total firms IRR (IRR for all fund providers). These fund providers are shareholders, bond holders, banks, and non-interest-bearing liability holders. As shown

[13] Insurance firms are identified by SIC codes between 6300 and 6499. These firms are excluded because their business is to insure liabilities and therefore they are uniquely different than the rest of firms. Insured liabilities are often recorded as long term 'other liabilities.'

[14] Merger data is obtained from Security Data Corporation, this database starts in 1977. Interest rate data is obtained from the St. Louis Federal Reserve website.

in Figure 1, IRR for surviving firms declines as horizon lengthens. This consistent pattern over the fifty year time period is a basis for concluding that a rational expectation for the present value of future cash flows is the book value of assets.

Figure 1 also shows that total firm IRR is nearly monotonically declining as time goes on (while stock prices increase)[15]. This quantifies the issue Porter (1998) points out: that the U.S. financial system focuses on near-term stock price appreciation, "even at the expense of long term performance." In fact, Figure 1 shows that realized total firm IRR declines to 6.45 percent by the early 1970s and continues its tendency to decline in the 1980 and 1990s. This leads to the comparison of returns for the total firm versus capital market providers provided below.

3.3 IRR for capital market participants

Figure 2 shows IRR for capital market participants (stock and bond holders). It also shows an overall declining trend in IRR as horizon increases. The capital market IRRs have declined from an average of 12 percent in the early 1950s to 8.6% in the 1990s. Overall, the analysis of capital market IRR reveals no increase of IRR as horizon lengthens which would be required to support market valuation greater than book value. We next compare total firm IRR and IRR for capital markets to known benchmarks.

3.4 Comparison of IRRs to the yield of ten-year treasury bonds

We compare ten-year IRRs to the yield of newly issued ten-year Treasury bonds, which we use for the risk-free rate. Figure 3 shows the striking fact that total firm IRR for the corporate sector has not exceeded the risk-free rate since 1973. This is a departure from the prediction, under any model with risk aversion, that firms with risky real assets are expected to earn more than the risk-free rate on average. Further, total firm IRR is 4.8 percent in the 1990s while the IRR for capital market investors is nearly four percent greater. *The results imply a significant wealth transfer from other capital suppliers, the no- interest-bearing liability holders in particular, to capital market participants.*

[15] The IRRs with horizons ending in 2001 and 2002 show a significant decline due to the worsened economic conditions in those years and the IRRs ending in 2003 increase for the survivors.

Figure 3 also shows that on an asset-weighted basis during the high inflation years around 1980, all fund providers realized IRRs that are at least four percentage points less than the long-term risk-free rate, suggesting that the high cost of funds at the time was not fully incorporated into firms' capital budgeting decision[16]. Next we compare capital market expectation to realized returns.

Figure 3 shows that in 1950 the capital market IRR significantly exceeded the Treasury bond rate. Starting in 1980, the capital market IRR became either significantly less than or equal to the Treasury bond yield. The weighted average cost of capital (WACC), which is the required return by capital markets, should be higher than the Treasury bond yield. *Thus it is likely that returns to capital markets have not exceeded the WACC since 1980*[17].

Overall, the results show that the total firm IRRs in the corporate sector have been less than the risk free rate since 1973. However, IRRs to capital markets are nearly four percentage points greater than total firm IRRs. This is accomplished by a wealth transfer from non-interest bearing liability holders to share holders and bondholders. The wealth transfer interpretation is supported by an analysis of cash flows to the fund providers. In the Appendix, Figure A2 shows that cash flows to all fund providers have usually been negative, and increasingly so in recent decades. The figure also shows that cash flows to capital markets almost always exceeded that to all fund providers, especially in recent decades. *This implies that the long-term other liabilities holders (pension funds, etc.) have experienced an increasingly negative cash flow (i.e. corporate liabilities are piling up – See Figure A1).*

Since our prior expectation, that fund providers earn at least their cost of capital, has not been realized, we question whether capital markets have allocated capital to its best use. This is the subject of the next section.

[16] Unfortunately, firms also failed to earn realized returns that exceed the long run average Treasury bond rate as well; thus, it is also not likely the firms went ahead with the investments with refunding at lower interest rates in mind.

[17] Interestingly, we observe no correlation between nominal IRR for any fund provider and the riskless rate. Yet, if firms followed the criterion that investment returns should exceed the cost of capital, then investments returns should also exceeds the inflation rate plus a premium. The lack of correlation may indicate: (a) there is no such thing as inflation hedged investments; (b) that realized inflation rates do not equal expected inflation rates; or (c) that corporations have little ability to change prices with inflation.

3.5 The role of capital market participants in the allocation of capital

Our objective in this section is to determine whether increased external funding (by shareholders, bondholders and banks) yields greater realized returns on newly invested capital than investments funded internally. We address this issue empirically because there are two possible theoretical outcomes. On the one hand, there is a long tradition of literature starting with Jensen and Meckling (1976) suggesting that external monitoring reduces agency costs. Theoretically, this will in turn improve allocational efficiency of capital. Many studies support this point of view. For instance, Berger, Ofek and Yermack (1997) find large stockholders prefer to increase leverage and monitoring from lenders. On the other hand, there is a trade-off associated with external financing. Not only is external monitoring costly, but external fund providers may also shorten managerial investment horizons, resulting in avoidance of profitable long term projects (see Von Thadden (1995)). Finally, the availability of funds from external sources, such as through an IPO or SEO, may enable management to over invest. Thus it is an empirical question whether external financing actually leads to greater realized returns than internal financing.

To address the issue, we sort firms into three groups each year based on the amount of new investments made. Investment is measured by the sum of: (a) capital expenditures; (b) research and development; and (c) advertising over the preceding two years. Then each is scaled by total assets in the current year. Additionally, within each of the three investment groups we further sort firms into three groups based on the amount of their new external financing. We define external financing to be the net stock and debt issued by the firm over the preceding two years, all scaled by total assets in the current year. The sorting process creates nine groups of firms each year based on their level of scaled investment and level of scaled external financing. For each year, we then determine the median IRRs for 5, 10 and 15-year horizons. In addition, each year, we measure the risk using the standard deviation of the 10-year IRRs. The average yearly risk and the average yearly median IRRs (5 year, 10 and 15) are reported in the tables.

Selected results for firms in the top decile of market capitalization[18] are shown in Table 1. Since 1975, among firms that invest the most, the 10-year capital market IRR for internally financed firms is on average three percentage points higher than that for externally financed firms. The yearly data (not reported) shows there was only a single year (1990) in which firms with the greatest external financing realized a higher median capital market IRR than that of the internally financed firms. Despite the dramatic difference in average IRRs, the ex-post risks, as measured by the standard deviation of the 10 year IRRs, are very similar for the two groups of firms.

In short, the results indicate that external financing does not lead to better allocation of capital than internal financing, given similar level of risks. Indeed, external capital markets might even distort firms' efforts to efficiently allocate capital to projects. How the distortion could occur is a subject of future study that may provide new insights into how to improve the operation of financial markets.

4. In depth analysis

4.1 Robustness tests

Robustness tests are used to: (a) check whether our conclusions hold on non-financial firms; (b) test for the influence of other liabilities on firm performance and survival rates, and; (c) compare the 10 year total firm IRR of externally financed firms to that of internally financed firms in the group of firms that invest the most. In addition, an alternative measure of IRR is used to ensure that our conclusions do not hinge on the method of computation. These tests are now discussed in order.

To start, we check whether our conclusions hold on non-financial firms because they have experienced less regulation than financial firms have. To accomplish this, we rerun the total firm IRR analyses for the sector of non-financial firms (SIC less than 6000 and SIC greater than 6999). As shown in Figure 4, the 10 year total firm IRRs for the corporate sector of non-financial firms decline over time and have never exceeded the yield of the 10 year Treasury bonds since 1977.

[18] We also have this data for all fund providers as a group (i.e total IRR); it is given in the Appendix, Table A3, and discussed in the next section, "Robustness tests." Conclusions are the same.

Next, we test for the influence of other liabilities on firm performance and survival rates. This analysis is shown in the Appendix, Table A3. When it comes time to pay off the accumulated 'other liabilities', firms have a very difficult time performing well or even surviving.

Table A4 and Figure A3 in the Appendix compare the 10 year total firm IRR of externally financed firms to that of internally financed firms for the group of firms that invest the most (top investing firms). Since 1950, the median IRRs of the externally financed group have never exceeded those of the internally financed group. Further, the average risk for each group, as measured by the standard deviation of IRRs, is identical. In unreported results, we analyze the IRRs of non-financial top investing firms. The same trend is observed. These analyses reinforce the conjecture that unidentified imperfections in the capital markets prevent efficient allocation of capital in the long term.

Finally, an alternative measure of IRR is used to check whether our conclusions are robust to the method of computation. This measure of IRR uses replacement value of total assets instead of book value when computing total firm IRRs. To determine replacement value, we use the Lewellen and Badrinath (1997) method[19]. Although their estimate of replacement value is considered to be the best (see Erickson and Whited (2001)), the data required limits our sample to post 1974. In the Appendix, Figure A4 shows that IRRs computed using replacement value follow the same trend but are slightly lower than the IRRs computed using book value. Given the different methods and samples used to compute realized corporate returns, it is reasonable to believe that our conclusions are consistent and valid.

4.2 *Cross-checks: ROA and common sized statement analysis*

Since our overall objective is to understand how firms' assets are being utilized over the long term, we begin our cross-checks by examining corporate performance using Return on Assets (ROA). Figure 5 shows that median ROA has decreased sharply since 1950 for both S&P 500 firms and all firms listed in the Compustat database.

[19] When data is unavailable we use the Lee and Tompkins (1999) approximation.

Figure 5 also shows that the decline in the median ROA is not due to declining risk since the standard deviation of ROA has steadily increased over time. The risk has increased by a factor of about two for S&P 500 firms and by a factor of about eight for all Compustat firms. We observe decreasing median ROAs (and IRRs) accompanied by increasing risks. Next, we investigate the causes of the decreased ROA over time. Figure 6 shows the results of breaking ROA, for the aggregate of all firms, into its component parts by using the DuPont system analysis. The analysis shows that ROA is declining due to a deteriorating profit margin (net income / sales) and decreasing management efficiency (sales / total assets)[20].

The common size income statement shown in Table 2 further analyzes the source of the decline in ROA from 1964 through 2003. We compare the mid-sixties to the bull market period in the late 1990s. Gross profit margins have increased by 4.4 percentage points from the mid 1960s to the late 1990s, indicating significant pricing power relative to costs. This may be the result of reduced cost of materials[21] and improved operating efficiencies. In unreported analyses, we find operating efficiency increased as indicated by the improvement in inventory turnover, which increased from six in the early 1960s to ten in the late 1990s. A closer look at Table 2 indicates the improvement in the gross profit margin is especially strong after the 1980s. On the other hand, the soaring sales, general and administrative (SG&A) costs have more than cancelled out the improvement in gross profit margins. Additionally, depreciation and net interest expenses have steadily risen. Non-operating income has decreased and special item costs have increased. The only bright spot for the firm (other than decreasing cost of goods sold, COGS) is that taxes have declined sharply. Thus although operating efficiencies have improved significantly over time, the results have not fallen through to the bottom line, largely because SG&A expenses have increased. As a result, net income as percentage of sales is declining over time.

[20] The lack of persistence in earnings beyond chance expectations (see Chan, Karceski and Lakonishok, 2003) is supportive of the declining ROA and IRR reported here. In unreported results, we find that sales growth for the corporate sector has experienced an overall decline since the 1950s. Additionally, there is no evidence of a change in the pattern of declining sales growth since the late 1970s.

[21] The popular press reports significant cost saving by outsourcing to China and other countries with low labor costs.

Overall, the standard analysis using common measures of profitability indicates that the performance of U.S. firms is declining while risks are increasing over time, despite the significant improvements in operating efficiency and reductions in procurement costs.

5. Summary and Conclusions

We calculate realized IRRs for U.S. corporations from 1950 to 2003 measured over several horizons: 10, 20, 30, 40 and 50 years. Our calculation overcomes the accounting bias in earnings and the bias introduced by using market valuations. First, we measure firms over sufficiently long periods (up to 50 years) to make their growth options a lot less valuable: they are eventually either exercised or expired. Second, we use an upper-bound value on the present value of all future cash flows in place of market valuations. We calculate IRRs for all fund providers and for capital market participants (debt and equity holders).

Our three new findings should provoke rethinking of certain 'axioms' or 'givens' in contemporary conceptions about the roles of capital markets and institutions:

1. Despite technological advances and regulatory improvements, we find pervasive evidence that U.S. corporations earn poor returns by any standard on the funds at their disposal. In particular, the aggregate 10 year realized returns to all fund providers have fallen below the yields of newly issued 10 year Treasury Bonds since 1973. This result is further supported by the long-term decline in the average ROA.
2. The decline in realized returns can not be attributed to declining risks as the volatilities of realized returns have been increasing over time.
3. Contrary to the prediction of agency theory that capital markets and financial institutions should improve the allocation efficiency of capital, we find that corporate investments financed by external funds actually earn lower long-term returns than those financed by internal funds. The common size financial statement analysis further shows that agency costs, which are included in the broader selling and general administrative expenses, may have actually increased and contributed to the poor realized returns to fund suppliers.

Our findings question the ability of capital markets and institutions to allocate resources efficiently for long-lived assets and hopefully direct the attention of researchers to the long-term performance of financial markets and institutions. We believe future research needs to address the following questions:

A. If U.S. corporations did not earn adequate returns for funds provided by the capital markets and institutions, how could this fact stay unknown after all these years? (We have shown that part of the reason is the increasing reliance on the 'other liabilities' and a significant wealth transfer from this group to lenders and stockholders. This wealth transfer provided additional cash flows to firms to discharge debt claims, pay dividends or repurchase shares.)

B. Since the duration of long-lived real assets spans over several generations of capital market investors and loan officers, how can we improve the operations of capital markets and institutions to enable their participants to take a long-term view?

C. Why do market participants fail to see through the veil shielding poor long-term corporate performance? Could it be due to the confidence created by generally rising stock markets in the last 30-50 years? Regardless of the reason, we are left with a major puzzle: what has sustained overall high and increasing stock prices when the underlying real assets earn poor[22] and declining returns accompanied by increasing risks?

[22] Since realized total firm IRR has been less than the 10 year Treasury bond since 1973, realized net present value on assets has been less than zero for the last three decades.

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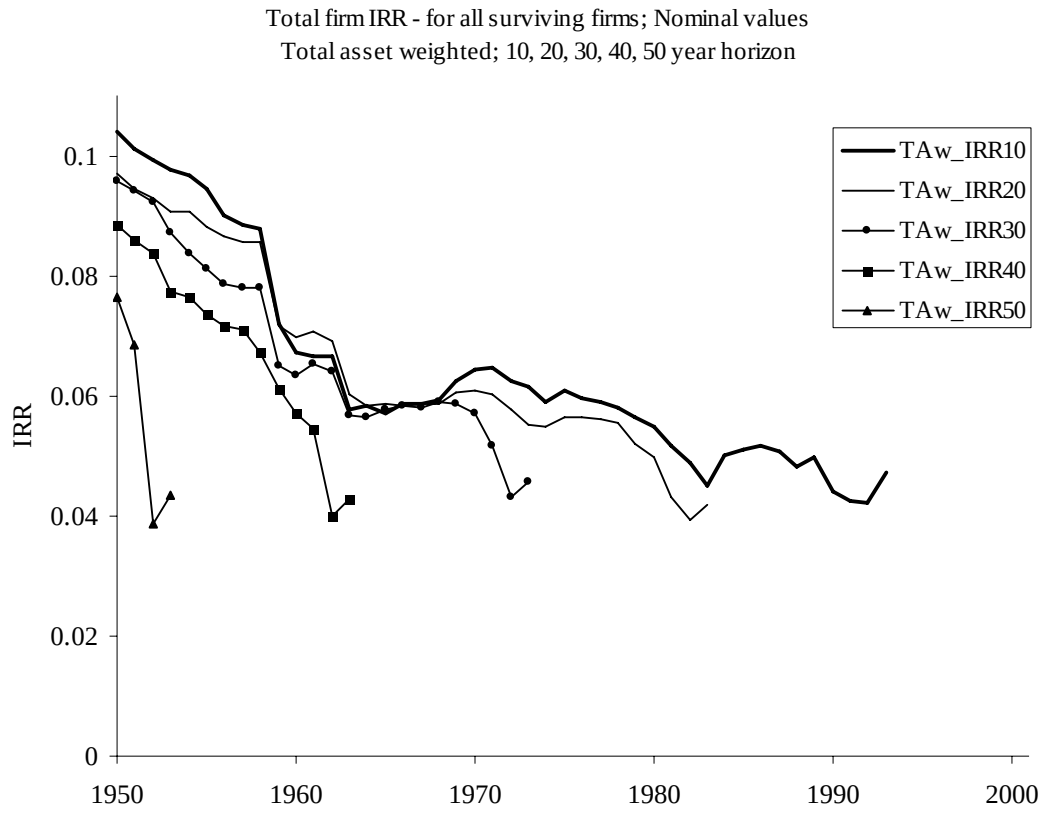

Figure 1: *IRR for all fund providers (Total firm IRR) for surviving firms weighted by total assets*

Total firm IRR for each firm is the return for firm i that solves $INV_{i,0} = \sum_{n=1}^{T} \frac{CF_{i,n}}{(1+IRR_i)^n} + \frac{TV_{i,T}}{(1+IRR_i)^T}$.

For firm i, $INV_{i,0}$ is the book value of total assets at time 0. The variable n ranges from time equals 1 to the horizon length (T=10, 20, 30, 40, and 50 years). The variable $CF_{i,n}$ is the net cash flow for firm i in year n. For all fund providers the flow = common and preferred dividends + purchases of common and preferred stock - the sales of common and preferred stock + interest - the market value of acquired firms' total assets + cash paid to acquire a target - change in total liabilities = data21 + data19 + data108 - data115 + data15 - the market value of all assets from acquired firms + cash paid to acquire a target - change in data181. The variable $TV_{i,T}$ is the book value of total assets unless the firm was acquired (i.e is a target) or exits the database in the last year of the horizon other than 2003 (the last full year of the database). Then, for target firms, the terminal value is set to the total market value of the merger (SDC variable VALM) plus the book value of total liabilities (data181). For firms that exit for other reasons in the horizon year, the terminal value is set to the market value of stock plus the book value of total liabilities (This upward biases our IRRs since bankruptcies etc are given an upward biased terminal value. We make this conservative estimate for 10,039 of the 20,354 firms in our sample). The plot line labeled **TAw_IRR10** is the total asset weighted IRR for the corporate sector computed over a 10 year horizon. Plot lines for the other horizons are similarly defined.

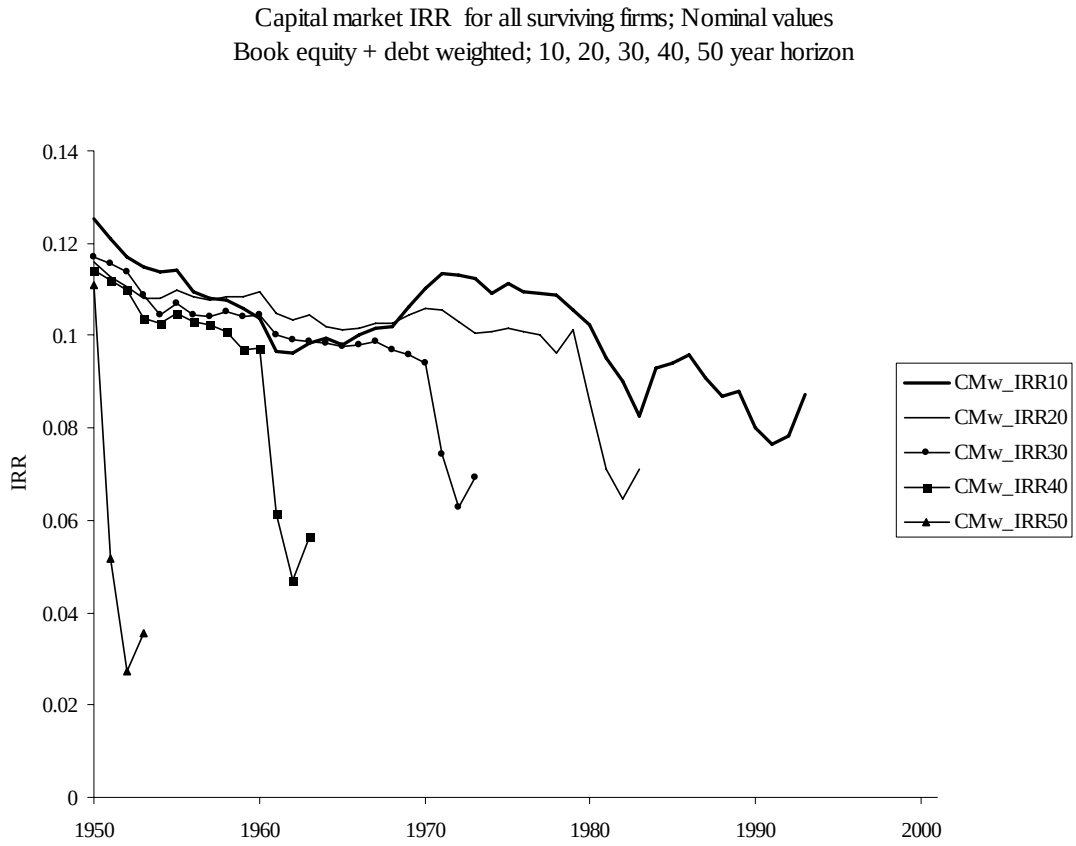

Figure 2: *Capital market IRR for all surviving firms*
The plot shows the value of capital market IRRs for the corporate sector (i.e. all surviving and non surviving USA Compustat firms excluding insurance firms having SIC codes between 6300 and 6499) through horizons of 10, 30, and 50 years after the start year of the IRR computation. These IRRs are found each year beginning in 1950 using the following procedure. IRRs are computed for all capital market participants (as an aggregate) in Compustat through the horizon needed to compute the IRR. Each year, the IRRs are found by solving $INV_{i,0} = \sum_{n=1}^{T} \frac{CF_{i,n}}{(1+IRR_i)^n} + \frac{TV_{i,T}}{(1+IRR_i)^T}$. For the capital market, $INV_{i,0}$ is the sum of the book value of owners equity + interest bearing debt for all firms in Compustat. n ranges from 1 to the horizon length (T=10, … 50 years). The variable $CF_{i,n}$ is the net cash flow for firm i in year n. For the capital market participants the flow, $CF_{i,n}$ = common and preferred dividends + purchases of common and preferred stock - the sales of common and preferred stock + interest - the market value of acquired firms' total assets + cash paid to acquire a target - change in interest bearing debt = data21 + data19 + data108 - data115 + data15 - the market value of all assets from acquired firms + cash paid for acquired firms - change in (data34+data9). The variable $TV_{i,T}$ is the book value of owners equity plus interest bearing debt unless the firm was acquired (i.e is a target) or exits the database in the last year of the horizon other than 2003 (the last full year of the database). Then, for target firms, the terminal value is set to the total market value of the merger (SDC variable VALM) plus the book value of interest bearing debt (data34 + data9). For firms that exit for other reasons in the horizon year, the terminal value is set to the market value of stock plus the book value of interest bearing debt (This upward biases our IRRs since bankruptcies etc are given an upward biased terminal value. We make this conservative estimate for 10,039 of the 20,354 firms in our sample). The plot line labeled **CMw_IRR10** is the book equity + debt weighted IRR for the corporate sector computed over a 10 year horizon. Plot lines for the other horizons are similarly defined.

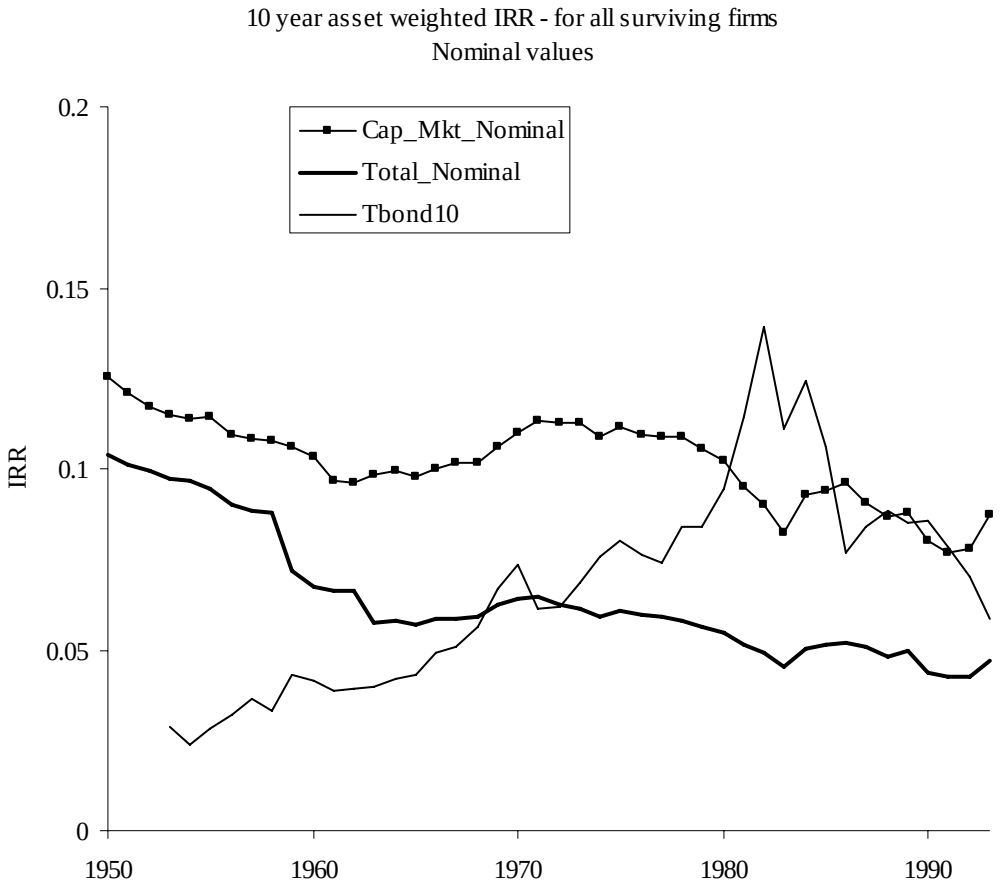

Figure 3: *Nominal values of corporate sector 10 year IRRs for fund providers*
Nominal value of corporate sector 10 year IRRs for capital markets (**Cap_Mkt_Nominal**) and for the total firm (**Total_Nominal**) are defined in Figure 1 (see TAw_IRR10) and Figure 2 (see CMw_IRR10). The plot line labeled **Tbond10** is the yield on new issue 10 year Treasury bonds for the years shown.

Table 1: *Firms in the top decile of market capitalization – Capital Market IRR versus external financing at increasing levels of investment (1975-2003)*
The sample is all U.S. firms in Compustat (excluding insurance firms) between 1975 and 2003. Further, firms must be in the top decile of market value and have the information necessary to compute capital market IRR. To be included in the computation of IRR, a firm must survive through the horizon length (5, 10, or 15 years). Firms in the top decile of market value (data25*data199) are found by ranking firms by market value of equity each year. The reported **IRR** is the average of the median value of the nominal realized capital market IRRs found each year; the computational details for computing IRR are given in the footnote[23]. For the IRR computation, the initial investment is the book value of owners equity + interest bearing debt. Terminal value is usually the book value of owners equity plus interest bearing debt for firms that survive through the horizon. However, if the firm exits the database in the horizon year, then terminal value is set equal to market value of equity and interest bearing debt. Ranking is first done each year by amount of **investmen**t then by amount of **external financing** (both are scaled by total assets in the ranking year). Investment is the last two years of capital expenditure (data128), research and development (data45), and advertising (data46). Unknown R&D and advertising are set to 0. External money is the a) net debt issued over a two year period (data34+data9 at time t – their values at time t-2) plus (b) the net issuance of stocks over the last two years (i.e. sale of common and preferred stock less the purchase of common and preferred stock over a two year period = data108 at time t -data115 at time t + data108 at time t -1 - data115 at time t-1. **Book to market** is the book value of equity / market value of equity = data60/(data25*data199). The variable σ **for 10 year IRR** is the average of the yearly standard deviations

Ranks		Average of the yearly median values							
Investment	External financing	Investment	External money	Total assets	Book-to-market	IRR: 5 year horiz.	IRR: 10 year horiz.	IRR: 15 year horiz.	σ for 10 year IRR
0 min	0 min	0.056	-0.050	3305	0.605	0.113	0.108	0.106	0.082
0 min	1	0.057	0.030	4661	0.695	0.105	0.102	0.101	0.059
0 min	2 max	0.055	0.174	4901	0.723	*0.093*	*0.094*	*0.094*	0.052
1	0 min	0.104	-0.059	2809	0.505	0.126	0.115	0.108	0.073
1	1	0.105	0.029	3469	0.579	0.112	0.105	0.100	0.068
1	2 max	0.104	0.150	3639	0.594	*0.099*	*0.098*	*0.099*	0.056
2 max	0 min	0.182	-0.053	2476	0.363	0.161	0.144	0.140	0.092
2 max	1	0.181	0.040	2648	0.391	0.130	0.126	0.120	0.076
2 max	2 max	0.197	0.191	1855	0.354	*0.116*	*0.111*	*0.102*	0.084

[23] Capital market IRR for each firm is the return for firm i that solves $INV_{i,0} = \sum_{n=1}^{T} \frac{CF_{i,n}}{(1+IRR_i)^n} + \frac{TV_{i,T}}{(1+IRR_i)^T}$. For capital market providers at firm i, $INV_{i,0}$ is the book value of equity (data6-data181) + debt (data34+data9). n ranges from 1 to the horizon length (T=5, 10, 15 years). The variable $CF_{i,n}$ is the flow of funds in the nth year of the horizon for the IRR computation at firm i, $CF_{i,n}$ is defined in table 2. $TV_{i,T}$ is the book value of book equity plus interest bearing debt unless the firm was acquired or exits the database in the horizon year. Then, for acquisitions, the terminal value is set to the total market value of the merger (SDC variable VALM) plus the book value of debt (data34+data9). For firms that exit for other reasons in the horizon year, the terminal value is set to the market value of stock plus the book value of debt; this biases our IRRs upward. Note: We report the IRR closes to 100 percent in the rare case of multiple roots.

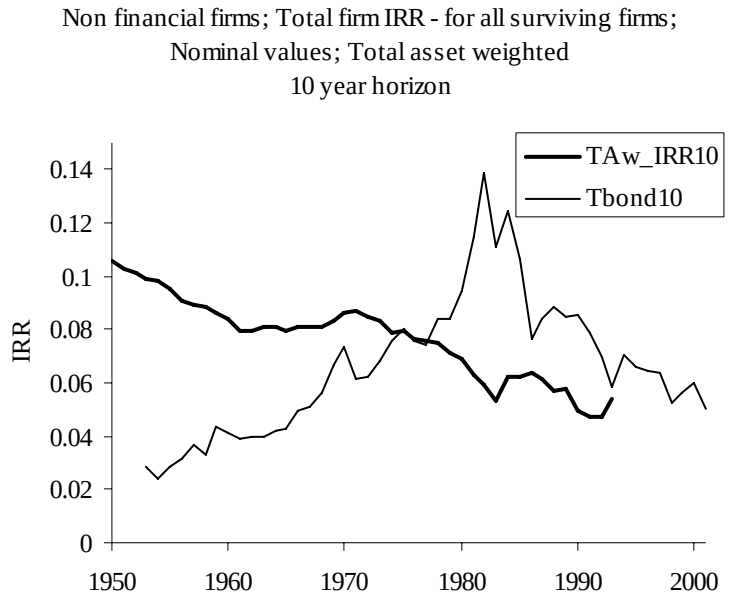

Figure 4: *Total IRR for non financial firms*
The plot for non financial firms shows the value of total firm IRRs for all surviving[24] firms excluding financial firms having SIC codes between 6000 and 6999. The plot line labeled TAw_IRR10 is based on total firm IRRs computed over a horizon of 10 years; the computation is described in Figure 1.

[24] A selection bias is introduced before 1978 because Compustat did not have full coverage of all listed firms until that date.

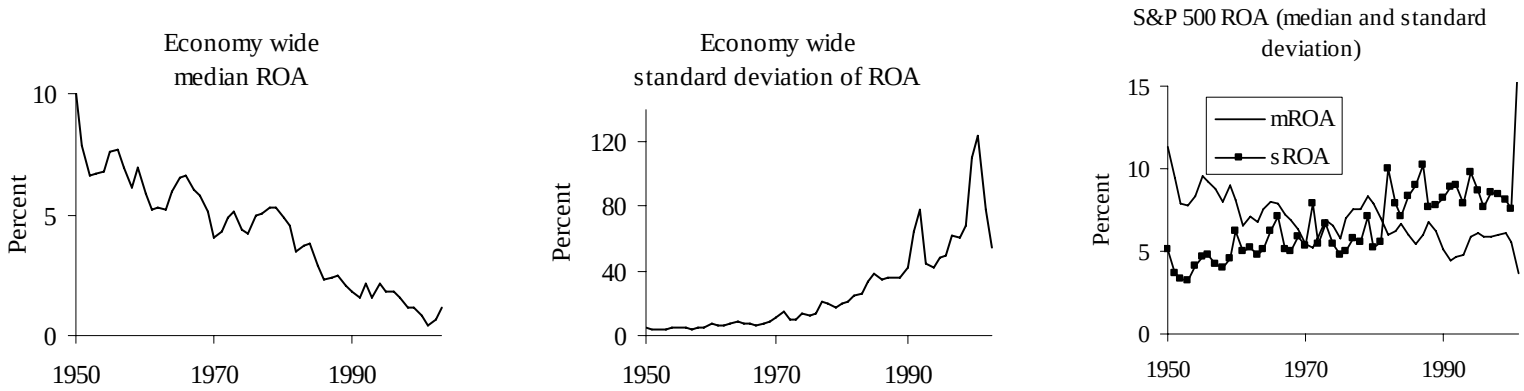

Figure 5: *Yearly median ROA and standard deviation of ROA for individual firms*
The economy wide sample in the first two figures includes all U.S. firms in Compustat (excluding insurance firms with SIC codes between 6300 and 6499) that report their net income (data172) and have total assets (data6) greater than $1 million. Return on Assets (**ROA)** for firm i = net income$_i$ / total assets$_i$ = data172/data6. **Economy wide standard deviation of ROA** is the standard deviation of ROA for all firms in the sample each year. In the last figure, the sample is all S&P 500 firms, where **mROA** is the median value of ROA for S&P 500 firms each year, and **sROA** is the standard deviation of ROA for S&P500 firms in the sample each year.

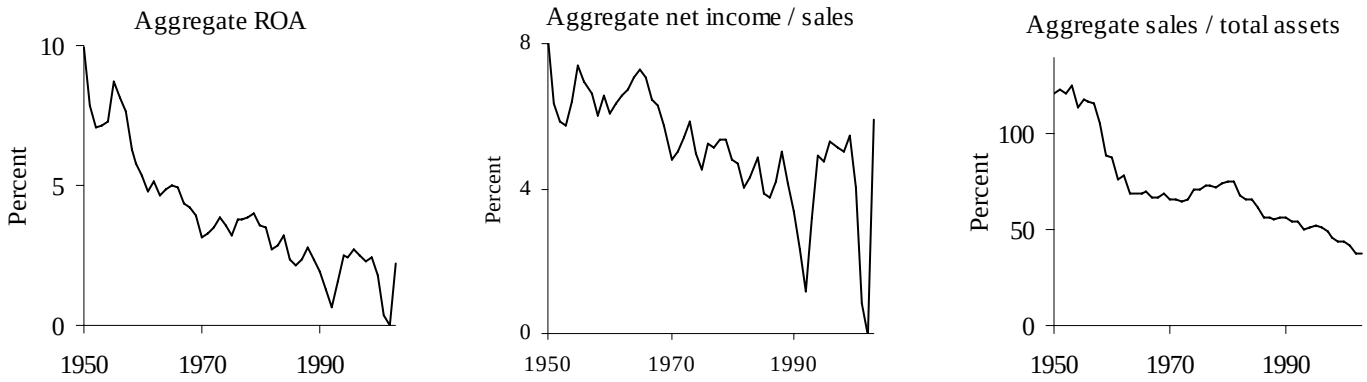

Figure 6: *Yearly analysis of firm performance*
The sample is all U.S. firms in Compustat (excluding insurance firms; i.e. SIC codes 6300 to 6499) that have total assets (data6) greater than $1 million and have reported sales (data12), net income (data172) and total liabilities (data181). Each year the values of each variable are summed together. In year t, **Aggregate ROA** is the return on assets for all firms combined = Sum of Net Income for all firms / Sum of total assets for all firms = sum(data172)/sum(data6). **Aggregate net income / sales** = sum(data172) / sum(data12). **Aggregate sales / total assets** = sum(data12) / sum(data6).

Table 2: *Common size income statement for USA firms - The mid 60s versus the late 90s*

The sample is all firms in Compustat (excluding insurance firms; i.e. SIC codes 6300 to 6499) that have all of the variables used to form the common size income sheet. Each year the values of each variable are summed together then divided by the sum of sales for all firms in the sample. The total value of each variable is reported as a percentage of the total value of sales in each year. The variables reported are (A) sales (data12), (B) cost of goods sold (COGS is data41), (C) Gross margin = data12-data41, (D) Selling general and administrative costs (SG&A=data189), (E) Operating income before depreciation (data13), (F) Operating income after depreciation (data178), (G) Interest expense (data15), (H) Non operating income (data61), (I) Special items (data17), (J) Pre tax income (Data170), (K) Taxes (data16), (L) Minority interest (data49), and (M) Net income before extraordinary items (data237)

				C=A-B		E=A-B-D					J=F-G+H+I			M=J-K-L
year	Number of firms	Sales (A)	COGS (B)	Gross margin (C)	SG&A (D)	Operating Income before depreciation (E)	Operating Income after depreciation (F)	Interest (G)	Non operating Income (H)	Special items (I)	Pre tax income (J)	Tax (K)	Minority Interest (L)	Net income (M)
1964	1599	100.0	69.9	30.1	14.9	15.2	10.8	0.8	1.0	0.0	11.1	4.8	0.1	6.2
1965	1748	100.0	69.7	30.3	15.0	15.3	11.0	0.8	1.0	0.0	11.2	4.8	0.1	6.4
1966	1883	100.0	70.0	30.0	15.0	15.0	10.9	0.9	1.0	0.0	11.0	4.7	0.1	6.2
1967	2038	100.0	70.2	29.8	15.5	14.2	10.0	1.0	0.9	0.0	9.9	4.1	0.1	5.7
1968	2546	100.0	70.0	30.0	15.6	14.5	10.4	1.2	1.0	0.0	10.2	4.6	0.1	5.6
1969	2671	100.0	70.5	29.5	15.0	14.5	10.1	1.3	1.2	0.0	9.9	4.6	0.1	5.3
1970	2720	100.0	71.3	28.7	15.7	13.0	8.4	1.6	1.2	0.0	8.0	3.5	0.1	4.5
1971	2859	100.0	71.1	28.9	15.3	13.6	9.2	1.5	1.1	0.0	8.8	4.0	0.1	4.7
1972	2965	100.0	70.9	29.1	15.2	13.9	9.7	1.4	1.1	0.0	9.3	4.3	0.1	4.9
1973	3204	100.0	71.1	28.9	14.6	14.3	10.3	1.5	1.1	0.0	9.9	4.6	0.1	5.3
1974	4102	100.0	72.6	27.4	13.7	13.7	10.1	1.8	1.1	-0.1	9.4	4.7	0.1	4.6
1975	4046	100.0	72.6	27.4	14.2	13.2	9.4	1.8	1.0	0.0	8.6	4.3	0.1	4.3
1976	4069	100.0	72.6	27.4	13.9	13.4	9.8	1.6	1.1	0.0	9.3	4.4	0.1	4.8
1977	4039	100.0	72.3	27.7	14.0	13.7	10.0	1.5	1.0	-0.1	9.5	4.5	0.1	4.9
1978	3925	100.0	72.3	27.7	14.0	13.7	10.0	1.6	1.0	-0.1	9.3	4.3	0.1	4.9
1979	3831	100.0	73.8	26.2	13.4	12.7	9.4	1.6	1.2	-0.1	9.0	4.1	0.1	4.8
1980	3822	100.0	74.3	25.7	14.0	11.7	8.1	1.8	1.4	0.1	7.7	3.5	0.1	4.2
1981	3823	100.0	74.5	25.5	14.0	11.5	7.8	2.2	1.8	0.1	7.5	3.2	0.1	4.2
1982	3931	100.0	74.1	25.9	15.0	10.9	6.6	2.5	1.6	-0.2	5.6	2.5	0.1	3.1
1983	4049	100.0	71.0	29.0	17.1	11.9	7.8	2.2	1.4	-0.3	6.7	3.1	0.1	3.6
1984	4083	100.0	70.1	29.9	17.5	12.4	8.4	2.2	1.4	-0.2	7.4	3.1	0.0	4.3
1985	4198	100.0	70.7	29.3	17.3	12.0	7.7	2.2	1.4	-0.8	6.2	2.9	0.1	3.2
1986	4325	100.0	69.0	31.0	19.3	11.7	7.2	2.5	1.4	-0.7	5.5	2.7	0.0	2.8

Table 2 continued: *Common size income statement for USA firms - The mid 60s versus the late 90s*

year	Number of firms	Sales (A)	COGS (B)	C=A-B Gross margin (C)	SG&A (D)	E=A-B-D Operating income before depreciation (E)	Operating income after depreciation (F)	Interest (G)	Non operating Income (H)	Special items (I)	J=F-G+H+I Pre tax income (J)	Taxes (K)	Minority Interest (L)	M=J-K-L Net income (M)
1987	4290	100.0	68.3	31.7	19.1	12.6	8.2	2.6	1.4	-0.3	6.9	3.0	0.1	3.8
1988	4122	100.0	68.0	32.0	19.4	12.6	8.5	3.0	1.2	-0.1	6.7	2.5	0.1	4.0
1989	4016	100.0	67.2	32.8	19.7	13.2	8.8	3.3	1.4	-0.6	6.5	2.6	0.1	3.8
1990	4016	100.0	67.2	32.8	20.3	12.5	8.4	3.2	0.9	-0.6	5.6	2.4	0.1	3.1
1991	4137	100.0	67.6	32.4	20.6	11.8	7.7	3.1	0.9	-1.2	4.4	2.0	0.1	2.3
1992	4491	100.0	68.0	32.0	19.9	12.1	7.9	2.5	0.7	-0.8	5.4	2.2	0.1	3.1
1993	5608	100.0	65.4	34.6	20.9	13.7	9.6	2.9	-0.3	-1.3	6.0	2.4	0.1	3.5
1994	5897	100.0	65.9	34.1	20.0	14.0	9.9	3.0	-0.1	-0.5	7.5	2.8	0.1	4.6
1995	6333	100.0	64.8	35.2	20.5	14.6	10.5	3.0	0.0	-1.3	7.1	2.7	0.1	4.2
1996	6141	100.0	65.2	34.8	20.5	14.4	10.3	2.9	0.0	-0.9	7.4	2.9	0.1	4.4
1997	5937	100.0	66.2	33.8	19.3	14.5	10.1	3.1	0.2	-1.2	7.0	2.7	0.1	4.1
1998	5801	100.0	65.0	35.0	20.2	14.8	10.3	3.5	0.0	-1.8	6.5	2.8	0.1	3.6
1999	5728	100.0	65.7	34.3	19.5	14.8	9.9	3.8	0.1	-0.2	7.6	3.1	0.1	4.3
2000	5454	100.0	65.8	34.2	19.9	14.3	9.1	3.6	0.2	-1.4	5.7	3.1	0.0	2.6
2001	5165	100.0	64.8	35.2	20.8	14.4	8.1	3.8	-0.4	-5.1	0.5	2.2	0.1	-1.8
2002	5052	100.0	65.1	34.9	20.0	14.9	10.0	3.5	-0.4	-3.2	4.5	2.7	0.1	1.7
2003	4441	100.0	63.1	36.9	20.5	16.5	11.4	3.5	-0.2	-0.8	8.3	2.8	0.1	5.3
Average (64-68):		100	70.0	30.0	15.2	14.8	10.6	0.9	1.0	0.0	10.7	4.6	0.1	6.0
Average (96-00):		100.0	65.6	34.4	19.9	14.6	9.9	3.4	0.1	-1.1	6.8	2.9	0.1	3.8
Difference between the average in the 1990s to the average in the 1960s:		0	-4.4	4.4	4.7	-0.3	-0.7	2.5	-0.9	-1.1	-3.8	-1.7	0.0	-2.2

Appendix

A.1 Approximations used in the calculation of realized IRR

The Compustat back dataset sometimes misses values used in the calculation of realized IRRs. The approximations follow.

- If the book value of equity is missing we approximate it with the value of total assets (Compustat item data6) less the value of total liabilities (data181).
- If dividends for either common or preferred shareholders are missing we set the value to zero. These data are missing is the early years of the Compustat database. Setting the values to zero downward biases Internal Rates of Return (IRRs) computed in the 1950s and 1960s. However, increasing the IRRs in this time period would only strengthen our conclusions. Internal rates of return are highest in the 1950s and 1960s even with a downward bias.
- If sale of common stock and preferred stock is missing, its value is set to zero. If purchase of common and preferred stock is missing it is also set to zero. These approximations are used because Compustat does not provide this data before 1971. The biases caused by this missing data are largely offsetting and are not likely to affect conclusions, as the values of these variables tend to be very small by comparison to other terms in the computation of IRR.
- If interest is missing, it is approximated by multiplying the book value of long-term debt (data9) times the yield on Moody's seasoned corporate bonds rated Baa (these yields are obtained from the St. Louis Federal Reserve web site) and adding to that the book value of short-term debt times the Baa rate minus 1.5 percentage points.

For computation of investments made by a corporation, we use capital expenditure (data128), research and development (data46) and advertising (data45). We require that capital expenditure exist. If R&D or advertising are missing we set them to 0; this occurs before 1971 because Compustat does not provide that data before this date. However, the bias is small because R&D and advertising were relatively small in proportion to capital expenditures before 1971.

A.2 Examples of long term other liabilities

The dominant source of increase in "liabilities other" is from long term "liabilities – other". In 2001 the value of this item for all firms is $1.0 trillion. Examples of items included in long term other liabilities are shown below for selected firms (in millions of dollars).

Example #1: Ford Motor (Financial year 1999)

Automotive sector:	
Post retirement benefits other than pensions	$15,458
Dealer and customer allowances and claims	7,271
Employee benefit plans	4,525
Unfunded pension obligation	1,189
Financial Services sector:	
Other liabilities and deferred income	6,775

Example # 2: International Business Machine (Financial year 2000)

Non pension post retirement	$7,128
Deferred income	1,266
Restructuring actions	854
Executive compensation accruals	769
Post-employment/pre-retirement liability	585
Environmental accruals	226
Other	497

Example # 3: General Motors (Financial year 2000)

Automotive operations	
Post retirement benefits other than pensions	34,306
Pensions	3,480
Other liabilities and deferred income taxes	15,768

- Warranties

- Post employment benefits
- Unpaid losses under self-insurance programs
- Other

Financing and Insurance Operations

Other liabilities and deferred income taxes	12,922

Example # 4: General Electric (Financial year 2001)

All other liabilities (see below)	$32,921

"This caption includes noncurrent compensation and benefit accruals at year-end 2002 and 2001 of $8,826 million and $8,745 million, respectively. Also included are amounts for deferred income, interest on tax liabilities, product warranties and a variety of sundry items" … such as "remediation actions to clean up hazardous wastes as required by federal and state laws".

Example # 5: Dow Chemical (Financial year 2000)

Pension and other post retirement benefits—non current:	$1,746
Other non current obligations:	$2,178

Description of other non current obligations: Silicone breast implant litigation, Superfund environmental cleanup, other.

Note that according to COMPUSTAT the long term other liability classification does not include:

1. Capital leases;
2. Deferred taxes (when reported separately);
3. Investment tax credit;
4. Long-term debt;
5. Minority interest;
6. Shareholders' equity;
7. Unearned deferred compensation related to redeemable preferred stock, and;
8. Insurance liabilities, reserves and annuity benefits

A.4 Supporting information

Table A1: *Individual firm yearly fund flow variables for capital markets, and the total firm*
Book value of equity is total assets minus total liabilities (data6-data181). There may be hidden liabilities like a pending lawsuit that could reduce the value of equity; we would count these items but have no way at present to identify them (Enron is an example). Common dividends is data21; preferred dividends is data19. If a dividend value is missing its value is set to 0. Sale of common and preferred stock (data108) is sometimes combined with other figures or missing. We then compute it from the change in Capital Surplus (data210); if this information is missing we set data108 to zero. Similarly there are times that Purchase of common and preferred stock (data115) is combined with other figures or missing. We then compute it from the change in Treasury Stock (data88); if data88 is missing we set data115 to zero. Interest expense (data15) may also be combined with another figure or missing. In that case we let interest expense equal that year's Baa rate times the book value of long term debt plus the Baa rate minus 1.5 percentage points times the book value of short term debt. Interest bearing debt is short term debt plus long term debt (data34+data9). Total liabilities is data181, this includes all interest bearing debt plus non interest bearing liabilities. Total assets is data6. Book value of equity equals total assets minus total liabilities (data6-data181). Value of merger equity is reported by Security Data Corporation (variable name VALM).

Cash outflow from an individual firm	Cash inflow to an individual firm
Panel A: Capital markets	
	Initial investment = book value of equity + interest bearing debt
Purchase of own common and preferred stock	Sale of common and preferred stock
Reduction in interest bearing debt	Increase in interest bearing debt
Common and preferred dividends	Acquired firm's market value of equity – cash paid for the firm + book value of its interest bearing debt
Interest expense	
Terminal value = book value of equity + interest bearing debt. For all firms (including target firms) that exit COMPUSTAT in the horizon year, terminal value = market value of the equity + interest bearing debt.	
Panel B: Total firm	
	Initial investment = book value of total assets
Reduction in total liabilities	Increase in total liabilities
Purchase of common and preferred stock	Sale of common and preferred stock
Common and preferred dividends	Market value of acquired firms' equity – cash paid + book value of total liabilities
Interest expense	
Terminal value = book value of total assets. For all firms (including target firms) that exit COMPUSTAT in the horizon year, terminal value = market value of the equity + book value of total liabilities	

Table A2: *Samples sizes*

The column labeled **Corporate sector firms** gives the number of firms used each year in the computation of total firm IRR for the corporate sector. Details of the corporate sector IRR computation for the total firm are given in Figure 1. The number of firms that survive and have sufficient information to compute their total firm IRRs for a 10 year horizon is shown in the column labeled **10 year IRR**. Similarly, the number of firms that survive and have sufficient information for computation of their total firm IRR for horizons up to 50 years are shown in the remaining columns. Details of the computation of total firm IRR for individual firms are given in Figure 1.

Year	Corporate sector firms	10 year IRR	20 year IRR	30 year IRR	40 year IRR	50 year IRR
1950	557	426	424	355	231	163
1951	658	434	431	347	234	159
1952	666	440	438	338	236	155
1953	674	446	445	332	231	146
1954	690	464	462	328	237	
1955	708	482	473	323	238	
1956	726	499	480	312	243	
1957	746	514	484	310	241	
1958	807	537	490	306	234	
1959	865	565	493	311	227	
1960	1427	1013	819	489	320	
1961	1564	1281	1000	645	415	
1962	1766	1522	1118	736	451	
1963	1984	1766	1265	826	499	
1964	2124	1857	1268	856		
1965	2274	1950	1269	854		
1966	2423	2024	1261	876		
1967	2587	2087	1265	872		
1968	3145	2287	1354	911		
1969	3334	2332	1380	901		
1970	3399	2334	1389	857		
1971	3584	2408	1432	863		
1972	3707	2434	1478	869		
1973	4028	2599	1543	881		
1974	5031	2996	1768			
1975	5179	2887	1707			
1976	5212	2758	1670			
1977	5221	2684	1639			
1978	5157	2602	1565			
1979	5094	2549	1512			
1980	5186	2593	1454			

Table A2 continued:

Year	Corporate sector firms	10 year IRR	20 year IRR	30 year IRR	40 year IRR	50 year IRR
1981	5329	2657	1459			
1982	5562	2806	1491			
1983	5831	2927	1498			
1984	5849	3015				
1985	6085	3158				
1986	6372	3323				
1987	6409	3291				
1988	6328	3206				
1989	6216	3102				
1990	6295	3032				
1991	6435	2991				
1992	6781	3045				
1993	7757	3231				
1994	8051					
1995	8557					
1996	8396					
1997	8102					
1998	7968					
1999	7857					
2000	7541					
2001	7046					
2002	6896					
2003	6447					

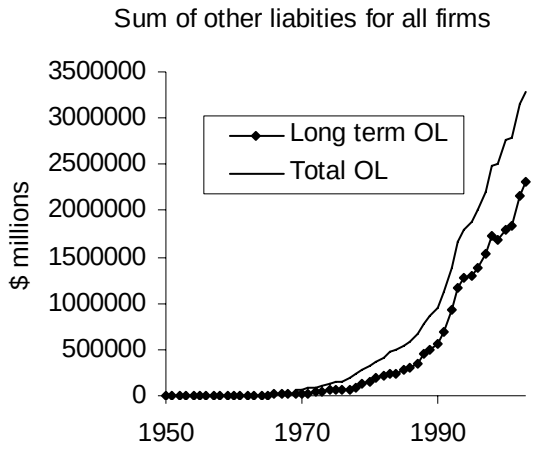

Figure A1: *Aggregate other liabilities*
The sample is all surviving and non surviving Compustat firms excluding insurance firms having SIC codes between 6300 and 6499. Further, to be in the sample, the firm must report total assets (data6) greater than 0. Current other liabilities is data72. **Long term OL** (other liabilities) is sum of long term other liabilities = sum(data75). **Total OL** is sum of long term other liabilities plus the sum of current other liabilities = sum(data75) + sum(data72). If either data72 or data75 is missing, their value is set to 0. Before 1963, current other liabilities (data72) is not reported.

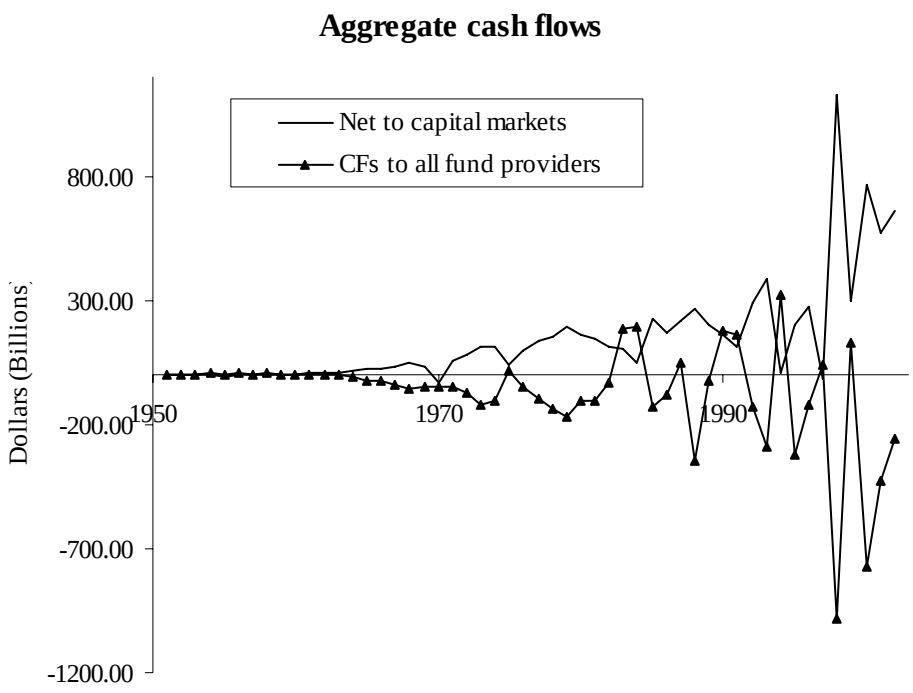

Figure A2: *Aggregate cash flows for fund providers*
The sample is all Compustat firms (excluding insurance firms, i.e. SIC codes between 6300 and 6499) with total assets greater than 0. **CFs to all fund providers** is the yearly fund flow to all providers; it is defined in Figure 1. Net to capital markets = fund flow to capital markets less the fund flow to all providers. Yearly fund flow to capital markets is defined in Figure 2.

Table A3: *Capital markets: The effect of changing other liabilities on IRR and firm survival rate*

The sample is all Compustat firms (excluding insurance firms, i.e. SIC codes between 6300 and 6499) in existence between 1950 and 1993 that have the information needed to do the required IRR computations. Panels A and C are for all firms in the period; Panels B and D are for S&P 500 firms in existence between 1984 and 1993. S&P 500 firms are selected if the firm is in the S&P 500 list in the base year of the IRR computation. Firms are **ranked** each year into five groups based on scaled change in other liabilities. **Scaled change in other liabilities (%)** is the difference between (a) other liabilities at time 10 and (b) other liabilities at time 0 all scaled by total assets at time 0 = (Other liabilities at t10 – other liabilities at t0) / (total assets at time 0). The variable **T0** is the base year of the IRR analysis where investment is determined. The variable **T10** is the terminal year of the 10 year IRR computation. **10 year IRR** is computed for capital markets as is described in Table 2. 5 year IRRs used in panels C and D are computed in a similar fashion, but over a horizon of 5 years. **Other liabilities** is total liabilities less the book value of interest bearing debt = data181-data34-data9. Total assets is data6.

In Panels C and D firms are categorized into two groups: (a) **Increasing other liabilities** – these are firms with an increase in their "Scaled change in other liabilities" and (b) **Decreasing other liabilities** – these are firms with a decrease in their "Scaled change in other liabilities". The correlation, i.e. **rho**, between the IRR (5 year or 10 year) and "Scaled change in other liabilities" is found for each of the two samples. Spearmans rank correlation test is used to determine the significance of the correlations. **dOL** is an abbreviation for "Scaled change in other liabilities." **Survival rate** is the fraction of firms in existence at five years that survive through at least ten years. The difference in proportions test is used to determine if the survival rates are significantly different.

Change in other liabilities versus IRR

Rank on scaled change in other liabilities	Sample size	Medians: Scaled change in other liabilities (%)	Other liabilities at t0	Other liabilities at t10	Total assets at t0	10 year IRR (%)
Panel A: All firms (1950-1993)						
0 (low)	17,765	-2.4	7.3	5.7	40	5.9
1	18,014	16.7	11.6	23.1	66	8.8
2	18,027	37.4	18.3	53.1	93	10.3
3	17,982	71.0	17.4	75.8	83	11.8
4 (high)	17,822	190.8	7.8	88.5	35	12.9
Panel B: S&P 500 firms (1984-1993)						
0 (low)	721	12	1727	2,359	6,118	9.4
1	729	34	1029	2,250	3,451	10.5
2	725	62	685	2,125	2,337	12.1
3	711	122	692	3,565	2,197	11.0
4 (high)	694	430	137	3,257	480	11.3

The correlation of change in other liabilities to IRR and survival rate versus change in other liabilities

	Increasing other liabilities	Decreasing other liabilities
Panel C: All firms – correlations and survival rates		
10 year rho: IRR to dOL	0.3*	0.08*
10 year sample size	78,713	10787
5 year rho: IRR to dOL	0.2*	0.10*
5 year sample size	115,073	25756
Survival rate	0.68	0.42^
Panel D: S&P 500 firms – correlations and survival rates		
10 year rho: IRR to dOL	0.1*	-0.02
10 year sample size	3,464	116
5 year rho: IRR to dOL	0.1*	0.10**
5 year sample size	5,304	398
Survival rate	0.65	0.29^

* p-value < 0.0001, ** p-value < 0.05; ^ p-value < 0.0001 for Ho: Survival rate for firms with increasing other liabilities = survival rate for firms with decreasing other liabilities.

Table A4: *Firms in the top decile of market value – Total IRR versus external financing at increasing levels of investment (1975-2003)*
The sample is all U.S. firms in Compustat (excluding insurance firms) between 1975 and 2003. Further, firms must be in the top decile of market value and have the information necessary to compute total firm IRR. To be included in the computation of IRR, a firm must survive through the horizon length (5, 10, or 15 years). Firms in the top decile of market value (data25*data199) are found by ranking firms by market value each year. The reported **IRR** is the average of the median value of the nominal realized total firm IRRs found each year; the computational details for computing IRR are given in the Figure 1. For the IRR computation, the initial investment is the book value of total assets. Terminal value is usually the book value of total assets for firms that survive through the horizon. The exception occurs when the firm exits the database in the horizon year, then terminal value is set equal to market value of equity plus book value of total liabilities Ranking is first done each year by amount of **investmen**t then by amount of **external financing** (both are scaled by total assets in the ranking year). Investment is the last two years of (a) capital expenditure (data128), (b) research and development (data45), and c) advertising (data46). If R&D or advertising are unknown they are set to 0. External money is the a) net debt issued over a two year period (data34+data9 at time t – their values at time t-2) plus (b) the net issuance of stocks over the last two years (i.e. sale of common and preferred stock less the purchase of common and preferred stock over a two year period = data108 at time t -data115 at time t + data108 at time t -1 - data115 at time t-1. **Book to market** is the book value of equity / market value of equity = data60/(data25*data199). The variable σ **for 10 year IRR** is the average of the yearly standard deviations.

Ranks		Average of the yearly median values							
Investment	External financing	Investment	External money	Total assets	Book-to-market	IRR: 5 year horiz.	IRR: 10 year horiz.	IRR: 15 year horiz.	σ for 10 year IRR
0 min	0 min	0.028	-0.137	53	0.984	0.069	0.067	0.067	0.093
0 min	1	0.031	0.011	82	0.907	0.067	0.069	0.069	0.302
0 min	2 max	0.028	0.238	109	0.736	0.064	0.063	0.065	0.096
1	0 min	0.087	-0.076	105	0.771	0.077	0.072	0.069	0.107
1	1	0.089	0.030	166	0.764	0.074	0.072	0.072	0.060
1	2 max	0.092	0.221	98	0.650	0.062	0.064	0.067	0.081
2 max	0 min	0.185	-0.032	60	0.572	0.079	0.075	0.075	0.125
2 max	1	0.193	0.113	81	0.562	0.072	0.071	0.071	0.085
2 max	2 max	0.252	0.511	27	0.355	0.022	0.049	0.053	0.125

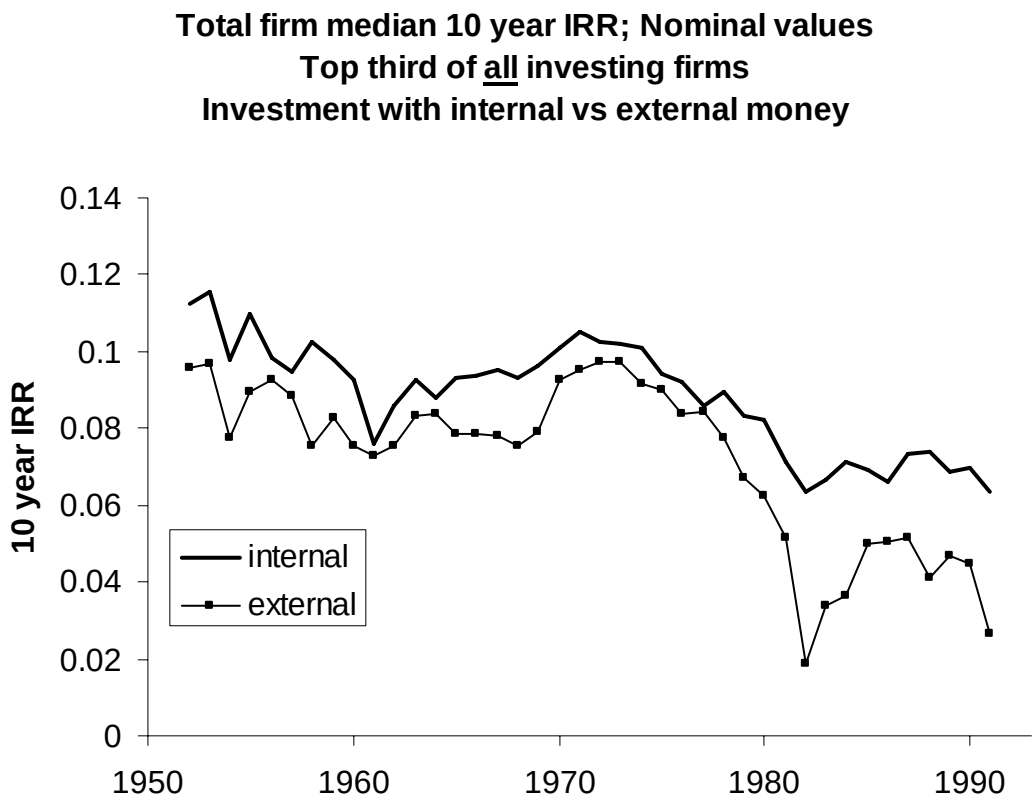

Figure A3: *All firms in the top rank of investment and top decile of market value – Median yearly total firm IRR for internal and external financing*
This figure plots the yearly median 10 year IRR for firms with the highest rank of investment level (rank = 2) for high (rank = 2) and low (rank=0) levels of external financing. **Interna**l means firms ranked 0 for external financing; **external** means firms ranked 2 for external financing. The sample, details of IRR computation, and ranking procedure are given in Table A4.

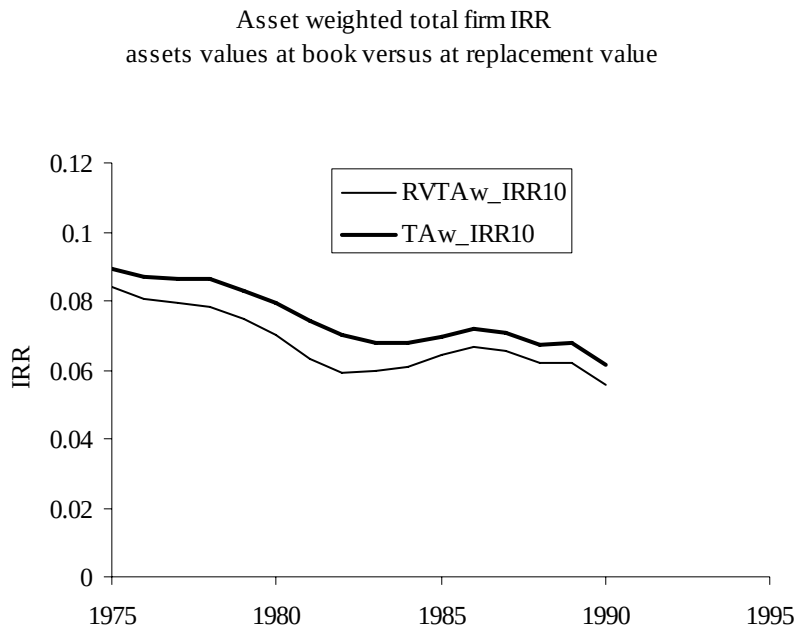

Figure A4: *Total firm IRR computed using the replacement value of total assets versus the book value of total assets*[25]
The sample is all firms with sufficient data to calculate the 10 year horizon IRR using both replacement value of total assets and the book value of total assets (data6). Replacement value is computed using procedures given by Lewellen and Badrinath (1997) and Lee and Tompkins (1999). Since replacement value requires data that large manufacturing firms usually have, the sample of firms is reduced by about two-thirds. For example, in 1980, total firm IRR for a 10 year horizon was calculated for 2,593 firms using the book value of total assets. In the same year there were only 952 firms with sufficient replacement value data to calculate the total firm IRR for a 10 year horizon. In 1980, this figure shows IRR computed both ways for just the 952 firms. This figure shows the 10 year horizon IRR calculated using book value (TAw_IRR10) for initial and terminal value versus using replacement value (RVTAw_IRR10). The calculations are done on the same set of firms from 1975 through 1990. The calculation procedure for TAw_IRR10 is described in Figure 1. The procedure for RVTAw_IRR10 is the same except replacement value of total assets is used in place of the book value of total assets.

[25] In unreported results we show that fixed assets are declining as a proportion of total assets through time.

Endnotes

[i] Fama and French (1999) (FF99) is the previous key investigation of long-term return on U.S. corporate investment. They conclude that the return on corporate investment is significantly greater than the weighted average cost of capital (WACC). We take issues with their study for a number of reasons.

First, the FF99 conclusion is methodologically predetermined. Return on investment is set to the discount rate that equates corporate cash flows to book value of equity plus interest bearing debt. WACC is set, by FF99, to be the discount rate that equates corporate cash flows to initial market value. The cash flows over time in these two mathematical problems are negligibly different. Since investors will not initially buy stocks unless they believe they will receive a return greater than the WACC, FF99 must find that that U.S. corporations only invest in positive net present value (NPV) projects regardless of corporate cash flows.

Second, FF99 do not explicitly include assets financed by non-interest bearing liabilities for two reasons. One is that they assume these assets earn an implicit return (equal to the cost of capital) that affects firm earnings; however, their method does not enable one to determine whether there is a wealth transfer from non-interest bearing liability holders to capital market participants. The second reason FF99 give is the claim that non-interest bearing liabilities are mainly due to an increase in short term trade receivables. However, long term other liabilities such as benefits promised to employees (See the appendix for extensive examples) have increased significantly. These long term type of management commitments are now backed by approximately 9.8 percent ($2.3 trillion) of all corporate assets compared to less than 1.7 percent ($1.4 billion) before 1960.

Third, the FF99 study follows the efficient market theory by making the assumption that a firm's market value is an unbiased estimate of the firm's future cash flows (i.e. the firm's terminal value). Shiller (1981), LeRoy and Porter (1981), and West (1988) have long argued that stocks are misvalued by the market. Shiller (2003) uses standard analysis of over 120 years of data to show that in the last 50 years U.S. stocks likely were significantly overvalued relative to the present value of dividends for all but a brief stretch of about seven years in the late 70s and early 80s. Return computations are sensitive to the assumed terminal value of the firm. If broad misvaluations occur for extended periods as the literature suggests, then the FF99 reported returns are biased significantly upward, especially over the time period of the FF99 study; however, FF99 do not explore the sensitivity of their results to extended periods of market misvaluation.

Fourth, FF99 compute firm cash flows by using accounting earnings and many values from both the asset and liability sides of the balance sheet. In the process FF99 make many assumptions. The net cash flow that investors actually receive is never found. The values that FF99 use are subject to manipulations as is evident from recent revelations about accounting irregularities in large U.S. corporations.

Finally, FF99 only investigate aggregate corporate returns. A study of individual firm returns is required to enable analysis of the characteristics of corporate capital allocation and the associated returns.

Technically our results differ from FF99 mainly because (a) we explicitly find the return earned on assets financed by non interest bearing liability holders, and (b) we avoid the use of, possibly biased, market valuation as the best estimate of the present value of future cash flows (PVFCFs) and instead derive an upper bound on the PVFCFs.