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Three Essays in Macroeconomic History

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THREE ESSAYS IN MACROECONOMIC HISTORY

A Dissertation Presented

by

J. W. MASON

Submitted to the Graduate School of the
University of Massachusetts Amherst in partial fulfillment
of the requirements for the degree of

DOCTOR OF PHILOSOPHY

September 2014

Economics

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by

J. W. MASON

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For Eli

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ABSTRACT

THREE ESSAYS IN MACROECONOMIC HISTORY

SEPTEMBER 2014

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Following Minsky, an economy can be understood as a set of units linked to each other by flows of money payments and by the commitments to future payments reflected on balance sheets. This dissertation offers three accounts of the historical evolution of the US economy, conceived of a network of balance sheets, over the course of 20th and early 21st century. The first essay looks at changes in the pattern of payment flows between nonfinancial corporations and financial markets associated with the “shareholder revolution” of the 1980s. It argues that the shift in payouts to shareholders from a quasi-fixed stream of dividends to a claim on every dollar actually or potentially available to the firm, has had important effects on the behavior of aggregate investment; in particular, it has weakened the link between corporate investment, on the one hand, and earnings and credit conditions, on the other. The second essay looks at household debt. It argues that that the evolution of household

debt-income ratios must be understood as a monetary phenomenon and not merely the reflection of developments in “real” expenditure and income. Decomposing the changes in household debt since 1929 using an appropriate accounting framework shows that changes in household behavior account for only a small part of the trajectory of household leverage over the past 80 years. The third essay applies this same broad perspective to the historical evolution of interest rate spreads. It argues that from a Keynesian perspective that regards interest as fundamentally the price of liquidity, there is no conceptual basis for picking out the difference in yield between money and a short-term government bond as “the” interest rate; there are many other pairs of asset yields the difference between which is determined on the same principles, and may have equal macroeconomic significance. This perspective helps make sense of the increasing gap between the policy rate and the interest rates facing most private borrowers.

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INTRODUCTION

While formally independent, these three essays share more than a common focus on the historical evolution of financial and macroeconomic variables in the United States. They share a common vision and, to a large extent, a common methodology.

The starting point for all three essays is the observation of Hyman Minsky (1993) that we do not need to think of an economy as a system in which scarce goods are exchanged on the basis of relative prices. As Minsky says, a network of markets

is not the only way that economic interrelations can be modeled. Every capitalist economy can be described in terms of interrelated balance sheets ... The entries on balance sheets can be read as payment commitments (liabilities) and expected payment receipts (assets), both denominated in a common unit. ... In this structure, the real and the financial dimensions of the economy are not separated. There is no “real economy” whose behavior can be studied by abstracting from financial considerations.

For Minsky, as for Keynes, the money payments and money commitments that constitute what we call the economy are an activity in themselves and must be understood on their own terms. They are not simply a reflection of an underlying non-monetary production and exchange of goods.¹ Balance sheets, on the one hand, and concrete productive activity, on the other, shape each other in far-reaching ways. But they are nonetheless two distinct systems. And both systems are composed of relationships between socially embedded human beings, not between commodities

¹It's worth noting that both Keynes' *General Theory* and Hicks' review of it that introduced the IS-LM diagram were written exclusively in nominal terms, reflecting a deliberate choice to describe the economy in terms of money flows rather than underlying “real” quantities. (Barens and Caspari, 1999)

conceived of as physical objects. To put it another way, production is not the allocation of a fixed stock of means between a known set of alternative uses, but a social activity carried out by human beings. Money and credit play a strategic role in this activity, allowing production a wider scale by coordinating the activities of productive units in the absence of central authority and other social ties. The dark side of this coordinating function of the monetary system is the disruptions to real production that occur when the network of money payments for any reason breaks down, and the power exercised through the money system over our collective and individual choices.

It was these kinds of considerations that led Keynes, when he spoke of being part of a revolution in economic thought, to describe it as a shift from conceiving of the economy in terms of “real exchange” to conceiving of it in terms of “monetary production.” (Leijonhufvud, 2008) As the compound nature of these terms suggests, this revolution – which is still to be accomplished – involves a double shift in perspective. First, one must see the network of money flows and commitments on its own terms, as an autonomous system. And second, one must look for the ways in which that autonomous system shapes and is shaped by concrete productive activity. All three of these essays, each in their own way, are attempts to perform this double shift.

The first essay, “Disgorge the Cash: From Funding Constraints to Rentier Constraints on Corporate Investment,” brings this Minskyan or “money view” (Mehrling, 2010) perspective to corporate finance. The essay looks at the changing pattern of payment flows between nonfinancial corporations and financial markets, and asks what the implications are for fixed investment. From an orthodox “real exchange” perspective, the question of what ownership rights are exercised over a corporation and how its profits are disposed of, should be entirely independent of the “real” outcomes of output and investment. This is the essence of the famous neutrality result of Modigliani and Miller (1958). But from the monetary production perspective of Keynes and his successors, investment and other forward-looking business decisions

can only be understood in terms of the patterns of cash payments and cash receipts associated with them. A firm's investment behavior cannot be understood in isolation from its financial position.

In this essay, I argue that there has been a fundamental shift in the relationship between sources and uses of funds for large nonfinancial corporations, reflecting a transformation of the relationship between the shareholders and managers. During much of the 20th century, access to funds was a major constraint on investment for US corporations, and investment was the main purpose of credit-market borrowing. In many cases, managers sought the highest level of investment for which funds were available. This was reflected in a strong correlation between fixed investment and cashflow from operations and borrowing, respectively. But since the "shareholder revolution" of the 1980s, shareholders exercised an effective claim on every dollar actually or potentially entering the corporation. Under this new regime, instead of trading off returns on investment against the cost of external funds, managers independently trade each of these off against the opportunity cost of increased payments to shareholders. As a result, the correlations of investment with cashflow and borrowing have become weaker, while the correlations of payouts to shareholders with cashflow and borrowing have grown stronger, especially at business-cycle peaks. This change can be observed in both aggregate and firm-level data.

The dissertation's second essay, "The Dynamics of US Household Debt, 1929-2011," applies the money view to the historical evolution of household debt-income ratios in the United States. While the first essay explores on way in which the system of balance sheets shapes concrete productive activity, here the emphasis shifts to the ways that the balance-sheet system may evolve independently of concrete production and consumption decisions.

A central methodological claim in this essay is that we cannot describe changes over time in the debt-income ratio without using an appropriate accounting frame-

work. The conventional division of household payment flows between consumption and saving is not suitable for this question. It is necessary, instead, to use an accounting framework that isolates net credit-market flows to a unit or sector from other sources and uses of funds, and to take account of changes in the debt-income ratio resulting from nominal income growth as well as from borrowing. To understand the implications of changing household income and expenditure flows for aggregate demand, it is necessary to distinguish expenditures that contribute to demand from expenditures that do not. Adapting the standard decomposition of public debt to household sector debt, I show that changes in income growth, interest and inflation rates explain, in accounting terms, a large fraction of the changes in household debt-income ratios observed historically. The rise in household leverage over the past three decades cannot be understood primarily in terms of increased household borrowing. For both the decade of the 1980s and the full post-1980 period, rising household debt-income ratios are mainly explained by the rise in nominal interest rates relative to nominal income growth. The rise in household debt after 1980 can be thought of as a debt-disinflation, analogous to the debt-deflation of the 1930s. In other words, it is fundamentally a monetary phenomenon.

The third essay, “Loose Money, High Rates: Interest Rate Spreads in Historical Perspective,” turns to the complex of market interest rates and their evolution over recent decades. Interest rates, I argue, cannot be understood as the price of current in terms of future production, but only as the price of liquidity – which is to say, the terms on which a unit can generate cash income as needed to meet its cash commitments. This is especially true when we consider the difference in yields, or spreads, between different assets, since these cannot be understood even in principle as the terms of exchange between the same real goods at two different dates. Nor in general can spreads be understood in terms of risk, where risk is understood as stochastic variation in the size of some bundle of real goods. Rather, liquidity – the

terms on which an asset can be used to make payments as needed – is central to the determination of spreads between yields, and interest rate spreads in particular.

Over the past 50 years interest rate spreads have widened substantially, both between longer and shorter maturity loans and between loans to riskier and less risky borrowers. In much of economic theory, the determination of interest rate spreads is analytically distinct from the determination of the overall level of interest rates. But from a Keynesian perspective that analyzes interest rates in terms of liquidity preference and conventional expectations, the overall level of interest rates and the variation in rates across different forms of debt are explained in the same ways. In this essay, I argue that this Keynesian perspective is particularly useful in explaining the rise in interest rate spreads, and that both conventional expectations and stronger liquidity preference appear to have played a role. The rise in the term and credit premiums is important for policy, because they mean that the low policy rates in recent periods of expansionary policy have not been reliably translated into low rates for private borrowers.

While the focus of this essay is, again, on the relative autonomy of the monetary system, the motivation for it, as for the other two, is a desire to understand how the evolution of that system shapes productive activity and concrete social outcomes. The explanation of high interest rate spreads may be found in the money system, rather than in production possibilities and consumption choices. But that does not diminish its importance for the conduct of monetary policy, the distribution of income, and the organization of productive activity through the credit system. If the structure of market rates is determined by the same financial factors as the overall level of interest rates, that is an argument for replacing or supplementing traditional monetary policy, with its focus on a single interest rate, with a “credit market policy” in which the authorities manage liquidity conditions more generally. (Pollin et al., 2011)

CHAPTER 1

DISGORGE THE CASH: FROM FUNDING CONSTRAINTS TO RENTIER CONSTRAINTS ON CORPORATE INVESTMENT

1.1 Introduction and Overview

In this essay, I suggest that the “shareholder value revolution” of the 1980s can help make sense of changes in the relationship between sources and uses of funds for the US corporate sector.

From the establishment of the modern corporation in the 1920s until the 1980s, decisions about corporate borrowing, investment and payments to shareholders were made by autonomous management. Corporate cashflow in excess of fixed (at least in the short run) dividend payments were at the disposal of management and served as low-cost funding for fixed investment or other corporate purposes. Meanwhile, the partitioned lending market and binding reserve requirements of the post-New Deal financial system meant that even creditworthy borrowers often faced credit rationing. In combination with generally high investment demand during this period, the result of these institutional features was that fixed investment was strongly constrained by financing. In this regime, profitability was important not only for investment demand, but also for its financing.

The various institutional changes in corporate governance and the financial system of the 1980s changed these relationships. Now shareholders exercised an effective claim not just on a firm’s long-run profits, but on all flows of cash available to it. Higher earnings no longer increased the pool of funds preferentially available for corporate purposes, since the decision to retain incremental funds rather than pay them

out had to be acceptable to the financial claimants who would otherwise receive them. At the same time, financial deregulation left creditworthy corporate borrowers facing a more elastic credit supply than in the postwar era. Together, these changes weakened the link between the supply of funds to corporations and their level of investment. In the new rentier-dominated regime, this relationship is increasingly replaced with a link between the supply of funds and the level of payouts to shareholders. This transformation of the corporate financing decision, I argue, can help explain a number of important recent macroeconomic developments, including the puzzling absence of evidence for direct links from the financial crisis of 2008 to the fall in corporate investment over 2008-2009.

The essay is organized as follows. The opening section presents the argument that for large corporations, the marginal use of funds has increasingly shifted from fixed investment to shareholder payouts. The next section motivates the analysis by offering a brief discussion of credit constraints in the Great Recession. The next section presents the institutional and historical context, arguing that the changing place of shareholder payouts in the firm's financing decision can only be understood in the context of owner-manager conflict and the increasing dominance of shareholders as a result of a variety of political and institutional changes after 1980. Then in Section 1.4, I suggest a simple analytic framework for thinking about the change in the corporate financing decision, updating Hyman Minsky's well-known model of the corporate financing decision for the era of rentier dominance. Section 1.5 then offers quantitative evidence for the change in the corporate financing decision described in the previous section. Using both aggregate time-series data from the Flow of Funds, and firm-level data from Compustat, I show that the relationship between corporate cashflow from operations, borrowing, investment and shareholder payouts has changed in ways consistent with the analysis presented in earlier sections. The correlations between investment and borrowing and cashflow respectively have grown

weaker, with a clear regime change in the first half of the 1980s. Meanwhile, the correlations between shareholder payouts and borrowing and cashflow, respectively, have grown stronger, especially at business cycle peaks. The final section suggests some implications for policy, and concludes.

1.2 From Funding Constraints to Shareholder Constraints

1.2.1 Investment and Finance: A Review of the Literature

Prior to the 1970s, studies of business investment generally started from the premise that internal and external funds were not perfect substitutes.¹ To early writers on business investment, it seemed clear that changes in financial conditions played a central role in investment fluctuations. The deep falls in investment associated with recessions were largely or entirely explained, in this framework, by the fall in internal funds associated with declining sales, combined with more restricted access to external funds. (Gurley and Shaw, 1956; Meyer and Kuh, 1966) Internal funds were assumed to be cheaper, from the point of view management, than borrowed funds, which in turn were cheaper than new equity issues. And except for the largest firms, the supply of external funds to the firm was assumed to be inelastic and, and absolutely rationed above some ceiling, with the marginal cost of external funds normally greater than the market interest rate. On a theoretical level, a number of explanations were suggested for this wedge. Raising external funds might involve significant transaction costs, or result in less favorable tax treatment, for instance due to higher taxation of dividends than capital gains. Use of external funds might be limited by the costs associated with bankruptcy or financial distress. External finance might create or exacerbate agency problems between shareholders, bondholders and management, or involve moral hazard. If managers were faithful agents of sharehold-

¹There is a good survey of this literature in Fazzari, Hubbard and Petersen (1988).

ers, for example, they would seek to take on excessive leverage from the point of view of bondholders; thus bonds typically include covenants limiting a firm's leverage or requiring it to maintain a minimum cushion of working capital. Or, asymmetric information between managers and external lenders might create a "lemons" problem in which lenders' inability to distinguish between the quality of investment projects leads to even "good" firms getting credit-rationed. (Greenwald, Stiglitz and Weiss, 1984)

However they arose, financing constraints were presumed to be important for all except the largest firms, and financial capacity appeared to be an important constraint on business investment. Because of the wedge between the prevailing interest rate and the borrowing cost facing firms, internal funds served as the preferred source of investment finance; credit would be sought only once internal funds were exhausted, and equity funds would be raised only once the firm's borrowing capacity was exhausted in turn. This was the "financing hierarchy" or "pecking order" of investment finance. (Myers and Majluf, 1984) Shareholders were paid a conventional dividend, which was adjusted only slowly in response to changes in the flow of earnings. So retained earnings could be allocated to fixed investment or other purposes at the discretion of management. Thus, early work on investment finance often treated financing as an important factor in variation in business investment across firms and over time.

One can identify two major strands within this literature, based on the treatment of management's investment decision. The larger strand explicitly gives management an objective function of maximizing shareholder wealth, despite the fact that this sits uneasily with the assumptions of asymmetric information, principal-agent problems or moral hazard that often motivate the existence of financing constraints in the first place. (Whited, 1992; Fama and French, 2005) A smaller but influential strand starts instead from the premise that management pursues growth, prestige, or some

other objective that is at least potentially in conflict with shareholder wealth. (Berle and Means, 1991; Jensen, 1986; Jensen and Meckling, 1976) Post Keynesian and heterodox writers can be found on both sides of this divide; see the essays collected in Pollin (1997*b*) and Davidson (1993) for a good sample of heterodox thought on these issues. Unlike Berle and Means and Jensen and his coauthors and followers, heterodox writers who see distinct objectives for management vis-a-vis shareholders do not assume that the interests of the latter have a stronger claim on either normative or efficiency grounds. Heterodox writers are also more likely to frame these questions in terms of a historical process.² For the first strand of investment-finance literature, the market failure was, in effect, the high cost of external funds relative to internal funds; with managers seeking to maximize shareholder wealth, the latter represents the true social opportunity cost of investment. For the second strand, the market failure was the low opportunity cost assigned by management to internal funds; from this point of view, the relevant opportunity cost was the cost of external funds and if internal funds were used to carry out investment projects that would not have been undertaken with external funds, that was a form of “managerial waste.”

Empirical work on the “pecking order” hypothesis continues to be well represented in the finance literature. But in economic theory, the idea of finance as a binding constraint on investment was increasingly displaced from the 1970s by the Modigliani-Miller hypothesis that capital structure is irrelevant for firms’ decisions about production and investment. The demonstration that, under certain conditions, investment decisions would be independent of the structure of a firm’s liabilities, opened the way for a reassertion of the neoclassical investment function, in which investment is simply the solution to an intertemporal optimization problem defined

²A noteworthy exception to the tendency of non-heterodox writers to pose their question in terms of the behavior of firms and markets in general, is Brown and Petersen (2009)

by the cost of capital, the production function, and any adjustment costs associated with changes in the capital stock. (Hall and Jorgenson, 1967)

The result was a curious bifurcation of the literature on corporate investment. On the empirical side, the role of credit constraints in investment continued to be an active research program. A new wave of empirical studies came in the 1980s, including notably Whited (1992) and Fazzari, Hubbard and Petersen (1988), both of which identified credit constraints using variation across classes of firms in the correlation between investment and cashflow from operations. Both papers found strong evidence for credit constraints and attracted many imitators. The papers had somewhat different theoretical frameworks, with Whited (1992) motivating the existence of a cashflow-investment correlation on the basis of an otherwise neoclassical firm maximizing shareholder wealth in the presence of unspecified financial frictions, while Fazzari, Hubbard and Petersen (1988) was much more engaged with the earlier, more eclectic literature on corporate finance. But for both papers, the critical assumption was a significant wedge between the cost of investment financed out of retained earnings and the cost of investment financed externally. Later papers (including subsequent papers by Fazzari and coauthors) generally followed Whited and derived their tests for credit constraints from a formal model of intertemporal optimization – “management” was simply shorthand for the first-order condition for the maximization of shareholder net worth.

The financial crisis of 2008 launched a new round of sophisticated empirical work on credit constraints and business investment. This latest round of empirical credit-constraint research is more divided in its results. Unsurprisingly, many studies do find evidence of a reduced credit supply after the Lehman failure in fall 2008. (Adrian, Colla and Shin, 2012; Becker and Ivashina, 2011; Erel et al., 2011) The role of bank distress in the post-crisis fall in business investment is more controversial. A number of studies do find a substantial role for credit constraints in the sustained decline in in-

vestment after 2008. (Almeida et al., 2009; Amiti and Weinstein, 2013; Duchin, Ozbas and Sensoy, 2010; Edgerton, 2012). But others offer more ambiguous evidence, finding that credit spreads narrowed during the recession (Montoriol-Garriga and Wang, 2011), that borrowers were effectively able to substitute away from bank credit to sources of external finance less impaired by the crisis (Ivashina and Scharfstein, 2010; Campello et al., 2011; Garcia-Appendini and Montoriol-Garriga, 2013), that the real effects of reduced credit supply appear to have been limited to the smallest firms (Greenstone and Mas, 2012; Chodorow-Reich, 2012), or that the effects of reduced credit supply appear too short-lived to explain the sustained fall in investment (Rahaman and Sun, 2012). A few studies reject outright a macroeconomically important role for credit supply in the post-2008 fall in business investment.³ (Kahle and Stulz, 2013; Kremp and Sevestre, 2013)

But there has been no theoretical equivalent of this rich empirical literature. There has been little systematic analysis of why firms might be finance-constrained, what explains the existence (and size) of the wedge between the perceived costs of internal and external funds. Indeed, the empirical literature seems to actively avoid these questions: A typical study suggests that “what is special about credit crises is that financial markets are arguably less than frictionless during those times,” without committing itself to any particular account of those frictions. (Almeida et al., 2009) Other empirical studies entirely abandon the specific role of credit as investment finance, treating credit instead as an input to current production. (Duygan-Bump, Levkov and Montoriol-Garriga, 2010; Chodorow-Reich, 2012; Greenstone and Mas, 2012) Some recent theoretical work does address the generic issue of liquidity constraints in an interesting way. (Farhi and Tirole, 2012; Holmström and Tirole, 2011; Tirole, 2011) But compared with the psychologically complex, institutionally specific

³A more general argument that reduced credit supply played only a limited role in the recession of 2008-2009 and subsequent slow recovery is made by Mian and Sufi (2014).

accounts offered by Keynes and the first generation of his successors, recent systematic treatments of the investment-finance nexus are thin. The question of why managers might pursue some goal other than maximization of shareholder wealth, and, if so, what that might be, is if anything even less explored. This question is difficult to pose in the context of the “rational expectations revolution,” which excludes these more sociological questions from the domain of economic analysis. The possibility of conflicts between a firm’s managers and its notional owners has been much more thoroughly explored by sociologists and legal scholars than by economists.

1.2.2 Alternative Views of the Investment-Finance Nexus

in this subsection I describe some alternative approaches to these questions, which I believe will be more productive for motivating the empirical work of the second half of the paper. There are two issues to consider here. First, how should we think about corporate finance in relation to the investment decision? And second, how should we think about the relationship between shareholders (or other financial claimants) and the firm’s professional managers?

The starting point for critical analysis of the corporate financing decision is Hyman Minsky’s description of the fundamental problem facing economic units as matching cash inflows to cash payments over time. That is, “Capitalism is *essentially* a financial system.” (Minsky, 1967) The essence of Minsky’s “Wall Street paradigm” is that “cash flows and the network of financial interrelationships must be examined before considering issues of production and distribution.” (Pollin and Dymski, 1992) From this perspective, there is nothing puzzling or in need of explanation about the wedge in perceived cost between internal and external funds. Obtaining external funds implies a contractual commitment to future repayment and thus, by definition, reduces a unit’s liquidity, understood in the Keynesian sense of access to funds relative to payment commitments. (Beggs, 2012) In the Walrasian paradigm that has dominated

economics in recent decades, the default assumption is that economic units face an infinitely elastic supply of credit at the market interest rate. But in the Minskyan paradigm, debt commitments always involve both “lender’s risk” (of nonpayment, especially under conditions in which the lender’s liquidity needs are also salient) and “borrower’s risk” (of loss of control over the financed project, especially relevant for professional managers). (Minsky, 1980) The existence of an upward-sloping supply curve for external funds and a hierarchy of finance arise naturally in this framework; they don’t require any special explanation in terms of information asymmetries, moral hazard, etc.

While Minsky’s “Wall Street paradigm” remains as relevant as ever, its concrete application must be specific to the historical and institutional context. Minsky’s analysis of the dynamics of investment and credit was necessarily shaped by the financial and corporate-governance arrangements of the postwar period in which it was developed. His last major work, *Stabilizing an Unstable Economy*, was published in 1986 but was really still describing the financial universe of the 1960s and 1970s. “The book took little account of the sea change taking place during the Volcker-Reagan years, except to deplore it.” (Mehrling, 1999) This is not intended as criticism; one of Minsky’s great strengths was his attentiveness to the concrete particulars of the banking system. But this means his vision cannot be carried over straightforwardly to a different set of financial arrangements.

One important aspect of the Minskyan vision that must be revisited in the light of that sea change is the relationship between the owners of financial assets and the management of nonfinancial firms. For much of the 20th century, shareholders’ status as owners or residual claimants was mostly notional; in practice shareholders were passive income recipients, with management free to dispose of the firm’s funds once a conventional dividend had been paid. Since the 1980s, however, shareholders have actively exercised their first claim on all “their” firms’ funds, borrowed as well

as earned. For now fundamental point is that, unlike the period when Minsky was writing, firms are under intense pressure to maximize cash payments to shareholders. At the same time, changes in financial system have resulted in more credit allocation by price rather than quantitative limits. (Krippner, 2011) The result is that for many large firms, the financial constraint on investment and other uses of funds is not the flow of cash *into* the firm, via earnings or borrowing, but the flow of cash *out* of the firm via dividends and stock repurchases.

The key question for the purposes of this essay is how the reassertion of shareholder power since the 1980s affects the relationship between investment and other macroeconomic variables. Crotty (1990) suggests that “institutional change in the past decade has given Keynes’ rentier domination thesis a degree of relevance it previously lacked. ... the validity of the hypothesis that financial markets dictate ... investment decisions changes with institutional conditions and historical circumstances.” While agreeing with the spirit of this remark, I suggest that, counterintuitively, the shareholder revolution may in fact have left investment *less* sensitive to conditions in financial markets.

1.2.3 Managers and Rentiers

To an important extent, managers and owners consist of two differing groups of people, operating in two different institutional contexts, and on many margins where the firm makes decisions their preferred choices may diverge. Classic statements of the importance of the separation of management from ownership of enterprises include Veblen (1923), Chandler (1977), and Berle and Means (1991). For present purposes, one particularly important aspect of this separation is that, in a world of absentee ownership, the wealthy are primarily owners of financial assets, that is, of claims on production rather than directly of productive assets themselves. In other words, “the emergence of a bourgeois class more or less separated from the enterprise” created

a new sociological gulf between the ownership of capital and the management of production, and “gave the capitalist class a strong *financial* character.”(?, emphasis in original)

The distinction between ownership and management has not, in general, played a large role in modern macroeconomic theory. Most discussions of corporate investment, borrowing, and other decisions assumes that managers and shareholders are identical, or that the former are faithful agents for the latter. There is an important exception, discussed below, in the corporate governance literature, which focuses on agency problems, but elsewhere the assumption continues to be that the firm can be adequately theorized as maximizing the present value of shareholder wealth. Even Keynes, while acknowledging the distinction between wealth-owners and managers (or “entrepreneurs”), assumed that in conflicts, it was always the rentiers who won. (Crotty, 1990) While the idea of asset-owner dominance may arguably have described the bank-centered financial capitalism of the early part of the century, this view was already obsolete by the mid-1930s when Keynes was writing. Nonetheless this strand of Keynes’ thought was adopted by most subsequent Keynesian economists, including some who in other respects were critical of the postwar consensus. In this view, when a firm faces a new investment opportunity, “The securities markets appraise the project, its expected contributions to the future earnings of the company and its risks.” (Tobin and Brainard, 1977) So all investment decisions are really made in financial markets; there is no role for autonomous management.

An alternative view, going back at least to Berle and Means, is that the management of the public corporation pursues its own objectives, largely unconstrained by financial markets. While autonomous management presumably still places a high value on profitability, the practical and psychological identification of managers with their own firm will lead them to make different appraisals than shareholders of the expected returns and risks of particular projects. In this view, “the primary objective

of top management is the long-term reproduction, growth and safety of the firm itself. ... For the managerial firm, dividend payments, like interest payments, are a cost of autonomy from capital market constituents.” (Crotty, 1990) This view of managers as wholly autonomous reached its high point at mid-century. In the early postwar period, the exercise of any substantive control by shareholders over “their” corporations seemed as anachronistic as a feudal nobility – a comparison made explicitly by management theorist Peter Drucker:

The mass-production revolution has completed the destruction of the power of the land-owning aristocracy of the *ancien regime*... But it has also dethroned the ruling groups of bourgeois society: the merchant, the banker, the capitalist. ... Where only twenty years ago the bright graduate of the Harvard Business School aimed at a job with a New York Stock Exchange house, he now seeks employment with a steel, oil or automobile company. (quoted in Davis, 2009)

The idea that capitalists had been evicted from the corporation is perhaps as extreme and one-sided a picture as Tobin’s vision of managers as stenographers passively taking down financial markets’ instructions. But Drucker presumably expresses the way many corporate managers saw themselves at the time.

While there was never a consensus on the full economic or political implications of managerial autonomy, there was broad agreement across a range of perspectives that a managerial firms will typically pursue a higher level of investment than a firm following the purely financial criteria suggested by Tobin. For critics of the shareholder-value revolution (discussed immediately below), this greater willingness to tolerate the risks of fixed investment (and other projects with large upfront costs and uncertain, long-term returns, such as research and development) is an important argument in favor of the managerial firm. (Lazonick, 1992) Again, however, it is important to stress that while the separation of ownership and control has been a major topic for historians and sociologists of American business, it has remained a specialist concern within economics. For the majority of work in macroeconomics and

finance, the governing assumption is that “managers act on behalf of the stockholders in order to maximize the value of the firm.” (Whited, 1992)

1.2.4 From Credit Constraints to Rentier Constraints

A number of recent studies of investment finance have found a weaker link between credit conditions and corporate investment, compared with the earlier period that provided the data for the first round of empirical studies of the invest finance nexus in the 1980s. This change has sometimes been ascribed to technological progress in the financial sector, which has removed the frictions that formerly led to credit rationing. (Brown and Petersen, 2009) Here I suggest an alternative explanation. Seemingly anomalous movements of investment, borrowing, shareholder payouts and profits can be made sense of in terms of the 1980s-era transformation of corporate governance. This “revenge of the rentiers” (Smithin, 1996) re-established maximization of shareholder value as a binding constraint on US corporations, with important implications for the financing decision facing management. Once shareholders were able to effectively exercise their claim on the firm’s cashflow, internal funds could no longer serve as a low-cost source of investment financing. Shareholders also exercised effective claims on firms’ borrowing capacity, with firms seen as providing insufficient payouts coming under pressure to take on additional debt. At a macroeconomic level, these institutional changes led to higher and more variable payouts to shareholders, and to higher corporate leverage. At the same time, regulatory and institutional changes within the financial system meant there was a shift from quantity rationing of credit to price rationing (via the interest rate), at least for more creditworthy borrowers. Together, these changes have weakened or even severed the link between corporate borrowing and corporate investment. Under the rentier-dominated regime of recent decades, I suggest, corporate finance is decreasingly a system for getting funds into firms, and increasingly a system for getting funds out of them. This is a point some-

times made with respect to equity financing, but I suggest it applies to borrowing as well. (Lazonick 2008) During the 1980s, the central problem to be solved by the financial system shifted away from how to provide capital to borrowers with promising projects, and increasingly shifted toward “how to motivate managers to disgorge the cash rather than investing it at below the cost of capital.” (Jensen, 1986). So while it may still be true that “the most stable and least easily shifted element in our contemporary economy” is the minimum return “acceptable to the generality of wealth-owners” (Keynes, 1936), there has been a shift in the point at which this fundamental constraint operates.

Formal models of investment continue to assume that firm assets are wealth for the firm’s “owners,” and that dividend payments and share repurchases are, in effect, simply moving money from one pocket to another. In this framework, there is no reason in the absence of specific tax or regulatory distortions for households to prefer to hold their wealth directly rather than indirectly as corporate assets. But actual wealth holders do not appear to see things this way. Converting wealth within the firm to wealth in the form of money is evidently highly valued by holders of financial claims against corporations, and a central source of conflict between them and corporate management. Because the notion of a “rentier constraint” on the corporate finance decision is somewhat novel, it is worth quoting from the business press at length to establish the salience of this constraint for corporate managers.

- “Corporate treasurers are shoveling investment-grade bonds out the door to raise money to buy back shares.”
- “An increasing number of US companies are doing buy-backs because the economics of such a move have probably never been better, according to bankers. Debt has become a cheaper source of capital, and this has helped to fund the biggest year for buy-backs since 2007. ... ‘I don’t think buy-backs are going to slow. There’s so much cash on the sidelines that shareholders want,’ said

Robert Leonard, managing director of the special equity transactions group at Citigroup.”

- “US blue-chip companies from Philip Morris to AT&T are taking advantage of cheap debt to finance share buy-backs and mergers and acquisitions activity at an accelerated pace.”
- “Marianne Lake, chief financial officer, told analysts the company could reach the new target faster but wanted to be able to also do ‘capital distribution to you guys’, by releasing profits rather than retaining them.”
- “Issuing debt to buy equity has become more attractive in recent months due to bold central bank action, which has pushed bond yields to record lows. ... Last year, Apple announced \$10bn of share buybacks and said it would return \$100bn to investors over the next three years, funded in part by a \$17bn corporate bond. ... Companies are also using cheap money from the bond markets to fund special dividends. The discount warehouse club Costco, for example, borrowed \$3bn from the markets late last year to fund a special dividend.”
- “An activist hedge fund has thrown down the gauntlet to Apple, pushing it to consider new ways to return billions of dollars to shareholders ... Apple said it would consider the idea... ‘Apple’s management team and board of directors have been in active discussions about returning additional cash to shareholders,’ the company said in a statement.”
- “The biggest US companies may have as much as \$2tn in cash available to spend in 2012, powering a potential surge in share buy-backs and dividend payments, [thanks to] a combination of cash on the books plus low levels of leverage and strong expected profits... Amid a struggling global economy, US companies in most industries have been hesitant to launch major new investments or complete

large acquisitions, and have been primarily using cash to repurchase their shares and pay dividends. ‘If more firms were optimistic about the future and seeing new opportunities, this money could go to investment,’ said Marc Zenner, head of Corporate Finance Advisory at JPMorgan. ‘Doing share buy-backs is a less risky option, especially when valuations are low. It shows capital discipline and enthusiasm about the stock’s future, and can also fend off activists.’”⁴

For present purposes, there are three key claims in stories like these, all of which are explicitly made in the final passage above. First, US corporations are “primarily” using available cash for dividends and share repurchases. Second, using funds for payouts is an alternative to using them for investment, where adequately profitable opportunities continue to be seen as limited. And third, one reason to make large payouts to shareholders is to “fend off activists.” An additional point often made in the business press is that payouts are often limited by a firm’s borrowing capacity. Corporations engaged in stock buybacks are often described as seeking to issue the maximum quantity of bonds that will not trigger a ratings downgrade. While business-press articles do not put it this way, in analytic terms this is clearly describing an upward-sloping credit-supply curve.

The fact that a number of high-profile companies are described in the business press as issuing new debt to fund shareholder payouts rather than increased fixed investment is not, in itself, establish that there has been a macroeconomically important shift in the relationships between these flows. But it does give such a shift some *prima facie* plausibility and is an argument for investigating the possibility more systematically. The argument of this paper is that, in fact, the picture of the corporate

⁴All quotes from *The Financial Times*: “Investors Hanker after the Old Normal,” January 28, 2013; “Low Bond Yields Fuel Corporate Buy-backs,” December 7, 2011; “Blue Chips Borrow to Fund Buy-backs,” May 11, 2011; “Jamie Dimon Cautions on Loan Profits,” July 12, 2013; “Executives Cash in as Cheap Debt Funds Buybacks,” May 21, 2013; “Apple under Pressure on \$137bn cash pile,” February 7, 2013; “US Groups Have \$2tn to Play with This Year,” January 5, 2012.

financing decision presented in articles like these is consistent with the scholarly literature on the transformation of corporate governance over the past 30 years. If we take this picture seriously, we need to modify our macroeconomic theory accordingly.

1.3 The Transformation of Corporate Finance

1.3.1 The Rise of “Shareholder Value”

During much of the 20th century, the picture painted by Drucker of a “dethroned” capitalist class had, if exaggerated, an important element of truth: Managers enjoyed a substantial degree of operational autonomy from shareholders and other financial claimants, and often conceived of their role as extending beyond maximizing returns to shareholders. But since 1980, there has been a transformation in the relationship between owners of financial assets and their agents in finance, on the one hand, and the management of corporations, on the other. Initially, this transformation had a strong element of conflict, with organized shareholders coercively asserting their control over a distinct group of managers. Over time, this conflictual aspect receded – though it has never disappeared – and rentier control came to be asserted more through the adoption by managers themselves of “shareholder value” as their overriding goal.

There were a variety of dimensions of this rentier reassertion:

1. Intellectual. The idea that corporations exist solely to maximize shareholder wealth is as old as the corporation itself, and in the early part of the century it was accepted legal and economic doctrine. But it largely receded from view during the middle of the century. The idea that the stock market could enforce this principle by offering a “market for corporate control” was reintroduced by Manne (1965), but it initially had little impact on either the theory or practice of corporate governance. It was the work of Michael Jensen and coauthors that brought the idea of takeovers and restructurings as tools for compelling management to put the interests of shareholders above those of

other corporate stakeholders. (Jensen, 2000, 1986, 1993; Jensen and Meckling, 1976) Over time, the ideas that shareholders are substantively the owners of the corporation, that maximizing returns to shareholders is the only function of the corporation, and that pursuit of other goals by management is a serious problem that needs to be solved by appropriate institutions, including a market for corporate control, came to dominate much economic and legal thinking about corporate governance.

2. Legal. A number of legislative and administrative reforms made it more feasible for shareholders to assert their notional power over management. Among these were legal challenges to laws limiting hostile takeovers of corporations, including the Supreme Court's 1982 decision in *Edgar v. MITE* striking down Illinois' anti-takeover law and similar laws in other states. (Davis, 2009) Also important was the revision of anti-trust regulations by the Reagan Justice Department, also in 1982, which relaxed the limits on concentration within industries. This opened up new possibilities for intra-industry mergers and undermined logic of conglomerates, the major initial target of hostile takeovers. (Roe, 1996)
3. Institutional. As discussed below, financial market changes made takeovers and other changes of control more feasible; one dimension of this was a broadening of the funds available to finance changes in corporate control, as the rules on the classes of investments permissible by various institutions funds were progressively relaxed, starting with pension funds in the 1970s and S&Ls in the early 1980s. (Lazonick, 2008) This also broadened the market for corporate bonds, contributing to the flattening of the credit-supply schedule described in Section 1.3.2. Somewhat later, the generalization of stock options and related compensation practices, plus much greater inter-firm mobility of top manage-

ment, changed the incentives and worldview of top executives, to be closer to that of shareholders.

4. Ideological. The idea that the creation of shareholder value is the sole purpose of corporation, and of economic life in general, has been widely adopted in the business press and culture at large. Combined with this was a decline in the idea of the corporation as a social organism or institution with an autonomous social purpose and with stable relationships with its employees, customers and suppliers, and communities where it operated. Indeed, this shift extended beyond the corporation throughout social life. The breadth of this vision suggested that America was becoming a “portfolio society” dominated by the “capital fiction,” in which all social relationships are evaluated as income-yielding assets. (Davis, 2009)

During the 1980s, the central front in the shareholder revolution was the hostile takeover and related changes in corporate control. Blair (1993) gives a good summary, which probably reflects the most broadly-held view of this period:

Takeovers and financial restructurings were devices ... used to discipline corporate managers and pressure them to increase cash flows and pay out more money to shareholders and other investors. ... [During the early 1980s, falling profits] at many firms ... triggered a dispute over whether these companies should retain cash for reinvestment or speed up the rate at which they paid it out to investors.

In the early part of the decade, tender offers, hostile takeovers, and leverage buyouts emerged as the weapons of choice... Potential target firms often fought off unwanted takeovers by embarking on stock buyback programs or otherwise providing improved payouts to shareholders. Some firms financed these payouts with current cashflows, but many others used borrowed money.

... early empirical work showed that shareholders of target firms were, in fact, made wealthier by takeovers. ... In many cases improved returns could be achieved only by obtaining concessions from suppliers or customers, reducing the amount of taxes paid, extracting wage concessions.... Or they could come from reducing investment. In other words, the improved returns to shareholders had to be achieved at the expense

of other social goals of the corporations. ... **the specific sin of management that the financial markets were eager to correct was managers tendency to ... overinvest.** (emphasis added)

As Blair emphasizes, while takeovers, LBOs and mergers were often justified on the grounds of increasing efficiency, the most important grounds of the conflict were not the profitability of current operations, but the disposition of the profits they generated.

The takeover movement was quantitatively large, comparable to the previous great merger waves of the turn of the century and the 1960s. Nearly half of US corporations received takeover offers at some point during the decade, and in several years acquisition volume reached the historically high level of 10% of total stock market capitalization. (Holmström and Kaplan, 2001) Among Fortune 500 companies, 28 percent were the object of takeover attempts, the majority hostile and the majority successful. (Davis, 2009) These takeovers were clearly understood as efforts by the owners of financial assets to “discipline” their agents, the managers of nonfinancial corporations. (Scharfstein, 1988)

The era of hostile takeovers did not extend past the 1980s; KKR’s takeover of RJR-Nabisco was the last major deal of its kind. By the mid-1990s only 5% of tender offers were contested, compared with as many as 40% a decade earlier. (Holmström and Kaplan, 2001) The decline of the hostile takeover was the result of both declining performance of these deals in the later 1980s, and a less favorable legal and regulatory environment, symbolized by Michael Milken’s conviction for securities fraud in 1990. By the end of the 1980s, more than 40 states had passed new anti-takeover laws. In Delaware, where the bulk of large American corporations are incorporated, the state Supreme Court ruled in *Paramount Communications v. Time Inc.* that boards had broad latitude to refuse a takeover offer. Twenty-nine other states had explicitly granted boards this authority by state law. (Blair, 1993)

The disciplinary aspect of the rentier-management relationship was now more likely to take the form of shareholder activism, with large outsider investors publicly pressuring management to increase payouts and adopt “value-enhancing” policies, pushing for seats on the board, sponsoring resolutions and threatening to sell their shares *en masse*. Coordination between activist shareholders was significantly eased by a 1992 SEC rule change that eliminated onerous disclosure requirements for communication between shareholders. (Holmström and Kaplan, 2003) Combined with behind-the-scenes pressure, this kind of shareholder activism acted as a nontrivial constraint on managerial autonomy. (Henwood, 1998) Initially, public pension funds were the leaders in this form of rentier activism, along with a few individual activist investors. But other classes of institutional investors have since adopted the tactic of acquiring large stakes in corporations and then using them to pressure management into adopting more shareholder-friendly policies. Hedge funds, for example, made only 10 13D filings in 1994, the first year for which records are available. (13Ds are the legally required disclosures investors must file with the SEC when they acquire a stake of 5% or more in a publicly-trade corporation.) In 2007, hedge fund 13D filings peaked at 272. (Bebchuk, 2013) As with the earlier takeover movement, while the rhetoric of shareholder activism might highlight productive efficiency, the substance of the conflict was the division of the funds available to the firm between internal uses and distribution to shareholders. A recent examination of shareholder activism does find significant positive excess returns to shareholders at corporations targeted by activists, but adds: “We did not see evidence that targets’ financials improved... The targets’ leverage and payout, however, did seem to increase, suggesting that the activists are unlocking value by prompting management to return additional cash to shareholders.” (Zhao and Wang, 2013) Note that here, as in the earlier takeover movement, “unlocking shareholder value” does not simply mean redistributing existing cashflows, but also more fully utilizing the firm’s borrowing capacity.

Increasingly after 1990, adversarial relationship was replaced by acceptance of maximizing shareholder value as “holy writ” by managers themselves. (Davis, 2009) By 1997, the repudiation of managerialism was sufficiently thorough for the Business Roundtable – representing the CEOs of the 200 largest American companies – to change its position on business objectives (after years of opposition) to read “the paramount duty of management and the board is to the shareholder and not to...other stakeholders.” (Holmström and Kaplan, 2003) One reason for this reorientation of management priorities was the change in executive compensation practices that began in the 1980s but came into its own in the 1990s. Executive pay both rose steeply in absolute terms and increasingly took the form of stock options; by the mid-1990s, options accounted for half of the compensation of CEOs at large US corporations. (Lazonick, 2008) Less dramatic than the growth of stock-based executive pay but arguably just as important was the change in the career trajectory of successful managers: They were now less likely to reach executive positions through promotion within a given firm, which necessarily entailed a certain identification with the firm as an institution and the formation of social ties with others connected with it. Instead, top executives were more likely to be recruited from outside the firm, as managerial turnover increased, the cult of the individual “superstar CEO” took hold and boards became more inclined to hire outsiders for top positions. (Kaplan and Minton, 2012) Given that LBOs did not, as early advocates had predicted, herald a shift away from the corporate form, but a device to redistribute claims on a firm whose legal and organizational structure remained essentially unchanged, simply switching the personnel at the top was a more straightforward way of reorienting the firm toward shareholder value than the more disruptive process of changing ownership. (Bhagat et al., 1990) As one critic of the takeover boom presciently remarked, “rather than a market for corporate control that involves buying and selling the capital of the company, we need a market for corporate management.” (Gilson, 1993)

While hostile takeovers have largely disappeared since the 1980s, owner-management conflict and pressure from shareholders have not. But it seems clear that the overt conflicts of the 1980s helped produce a lasting change in norms; that, combined with the new compensation practices, increased executive mobility between firms, and the fact that top managers can themselves expect to become members of the wealth-owning class, have made managers more responsive to the desires of shareholders. So the disappearance of the overtly coercive tactics of the 1980s does not indicate a return to the managerial autonomy of the mid-20th century. As ? summarize these developments, “During the 1980s the disciplinary aspect of the new relationship between the capitalist and managerial classes was dominant,” but “after 2000, ... managers had become a pillar of Finance.” Today, the “financial facet of management tends to overwhelmingly dominate” and “a process of ‘hybridization’ or merger is under way.”

The bottom line is, there was a reassertion of shareholder power and secondly, a primary purpose to which that power was exercised was to increase the level of payouts from the firm to shareholders. That the latter was true is clear from the language used by the academic and policy advocates for the shareholder revolution, and from the course of specific incidents of takeover threats and pressure from activist shareholders. An increase in payouts is invariably both a demand of the outsiders, and a central part of the strategy adopted by management to placate them. And as I show below, the era of shareholder dominance has coincided with much higher payouts in general.

Admittedly, there is a puzzle here. Shareholder rhetoric focuses on value, not payouts as such. Shareholders naturally want “their” companies to be more profitable, but why should they want a higher share of those profits to leave the company as payments to themselves? If the stock market is efficient, resources owned by the corporation should be fully incorporated into the stock price, so paying them out

should not enrich shareholders. If there are financial frictions – either in payouts, such as taxes, or in borrowing by the corporation – then leaving funds in the corporation should be more efficient than having them corporation pay them out and then borrow them back. From this point of view, it’s unclear why firms pay dividends at all – the well-known “dividend puzzle.” (Black, 1976) The argument is often made that payouts should be high when the company faces limited growth opportunities; but this superficially plausible argument invites the question of why, if better investment opportunities are available to shareholders, those same opportunities cannot be taken directly by the firm itself, avoiding the intermediate step of payouts, with its associated frictions. The standard neoclassical model of the firm simply assumes an exogenously fixed set of investment opportunities available to the firm, but this is hard to justify, especially from a perspective that otherwise treats the firm as a veil without economic significance. (?) Others suggest that financial markets are (now) better judges of potential projects than management, so the capital allocation function should be performed by financial market participants rather than within the firm. Undoubtedly this is how many financial market participants see things, but it is even harder to reconcile with conventional economic theory, which normally assumes that the true expected returns on all possible projects are known by all. The critical point, perhaps, is the one stressed by Lazonick (2008): The dispute is not so much about the division of a known, fixed stream of income, as about *control* over the firm’s resources in the face of unexpected contingencies.

1.3.2 The Weakening of Credit Quantity Constraints

Logically independent of the shift to rentier dominance but happening at roughly the same time and connected to the same broad political-economy currents, were a series of changes in credit markets that broadened the channels by which funds could flow to corporate borrowers. Corporations became less dependent on bank

loans, and lenders became less dependent on a fixed pool of deposit funding. These developments, largely though not entirely the result of various measures of financial deregulation, meant that the supply of credit to corporations became more elastic after 1980. While in the postwar decades, binding reserve requirements and strict limits on the types of funding available to lenders could result in absolute constraints on the quantity of credit, with even high-quality borrowers rationed, since the 1980s banks have been able to create essentially unlimited credit for eligible borrowers willing to pay the market interest rate. (Krippner, 2011) This shift may be seen as part of a broader process of “financial deepening” that has progressively relaxed the savings constraint at an economywide level, leaving the supply of credit highly elastic at a given interest rate. (Pollin, 1997*a*) (The extent to which the market interest rate can be said to be determined by monetary policy is the subject of another essay in this dissertation.) In this new environment, individual firms still typically face an upward-sloping credit supply curve, if only because the probability of financial distress rises with leverage. But it is likely to be shallower than in the old regime of deposit-constrained lenders, and high-quality borrowers are unlikely to encounter the absolute ceilings on borrowing that were previously common. This change is not essential to the argument of this essay, which is focused on the relationship between firms and shareholders, not firms and lenders. But as I discuss below, the difference between the financing decisions of the managerial and rentier-dominated firm will be more noticeable when the credit supply is elastic.

1.4 Two Models of the Financing Decision

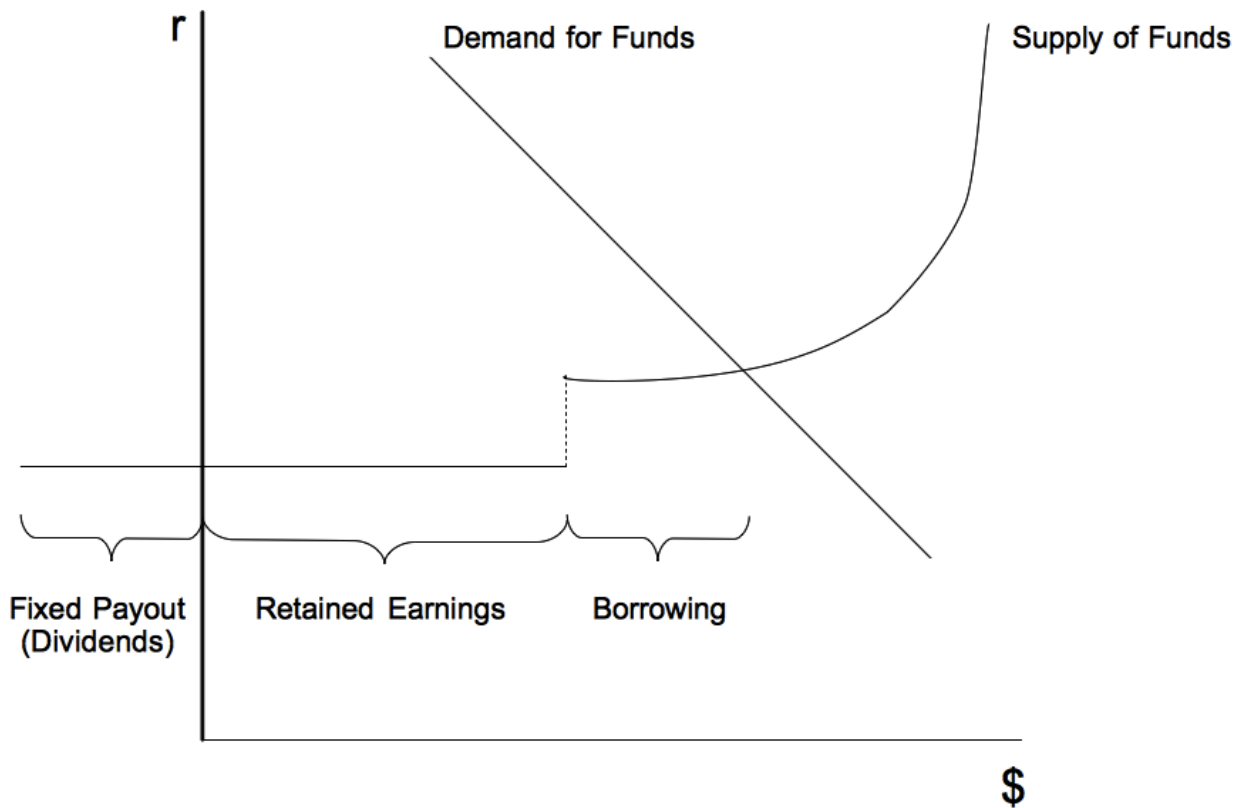
The change in the corporate financing decision is well illustrated by the contrasting views of shareholders taken by two successive CEOs of General Electric. For Owen Young, “the stockholders are confined to a maximum return equivalent to a risk premium. The remaining profit stays in the enterprise, is paid out in higher wages,

or is passed on to the customer.” For his successor Jack Welch, on the other hand, “regarded the shareholder as king – the residual claimant, entitled to the [whole] pot of earnings,” while employees had no claim on the company at all. (Davis, 2009)

We can illustrate this change schematically by updating Minsky’s well-known depiction of the firm’s financing decision. A version of his original figure is shown as Figure 1.1.

1.4.1 The Managerial Firm

Figure 1.1: The Financing Decision Under Managerialism



The figure schematically shows demand for funds for investment (and for acquisitions, continuation of money-losing operations, etc.) and supply of funds, at various cost of funds facing management, including borrower’s risk, in a regime where the firm’s funds can be freely disposed of by management once a conventional dividend has been paid.

For mid-20th century managerial firm:

1. The demand for funds curve reflects the subjective expected return of the marginal project.
2. The supply of funds curve combines two segments: a horizontal internal funds segment, and an initially flat and then upward-curving supply of credit segment.
3. Payout to shareholders (in the form dividends) is exogenously fixed, at least in the short run. Cashflow in excess of fixed payout (“retained earnings”) are available to management for payments to stakeholders or as low-cost pool of investment finance. In the models of the corporate financing decision that underlie much of the empirical credit-constraint literature, the firm does not make payouts to shareholders until it has exhausted investment opportunities with an expected yield in excess of the interest rate. Thus a given firm may either borrow or pay dividends, but not both. (Whited, 1992)
4. A firm with internal funds in excess of investment opportunities will not accumulate cash indefinitely. Either the firm will eventually increase its dividend payments; or else it will eventually lower prices and raise wages, reducing internal funds, lower its hurdle rate for new projects. These latter possibilities were emphasized by both defenders and critics of the managerial firm.
5. From the perspective of management, the cost of internal funds is set by the interest rate available to the firm on its liquid assets, i.e. the riskfree short-term rate, plus the marginal benefit of having an additional dollar of liquid assets available for unforeseen contingencies. In general, a firm will undertake projects with an expected return greater than this rate until internal funds are exhausted, after which the hurdle rate for new projects rises discontinuously to the firm’s long-term borrowing rate. This discontinuous jump is represented by the dotted vertical segment of the cost-of-funds curve.

6. The interest rate paid by the firm is higher than the rate available on its cash both because the firm must borrow long-term and because its borrowing rate incorporates lender's risk. The effective rate from the point of view of management is higher still, because there is also borrower's risk on borrowing as perceived by firm management.
7. Since both lender's risk and borrower's risk rise with the level of debt, the firm does not face a perfectly elastic supply of credit, but rather increasing costs (especially taking borrower's risk into account) and often eventually a hard quantitative limit. (The latter is more likely in contexts where lenders depend on deposit financing, and so themselves face an inelastic or quantitatively constrained supply of funds.)
8. As a result of the points above, the firm has hierarchy of finance: first internal funds, then borrowing, then new equity issues (not shown in the figure.) Each is exhausted before firm turns to the next.
9. When the supply of funds is low relative to demand, more firms will find themselves on the steeply upward sloping part of the supply of funds schedule, where changes in cashflow (which shift the supply of funds schedule horizontally) will affect investment. On the other hand, when the demand for funds schedule intersects the retained earnings or the flat part of the borrowing schedule, changes in cashflow will not affect investment, except insofar as changes in current cashflow are correlated with expected returns on new projects.

1.4.2 The Rentier-Dominated Firm

The financing decision of the rentier-dominated, or shareholder value-maximizing firm, is different in an important respect. Since shareholders are now able to impose sanctions on management that provides an insufficient flow of payments, shareholders

must be satisfied that any corporate use of a dollar other than paying it out as dividends or share repurchases has at least as great value to them as a dollar of cash in their own hands. In effect, then, this latter value is the opportunity cost for any corporate decision to increase current expenditure, and also for any decision *not* to increase current cash receipts by sale of assets, issuance of new liabilities, etc. I call this value – the discount rate of a dollar in the firm relative to a dollar in the rentier’s hands – the rentier opportunity cost (ROC). Note that the ROC is not simply the “true” expected return from alternative projects available to shareholders. Nor is it even shareholders’ subjective beliefs about such returns, though those must be a factor in it. Rather, it is the minimum effective return that shareholders are able to enforce on management, through whatever combination of external coercion, compensation practices and shareholder value norms are making management act as agents for shareholders.

In the ideal world of neoclassical theory, the cost of external funds to the firm, the effective cost of internal funds, and the ROC all lie along the same horizontal line at “the” interest rate. In such a world it would make no difference if firms financed projects internally, financed them by borrowing, or paid out all their internal funds to shareholders and then borrowed them back. The same projects would be undertaken in any case. Much of the literature on business investment and finance continues to treat this as the default, with a significant difference between the effective costs of internal and borrowed funds regarded as a “corner case” that can usually be safely ignored. (Bayoumi, 1997)

The reasons why we should expect an important wedge between internal and borrowed funds are discussed in Section 1.2.2. But why should the rentier opportunity cost lie above the managerial firm’s cost of internal funds? There are several reasons.

One reason is agency problems. Even in the rentier-dominated firm, managers retain a significant degree of autonomy. If, for whatever reason, there are differences

of interests or opinion between managers and rentiers over the best use of a dollar, as long as the dollar is within the firm the view of the managers will likely prevail. Whereas if the dollar has already been paid out to the rentiers, then of course the view of the rentiers will. For advocates of the corporate governance changes of the 1980s, the main goal of strengthening shareholders was “to force corporate assets out of the hands of managers who could not or would not use them efficiently.” (Holmström and Kaplan, 2003) Changes in executive hiring and compensation practices have reduced the probability that managers will prioritize the growth of the firm and obligations to its stakeholders over shareholder value, or that they will overestimate the growth prospects of their own firm. But as long as it remains greater than zero, shareholders will want a premium for leaving money within the firm. Furthermore, the weakening of managers’ identification with the firm and the replacement of intrinsic motivation with financial incentives can create new agency problems of its own. While in economic theory or even sometimes in law, managers may owe a duty only to shareholders, sociologically shareholders remain just one of many constituencies with which managers must deal. Evacuating all these other relationships of any sense of duty or moral obligation, while leaving it undiminished in this one case, is a difficult, probably insurmountable, institutional and ideological challenge. It is more likely that a corporate culture that discourages responsibility to employees, customers and the broader public will discourage responsibility to shareholders as well. (Greenwood, 2004) So a diminishing premium to compensate for the risk of corporate soulfulness may be accompanied by an increasing premium for the risk of “Enronitis.”

Related to this, even if the owners are perfectly faithful agents, funds within the firm may be more vulnerable to capture by other constituencies, such as governments, organized consumer groups, or labor. It’s clear that for many critics of the managerial firm, the potential claims of workers especially were a major danger of leaving too many resources within the corporation. For Berle and Means (1991), an important

danger from the loss of shareholder power was that firms may “maintain labor standards above those required by competitive conditions.” Similarly, Jensen, defending the view that the public corporation was becoming obsolete, gave this list of forces that made capital allocation within the firm no longer viable: “striking Eastern Airlines pilots, Pittston Coal miners, [and] New York Telephone employees, who seem perfectly content to destroy or damage their employer’s organization while attempting to serve their own interests. Ralph Nader’s consumer activist organization is another example.” (quoted in Henwood, 1998) Jensen was writing here for a general audience, but within the economics literature we can find similar claims that when firms’ pools of internal funds get too big, there is a danger they will be claimed by organized workers. For instance, it has been argued that the sharp increase in steelworkers’ wages in the 1970s “was a rational response to ... workers recognizing that the industry was in irreversible decline. In this model, wages increased when the union adopted an endgame strategy aimed at increasing labor’s share of the remaining quasi-rents.” (Deily, 1998) Note that in this argument, the danger of appropriation of corporate resources by workers is greatest at firms that have high cashflow but poor investment prospects – the same ones targeted by the takeover specialists and activist investors.

A third reason is liquidity. The stock market has, since its inception, been primarily a tool, not for raising capital for investment, but for rendering the long-lived assets required by modern production liquid from the point of view of individual wealth-owners. In large part, it achieves this goal – shares are vastly more liquid than direct ownership of productive assets. But they are still not as liquid as money, or as relatively more money-like assets such as bonds from safe issuers. Rentiers, like other economic units, face a survival constraint. At some point they will face an unexpected fall in income, or increase in desired expenditure, and there is no guarantee that their claim on the firm will be mobilizable at that moment. Even if the “true” present value of a project was sufficiently high, this may not be reflected in the price

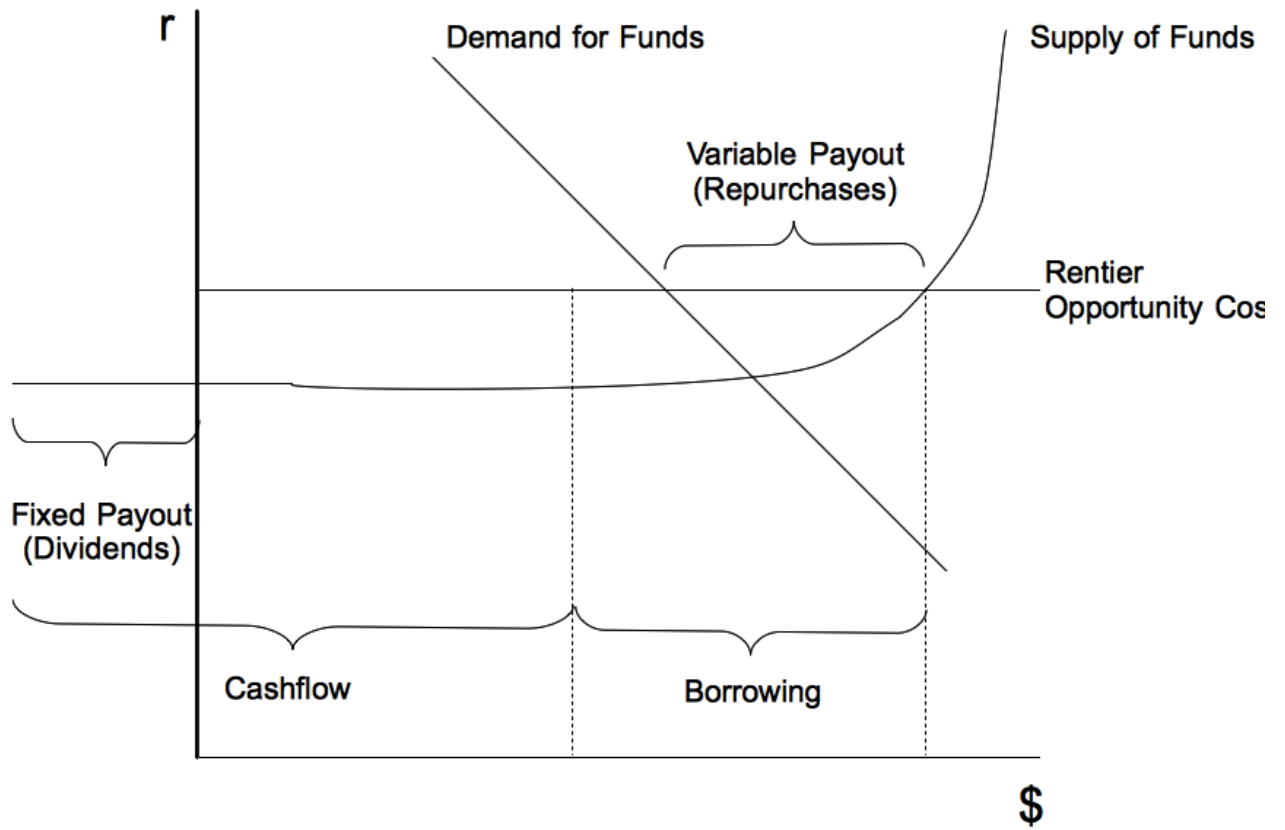
of the firm's stock when it is needed. In some cases, there is the additional problem of disposing of large blocks of shares without moving the market price. So even if shareholders believe that the investment opportunities facing the firm have higher expected returns than their own next best option, that managers are perfectly faithful agents, and there is no danger of appropriation of corporate resources by other constituencies, they still will want a premium for leaving "their" money in the firm.

While these considerations may always have made shareholders prefer higher payouts to retention of funds within the firm, they did not become operational constraints on management until the institutional transformation described in the previous section. The effect of this change on the corporate financing decision is shown in Figure 1.2.

For the rentier-dominated, or shareholder value-maximizing, firm:

1. Demand for funds and the credit supply curve are the same as for the managerial firm.
2. The rentier opportunity cost is the minimum expected return a use of funds must have for rentiers to accept leaving funds in the firm in that purpose. Note that the rentier opportunity cost is the minimum return that shareholders (and other financial claimants) are actually able to enforce on the firm, not necessarily their subjective discount rate on retained vs. paid-out funds.
3. Because the rentier opportunity cost is greater than the riskfree interest rate (for reasons discussed above), there is no longer a separate lower-cost category of internal funds or retained earnings.
4. Payout to shareholders are higher than in the managerial firm, for a given mix of investment opportunities, internal funds, and borrowing costs; payouts vary strongly with the availability of funds. It is important to distinguish between

Figure 1.2: The Financing Decision Under Rentier Dominance



The figure schematically shows demand for funds for investment (and for acquisitions, money-losing operations, etc.) and supply of funds, at various cost of funds facing management, including borrower's risk, in a regime where shareholders exercise effective first claim on all funds entering the firm.

payouts that are fixed in the short run, as in the managerial firm, and additional payouts that depend on the difference between the cost of funds to the firm and the opportunity cost of leaving funds in the firm, from the point of view of shareholders or rentiers. It is often convenient to think of the fixed part of payouts as corresponding to dividends and the variable part to stock buybacks. However, this division may be becoming less useful as firms shift from dividends toward repurchases even for the less cyclical component of payouts. (Dittmar and Dittmar, 2002) In any case, the distinction between dividends and repurchases is irrelevant for the empirical analysis below, which treats shareholder payouts as a single category.

5. The hurdle rate for new investment may be either the rentier opportunity cost or the subjective interest rate (that is, incorporating borrower's risk) facing the firm. When investment demand is high, and credit is limited, the firm's demand for funds curve will cross the supply-of-funds curve above its intersection with the rentier opportunity cost. In this case the firm faces the same financing decision as the managerial firm. But compared with the case of the managerial firm, this will happen less often, since some of the upward sloping part of the credit-supply curve lies below the ROC.
6. When the expected returns on investment are lower, or credit is more freely available, the demand for funds curve will cross the ROC curve above the supply of funds curve. In this case, the decision facing management is not, "Is the return on this project higher than the cost of financing it?", but rather, "Is the return on this project high enough to justify keeping the required funds within the firm rather than paying them out to shareholders?"
7. Most importantly, for a firm in the position shown in Figure 1.2, the investment and borrowing decisions are unrelated. The firm invests up to the point where

the expected return on the marginal product equals the ROC. Independently, it borrows until the marginal cost of additional debt equals the ROC. So a change in the investment demand curve does not affect borrowing, while changes in profits and in the supply of external funds do not affect investment. Instead, shifts in either of these schedules show up as changes in the variable part of payouts. This is the key prediction of our analysis.

8. However, since expected returns are still correlated to some extent with current profits, there will still be some correlation between cashflow and investment, even if it no longer operates through the financing channel.
9. Finally, if there is important variation in rentier opportunity cost, this will have opposite effects on borrowing and investment. (This is easy to see in Figure 1.2 by envisioning a vertical displacement of the ROC curve.)

The modification of corporate governance represented here is not the only change in the corporate financing decision to be considered. As noted above, there were also institutional and regulatory changes in financial markets over this period, which tended to make the credit supply more elastic. So the upward curve in the supply-of-funds schedule is shallower than in the earlier period, meaning that a larger share of firms – at least among creditworthy ones – will find their demand-for-funds curve crossing the ROC.

1.4.3 Operationalizing the Model

Our hypothesis is that during the 1950s, 1960s and 1970s, US corporations were in general well-described by the managerial model. During the 1980s, there was a widespread (though not universal) shift toward the rentier-dominance model. Very high expected returns at many firms during the late 1990s probably increased the share of firms at which the funds-demand curve crossed the funds-supply curve, but

since the end of the tech bubble, investment demand has been relatively low. The past decade has also seen further generalization of the “shareholder value” norm, including in sectors, such as information and high-tech, where it was previously weaker.

This hypothesis leads to six concrete predictions.

1. There will be a strong correlation between borrowing and investment in the earlier period, but this relationship will weaken or vanish entirely in the later period.
2. There will be a strong correlation between cashflow and investment in the earlier period. This relationship will also weaken in the later period.
3. There will be no correlation between borrowing and payouts in the earlier period, but a strong relationship in the later period.
4. There will be some correlation between payouts and cashflow in the earlier period, but this relationship will grow stronger in the later period.
5. The changes in the borrowing correlations will probably be sharper than the changes in the cashflow relationships, because there are also non-financing channels linking profits to payouts and investment.
6. Within each of the two periods, the relevant relationships will show opposite cyclical dynamics. The correlation between cashflow and investment of the early period will be strongest when credit is tight, so that the demand-for-funds curve is more likely to cross the steeply upward-sloping part of the supply-of-funds curve. The correlations of the later period, of cashflow with payouts and of borrowing with payouts, will be strongest in periods of high profits and abundant credit, when the demand for funds curve is more likely to cross the ROC curve.

It is worth developing the last point a bit more. Under the managerial model, the credit supply curve only matters when the supply of funds is low relative to demand. Thus, the association between investment and borrowing should be stronger among firms facing, and in periods of, tighter credit constraints. Under the rentier dominance model, by contrast, firms are always on the credit-supply curve. That is, rentiers demand that "their" corporations take full advantage of their borrowing capacity in order to increase payouts. Because payouts are residual, i.e. lowest priority use of funds, this constraint only matters when firms have access to funds beyond those needed for high-expected-return investment and other internal uses. This is most likely at times when cashflows from operation are high, and credit is cheap and abundant. In periods of falling profits and tighter credit constraints, by contrast, it is more likely that the demand for funds curve will cross the supply of funds curve and variable payouts will go to zero. Thus the correlation between payouts and borrowing will be weaker in periods of tight credit constraints and among firms facing more restricted credit supplies. So while I hypothesize that in general there will be clearer links of borrowing and cashflow with payouts under rentier dominance, over shorter horizons expect that the strength of these links will show strong procyclical variation. By the same logic, the strengthening of the payout relationships will be strongest among larger firms and in general those with the greatest borrowing capacity.

1.4.4 Dividends and Repurchases

In this paper, I am combining dividends and share repurchases into a single measure of shareholder payouts. This is consistent with the great majority of the literature on corporate governance and payout policy. But it is worth asking if these two flows are really equivalent.

Both dividends and repurchases are payments from firm to shareholders. They equally reduce resources available to the firm, and, at a sufficient level of abstraction,

provide equal income for shareholders. It is well-known that, in simple models of share valuation based on the present value of expected future dividends, the value of shares does not change when firms substitute repurchases for dividends. (Fama and French, 2001)

Nonetheless, as Evans (2001) persuasively argues, there are contexts in which it is important to distinguish dividends and stock buybacks. In principle, he agrees, “profits can just as easily be distributed through repurchases” as through dividends. And historically, there is a strong relationship between stock valuations and repurchases, suggesting they do reliably function as income for shareholders. But there are important differences between the two kinds of payment. For one thing, equity prices should mainly reflect expected future payments. Since firms are reluctant to change dividends, current dividends are informative about future payments. But repurchases are less persistent, so they carry less information about future flows. So a rational investor should give less weight to repurchases than to dividends in valuing a share. Second, repurchases are often financed by new debt:

While there are several reasons why firms might borrow funds to repurchase equity, none of them justify an increase in share valuations... There is a limit to the amount of debt a corporation can take on, and therefore *if* the market is a precise discounting machine it should not impute additional value to the shares of corporations who decrease the amount of their equity through increased leverage. After all, if it were uncovered that firms were borrowing to make dividend payments, they would be accused of Ponzi financing, warranting a decline in stock prices. (Evans, 2001, p. 167, emphasis in original)

Similarly, to the extent that repurchases come at the cost of lower investment, they reduce the flow of future profits, and so shouldn't increase a rational investor's valuation of its stock. For these reasons, Evans suggests that while both dividends and repurchases positively related to stock prices in practice, they should be understood as operating through two fundamentally different mechanisms. Dividend payments

increase the fundamental value of shares, but repurchases raise their price only by reducing their supply.

In the context where it is being made – explaining equity price movements, and in particular the long bull market of the 1980s and 1990s – Evans’ argument is convincing. But in the context of the corporate financing decision that is the focus of this paper, the two forms of payments look more equivalent. Not so obvious that they should be treated differently. After all, both payments to shareholders out of corporate treasury. The degree to which shareholder payouts constrain corporate decision-making does not depend in any obvious or straightforward way on the response of stock prices to those payouts. It’s enough that shareholders want them to happen.

But this invites the question, why do shareholders place such a high priority on payouts? Evans says that rational investors should not value shares more if payouts come at expense of lower investment or higher debt. This is true in the models of rational investors and efficient markets that he is responding to. But it does not take into account owner-manager conflict that is focus of the present paper.⁵ Where managers and shareholders have conflicting goals, reducing investment may be precisely the goal of shareholder activism. For Holmström and Kaplan (2001), the great accomplishment of the takeover wave of the 1980s “was to force corporate assets out of the hands of managers who could not or would not use them efficiently.” When management is undertaking fixed investment for purposes other than maximizing shareholder value, using funds for repurchases rather than for investment does indeed leave shareholders better off. A similar argument applies to debt. It is undoubtedly true that through much of the history of public corporations, a company that borrowed to increase dividends would be regarded as engaging in unacceptable Ponzi

⁵This is not meant as criticism – we always have to abstract from some questions to focus on others.

finance. But norms change. Today, it is not surprising to open the *Wall Street Journal* and find a demand that Apple should not only start “handing back [its cash holdings] to stockholders through dividends ..., but also start borrowing, and hand that money back, too.”⁶ Evidently shareholders place a higher value on an additional dollar in their own hands than an additional dollar of assets, or a dollar less of debt, on the books of “their” firm.

Some reasons why this is so are discussed in Section 1.4.2 above. Indeed, the same question applies to dividends as well as repurchases. If shares reliably reflect true expected value of firm profits, and are highly liquid, it is impossible for shareholders to be made better off by any payments from firm – dividends as much as repurchases are just moving money from one pocket to another. Even if the firm lacks good investment opportunities, why can’t it lend its excess funds directly to a firm with better opportunities, and skip the intermediate step of paying them out to shareholders? After all, payouts – whether dividends or repurchases – have substantial transaction costs. In the Walrasian world of modern macroeconomics, it is unclear why they should happen at all.

Evans himself provides what may be the best answer to this dilemma. The conventional view of shares as representing the true expected value of all future corporate profits is simply not coherent. The purpose of shares – of financial markets in general – “is to provide liquidity to asset holders.” (Evans, 2001, p. 112) But liquidity is of value only in a world where future income flows are uncertain. If all agents knew the true expected returns from any investment project, there would be no need for a liquid market in corporate equities. Claims on all future income from production could be freely sold or hypothecated without any need for a special additional class

⁶“What Steve Jobs Really Should Be Unveiling,” June 10, 2010. “Tech” companies like Apple are among the most visible targets of this kind of shareholder pressure today precisely because managerial autonomy has been more persistent there than in other sectors.

of tradable claims on firms. (Crotty, 1992) Conversely, in a world where liquidity does matter, there is nothing strange about shareholders placing a higher value on a dollar under their direct control than a on a dollar inside the firm, and demanding a correspondingly higher return from the latter. By the same token, Evans' supply and demand framework for understanding stock prices makes more sense than the discounted dividend model that dominates the literature. The actual decision facing investors is not optimizing income flows over infinite future time, but allocating their portfolio in the present. Thus, the same considerations that favor distinguishing dividends and share repurchases in his study of equity prices, favor combining them for the questions being asked here.

It is standard practice in critical discussions of shareholder payouts to use negative net share issuance as a measure of total funds transferred to shareholders by share repurchases. (Lazonick, 2008) This is the convention followed here. However, it is important to keep in mind that net share issuance is the sum of three gross flows: New share issues, minus share repurchases, minus cash purchases of shares in corporate acquisitions. It is appropriate to group these three flows together with dividends as payouts, since together these flows represent total cash payments received from the corporate sector by virtue of share ownership. But treating negative net share issuance by the sector in the aggregate as exactly equivalent to share repurchases by an individual firm can be misleading, since the three component gross flows are of comparable magnitude: in recent decades, repurchases vary from about 1 to about 3.5% of corporate assets, and cash acquisitions from about near zero to about 1.5%, both with a strong cyclical pattern.⁷ Total new share issues are more stable between

⁷Share issue and repurchase figures from Compustat, and refer to the nonfinancial sector. Acquisition expenses reported in Compustat range from 1 to 3% of corporate assets, but these include some noncash acquisition expenses, such as assumption of the acquired firm's long-term debt. So actual cash payments to shareholders as a result of corporate acquisitions will be lower than this. The range given in the text is derived from the gap between net repurchases as reported in Compustat and net negative issuance shown in the Flow of Funds.

1 and 2% of corporate assets. Unlike the other two flows, repurchases also have a clear positive trend; only since 2001 have aggregate repurchases consistently exceeded aggregate new issues. Before then, firms were not in the aggregate net purchasers of their own shares; negative net share issuance would not be observed in the 1980s and 1990s in the absence of cash acquisitions. It appears that little if any of these new share issues represent new funds being raised by the firm; rather, they are the result of the exercise of stock options. (Stothard, 2013) Leary and Roberts (2010) assume that new share issuances of less than 5% of firm assets represent option exercise rather than equity finance; issuances greater than this threshold account for less than 20% of firm-year observations of new stock issues. It is not entirely obvious that it is appropriate to simply net shares issued as a result of option exercise from share repurchases; in part because they are often exercised at prices well below the current market price of the share, and in part because there is some conceptual question about the economic nature of the payments. Are stock option grants simply part of the firm's labor costs, or are the top executives who receive most stock option grants better regarded as members of the capitalist class, whose payments from the firm are a form of profit rather than wage income?

In this paper, I cannot pursue these important issues further. For my purposes, it is sufficient that shareholders place a high priority on current payouts and have the institutional power to force managers to take that priority into account in their investment and borrowing decisions. I take it as a historical fact that an effect of increased rentier dominance has been greater pressure on firms to use any increase in available funds to raise shareholder payouts rather than investment or other uses internal to the firm. And since both the academic literature on takeovers and shareholder activism and the self-reports of the activists themselves suggest that shareholders regard dividends and repurchases as approximately equivalent, I treat them as equivalent here.

1.5 Empirics

Below, I empirically investigate the predictions of the hypothesis of a shift from a managerial financing decision to a rentier-dominated financing decision. I examine two sources and two uses of funds: cashflow from operations, net borrowing, fixed investment, and payouts to shareholders (including net share repurchases).⁸

While this section is based on regression analysis, the goal is not primarily to test for a causal relationship from the right-hand to the left-hand side variables. The question is not, e.g., whether an exogenous increase in borrowing is associated with higher investment but rather, to what extent borrowing and investment have similar distributions across time periods or across firms. More precisely, the question is whether there was a change, sometime in the 1980s, in the degree to which the two variables have similar distributions. Testing for causality is inappropriate since our hypothesis does not describe causal relationships between the various sources and uses of funds. The two models make predictions about the correlations between the four variables, not about causality between them. In the managerial mode, an easing of credit conditions leads to higher borrowing and higher investment; in the rentier-dominance model, it leads to higher borrowing. But in neither case are we claiming that causality runs from borrowing to investment/payouts, or from payouts/investment to borrowing. So some common identification problems are less of a concern here.

In the remainder of this section, I ask whether the data is consistent with the hypothesis that the shareholder revolution as moved US corporations from a financing decision in which investment and borrowing are set jointly so that the marginal cost

⁸The two other main sources/uses of funds for the sector in the aggregate are net acquisition of financial assets and net foreign investment. At the firm level, acquisitions are another important use of funds. Note that for the corporate sector as a whole, cash-funded acquisitions are equivalent to share repurchases, and show up identically in the Flow of Funds as a subtraction from net new equity issuance. While I have not done so here, there is a case for also treating cash acquisitions as a form of shareholder payouts in the firm-level data. (Leary and Roberts, 2010)

of funds equals the marginal return on investment; to a world where investment and borrowing are adjusted independently so that their marginal return and cost, respectively, each equals the effective value to shareholders of an additional dollar of payouts. Another way of asking the question is, is there a clear difference between the two periods in the extent to which additional funds flowing into the corporate sector remain there, financing fixed investment and other corporate expenditures, versus the extent to which they quickly pass through and flow out to shareholders. The leakier are corporate buckets (or perhaps better, the more easily they overflow), the less difference the economy-wide supply of liquidity will make to the amount of activity inside them.

For the aggregate payout measure from the Flow of Funds in the next section, I measure payouts as dividends minus net share issuance. For firm-level payouts discussed in the following section, I use dividends plus share repurchases minus new share issuance.

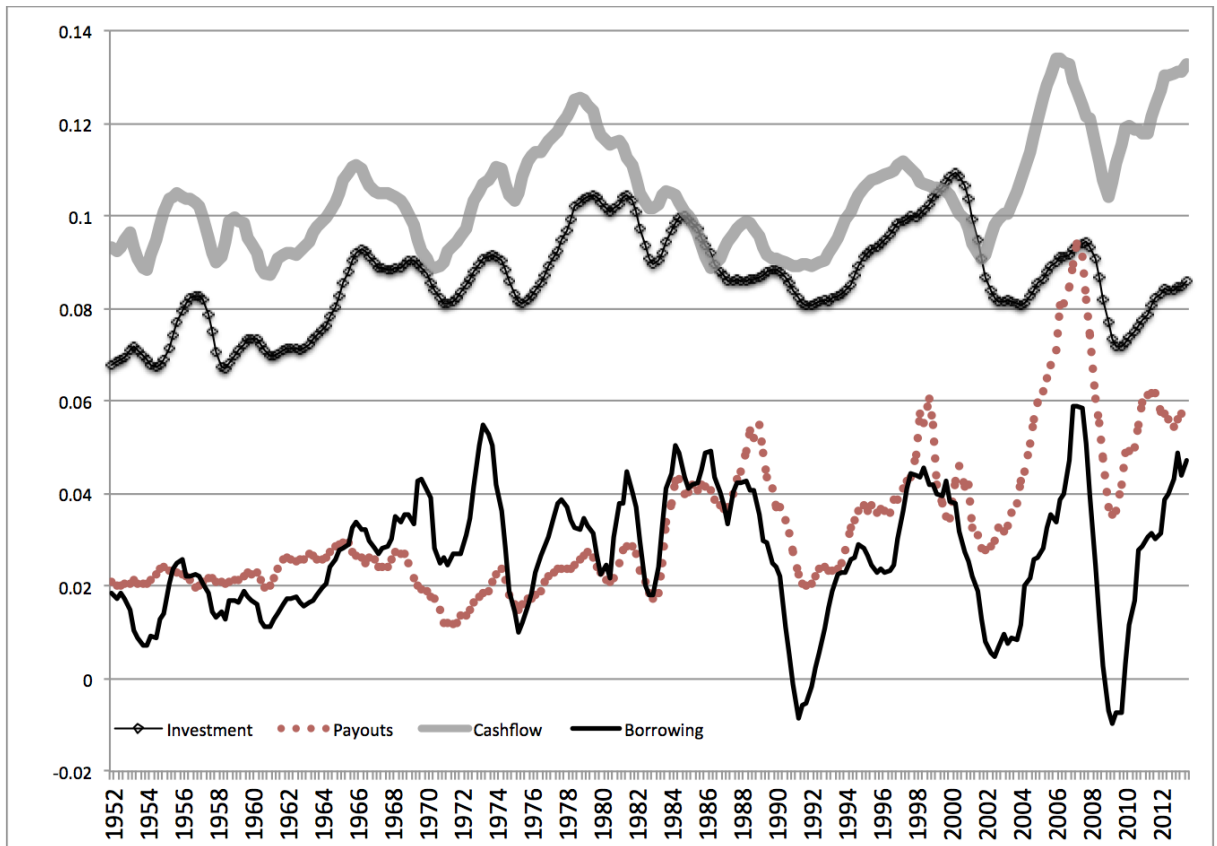
1.5.1 Time Series Data

First, I use quarterly time series data from the US financial accounts prepared by the Federal Reserve (the accounts formerly known as the Flow of Funds) to test our predictions for the US nonfinancial corporate sector in the aggregate. Investment is gross fixed investment. Payouts are dividends less net equity issuance.⁹ Borrowing is the annualized quarterly change in credit-market liabilities. Cashflow is profits after tax plus capital consumption allowance.

Figure 1.3 shows the four flows over the past six decades. Corporate cashflow from operations (the heavy gray line) fluctuates with the business cycle; through most of the period it was stable around 10 percent of corporate assets, but there has

⁹The arguments for and against including net share buybacks with dividends are discussed in the Appendix.

Figure 1.3: Sources and Uses of Funds, US Corporate Sector, 1952-2012



Source: Flow of Funds, author's analysis.

The figure shows 4-quarter moving averages of of gross fixed investment, shareholder payouts (dividends less net new equity issues), cashflow (aftertax profits plus depreciation allowances) and net new borrowing for the nonfinancial corporate sector, as a fraction of trend GDP.

ben a sustained increase since 2000. (This recent increase is entirely due to higher pretax profits, not to depreciation or corporate taxes.) Corporate investment shows a similar cyclical pattern, but with sharper peaks. The late-1990s expansion is the one period in the data in which aggregate corporate investment exceeded aggregate corporate cashflow; but investment since 2000 appears to show a declining trend. The 1980s business cycle stands out in both series since neither shows a noticeable peak in the late 1980s. Corporate borrowing (the solid black line) shows fluctuations with increasing amplitude over time. In the first 20 years of the series, the fluctuations of borrowing over the cycle are comparable in magnitude to fluctuations in investment and cashflow, but in the past few cycles they have been noticeably larger – 6-7 points, compared with 2-3 points for investment and 3-4 points for cashflow. The same is true to an even greater extent for shareholder payouts, which display essentially no cyclical pattern for the first 20 years of data but rise and fall by six points over the most recent business cycle. Notably, the second half of 2007 – the peak of the last cycle – is the only period in which aggregate payouts exceed aggregate investment.

It is evident that, apart from a brief period at the end of the tech boom, corporate cashflow has always comfortably exceeded corporate investment; in the aggregate, the corporate sector does not require financing. This does not preclude the possibility that many individual firms face investment opportunities that exceed their available funds.; in general, theory gives little guidance about the distribution of investment opportunities across firms. (Gordon, 1992) But while one should not dismiss the importance of external funding, especially for new, small, noncorporate firms, the top two lines of Figure 1.3 do offer striking visual evidence that, with respect to the corporate sector at least, the financial system is doing something other than financing investment. Visual examination also suggests that since the mid-80s, shareholder payouts have been higher, more variable, and more closely correlated with borrowing. The immediate pre-Great Recession period stands out particularly dramatically. No-

tably, both payouts and borrowing hit their high for the full sixty-year period at the same point, at the end of 2007. More broadly, all of the series except cashflow seem clearly to exhibit different behavior before and after the mid-1980s.¹⁰ The question is whether these visual impressions are valid. Are there statistically verifiable differences in the associations between these four variables between the earlier and more recent periods?

Or again, and more fundamentally: The question is, at an economy-wide level, are higher corporate earnings and borrowing associated with higher investment, or with higher payouts to shareholders?

With respect to the exact dating of the shift from a managerial to a rentier-dominated financing decision, there is no single breakpoint. The shift was a socio-logically complex, contested process that was not fully accomplished in one step. It seems likely that a substantial minority of the corporate sector – especially in growing sectors – continues to function under a basically managerial regime, though it is under continuous pressure from the rentiers. A striking recent example of this pressure is Apple’s decision, under fire from activist shareholders, to use its cash holdings – previously reserved for strategic acquisitions – to begin paying dividends for the first time in 17 years and to devote \$30 billion per year to stock repurchases. Dividends and repurchases together totaled \$41 billion in 2013, slightly above the company’s reported earnings of \$37 billion and approximately triple its combined budget for fixed investment (\$8 billion) and research and development (\$4 billion).¹¹ So in an important sense, the shareholder revolution is ongoing. While the intellectual underpinnings of the shareholder value revolution were laid in the late 1970s, the critical institutional changes that made it the operational principle of corporate finance clearly took place

¹⁰If we divided cashflow into profits and depreciation, we find that profits declined from the 1950s to the 1980s, while depreciation increased more or less in tandem. Since then, neither series shows any trend.

¹¹Data from Apple’s 10-K filings, accessed at <http://investor.apple.com/sec.cfm>.

in the first half of the 1980s. With respect to share repurchases – which drive most of the changed behavior of shareholder payouts – the critical change was the adoption of Rule 10b-18 by the SEC in 1982, which made large scale share repurchases legal for the first time. (Grullon and Michaely, 2002) The leveraged-buyout era – the coercive phase of the reassertion of the rentiers – effectively came to an end after KKR’s 1989 hostile takeover of RJR Nabisco. But by then it had clearly achieved its goals, and the carrot of stock-based compensation could largely function without a stick. The decisive transition was clearly complete at that point. The bulk of the historical material suggests a dividing line near the middle of the decade, or perhaps a year or two earlier. The exact year is arbitrary, but only within modest limits. With respect to the regression results reported in Section 1.5.1, a Chow test for structural breaks is consistent with a line anywhere in the 1980s; we reject the null of stable coefficient values if we divide the two periods in any year between 1981 and 1989. But for both regressions, the test statistic is greatest if we end the first period at 1984. Since that is consistent with the historical evidence, I use that dividing line in the econometric tests that follow.

Of interest here are four flows for the nonfinancial corporate sector: investment, shareholder payouts, borrowing, and cashflow from operations. Investment is gross fixed investment; at the time the work here was done, historical investment figures had not been updated to include research and development or intellectual-property spending. Shareholder payouts are total dividends minus net equity issues. This means that, as defined here, payouts include cash acquisitions as well as payouts. Distinguishing cash acquisitions from buybacks is not possible in the aggregate data but, arguably, combining these payments is conceptually appropriate since, at the aggregate level, both are payments from the corporate sector to shareholders. Borrowing is net change in credit market liabilities. Cashflow from operations is aftertax profits plus depreciation. All variables are normalized by the corporate sector’s total

asset stock. I have chosen to use total corporate assets as the scaling variable partly to maintain consistency with the cross-sectional results reported in the section below, and partly because it seems more natural to measure corporate sources and uses of funds relative to the size of the corporate sector, rather than relative to the size of the economy as a whole. The same regressions using trend GDP rather than total corporate assets to normalize the flows yield almost identical results.

The means and standard deviations of the four ratios for each period are shown in Table 1.1. As the table shows, of the four ratios only payouts had a significantly different average value in the two periods – 1.5 percent of total corporate assets annually in 1952-1984, compared with 2.5 percent of total assets in 1984-2013. All of the variables showed greater variance in the second period, but the difference was largest for payouts, followed by borrowing. It may be surprising that corporate borrowing was somewhat lower on average in the second period than in the first, given the widely held view that this has been a period of rising private debt.¹² The statistical fact of no long-term increase in corporate borrowing can be reconciled with the general perception in two ways. First, corporate borrowing has been much more variable since the mid-1980s, with periods of high borrowing alternating with periods of corporate deleveraging. (Each of the past three recessions saw at least one quarter in which net corporate borrowing was negative, something that never occurred between 1950 and 1990.) Second, the genuine rise in corporate debt – measured either relative to assets or GDP – is sometimes mistaken for an increase in corporate borrowing. In fact, the acceleration of corporate debt ratios after 1980 is the result of lower inflation, which implies a higher debt ratio for any given level

¹²If we normalize by trend GDP rather than by corporate assets, corporate borrowing is essentially the same between the two periods – 2.6 percent of GDP annually in the first period, and 2.7 percent of GDP in the second.

Table 1.1: Descriptive Statistics, Nonfinancial Corporate Sources and Uses of Funds

	Investment	Payouts	Borrowing	Cashflow
Period 1: 1952 - 1984				
Mean	5.6	1.5	1.7	6.8
St. Dev.	0.3	0.2	0.5	0.4
Period 2: 1985 - 2013				
Mean	5.0	2.5	1.5	6.1
St. Dev.	0.6	0.8	1.0	0.7

Source: Flow of Funds; author's analysis. All flows are expressed as percentages of nonfinancial corporate sector total assets. See text for variable definitions.

of borrowing.¹³ In any case, while the hypothesis proposed here does require the observed increase in payout ratios, it does not imply any other change in the average level of the variables. Rather, it predicts a change in their relationships – a weakening of the association of investment with cashflow and borrowing, and a strengthening of the association of payouts with cashflow and borrowing.

Like most macroeconomic variables, these flows show significant autocorrelation. The hypothesis of white-noise residuals is rejected at the 0.0001 level for all four variables. A Dickey-Fuller test rejects the hypothesis of a unit root at the 0.0001 level for borrowing and at the 0.018 level for payouts. But the test just fails to reject a unit root for cashflow ($p=0.056$). And it clearly fails to reject a unit root for investment, with $p=0.31$. So regressions using levels are not appropriate. I therefore first-difference the variables.¹⁴ While the residuals are still not white noise with first-differencing, the autocorrelation coefficients are all well below 1 and the Dickey-Fuller test rejects a unit root at the 0.0001 level for all four variables.

Regressions results on the time-series data are reported in Table 1.2. These are bivariate regressions of the year-over-year differences in each use on each source, all

¹³The similar behavior of household debt ratios is discussed in the second essay of this dissertation. See also Mason and Jayadev (2014).

¹⁴In order to avoid introducing spurious correlations due to variation in the denominator, I take the difference first and then divided by initial-period total assets.

Table 1.2: Regression Results, Aggregate Investment, Payouts, Borrowing and Cashflow, US Nonfinancial Corporations

Regression	1952 - 1984		1985 - 2013	
	Coefficient	r^2	Coefficient	r^2
Investment on Borrowing	0.20 (0.03)	0.22	0.15 (0.03)	0.22
Investment on Cashflow	0.48 (0.07)	0.28	0.22 (0.08)	0.07
Payouts on Borrowing	0.16 (0.03)	0.17	0.49 (0.07)	0.30
Payouts on Cashflow	0.25 (0.07)	0.09	0.78 (0.21)	0.11

Source: Flow of Funds; author's analysis. Note that quarterly FoF data begins in 1952.

The table reports the coefficient and r^2 for bivariate regressions of the year-over-year differences in the variables shown, for the US nonfarm nonfinancial corporate sector. Observations are quarterly and seasonally adjusted. Investment is gross fixed investment. Borrowing is net change in credit market liabilities. Cashflow is profits after tax plus capital consumption allowance. Payouts is dividends minus net equity issues. All values are normalized by total corporate assets. Standard errors are in parentheses.

The table shows that the relationship of investment with borrowing and cashflow from operations has grown weaker since 1985, while the relationship of payouts to shareholders with borrowing and cashflow from operations has grown stronger.

normalized by total corporate assets. Since the left hand variable in each regression is a use of funds and the right hand variable is a source of funds, one natural way to interpret these results is as a description of the disposition of the marginal dollar entering the corporate sector. The results may be interpreted as suggesting that in the postwar decades, of each incremental dollar of income to the corporate sector, nearly half went to fixed investment and only a quarter was paid out to shareholders. Since 1985, those proportions have reversed, with 22 cents of each incremental dollar of income invested and all the rest paid out to shareholders. Similarly, in the postwar decade, of each additional dollar borrowed by the corporate sector, 20 cents were spent on fixed investment and 16 cents were paid out to borrowers. But since 1980, half of each additional dollar borrowed by the corporate sector has been paid out to shareholders, while only 15 cents have been invested.

These results are clearly consistent with our predictions. The relationships of investment with both borrowing and especially cashflow is notably weaker in the post-1985 period than before 1985. The coefficients of payouts on borrowing and cashflow, on the other hand, are both much greater in the post-1985 period, as is the share of variance explained by the payout-borrowing regression. For the nonfinancial corporate sector as a whole, the hypothesis of a structural change in the financing decision seems consistent with the data. Most importantly, it strongly appears that in the aggregate, fixed investment is no longer the primary use of funds borrowed by corporations, in the way that it was in earlier decades.

The prediction that is not borne out in the data is a larger change in the correlations of investment with borrowing, than with cashflow. In fact, the relative weakening in the cashflow-investment relationship is significantly greater than in the borrowing-investment relationship. As will be seen in the next section, the same excess weakening of the cashflow-investment relationship is present in the cross-sectional regressions. This suggests that some other factor, in addition to more assertive share-

holders, is holding down investment relative to profits. Three natural alternatives are chronically depressed demand, “the China price,” and the relative lack of major innovations in the past 30 years. Even firms with high current profits will not invest if their existing capacity is underutilized. Nor will they invest if there is a high probability that imports will render their capital uncompetitive before the end of its normal life. Investment will also be depressed by a relative absence of major innovations or other “epoch-making” shifts that devalue existing fixed capital while raising the return on new investment. All these factors introduce a wedge between the marginal profit rate on new capital, which is what firms try to estimate in making investment decisions, and the average rate of profit on the existing capital stock, which is what we see in the aggregate data. Investigating these alternatives is beyond the scope of this paper. But none of them are inconsistent with the hypothesis advanced here, and can be regarded as complementary to it.

1.5.2 Corporate Finance in the Great Recession

The most recent investment cycle offers particularly strong evidence for the rentier dominance hypothesis.

During the Great Recession of 2008-2009, the US experienced a severe financial crisis, involving record numbers of bank failures, the insolvency of major financial institutions, seizing-up of interbank credit markets, and steep falls the value of many classes of financial assets. Over the same period, there was a steep fall in business investment, including a 25% fall in fixed investment in the nonfinancial corporate sector.

It is natural to think these two phenomena were related: It is widely accepted by policymakers and journalists as well as economists that the main factor in the steep fall in business investment was the disruption in the financial system, which cut off

the flow of credit to nonfinancial businesses and prevented them from financing new investment.

The view that credit constraints are directly responsible for the steep fall and slow recovery of business investment is essential to make sense of the crisis in terms of New Keynesian theory, which is committed to the view that businesses know the true, fundamentals-determined expected return on all investment projects, so only time-varying financial frictions can explain the observed instability of investment. But it is also a natural view for Post Keynesians, influenced by the the Minskyan view that firms face an upward-sloping credit supply incorporating both borrower's and lender's risk, which vary endogenously over business cycles. In Minsky's "financial theory of investment and investment theory of the business cycle," shifts in the supply of external funds must, on some level, be the drivers of booms and busts in business investment.

There is no question that many businesses did face tighter credit conditions during the Great Recession. Small, unincorporated businesses may have been especially vulnerable to the tightening of bank lending standards. But for the corporate sector, which accounts for 80 percent of business fixed investment, it is less obvious that credit conditions are the binding constraint on investment, either during the recession or in general. An argument that an adverse shift in the supply of external funds was the main direct cause of the fall in corporate investment in the recession would, at least, have to account for several anomalous facts.

1. The fall in investment occurred across the corporate sector, as opposed to being concentrated among firms with a higher probability of facing binding constraints. In particular, large firms, firms with investment-grade bond ratings, and firms that entered the crisis with no debt, which should have been less affected by tighter credit conditions, all reduced investment during the recession by about as much as the corporate sector as a whole. (See Table 1.3.)

2. As shown in Section 1.5.3, cashflow-investment sensitivity, a standard measure of credit constraints, does not show any consistent increase during the recession, either generally or relatively among firms more likely to face credit rationing. Nor is there an absolute or relative strengthening of cashflow-investment sensitivities during the early 1990s, the last period of severe financial distress.
3. At the same time they were reducing investment, corporations were increasing cash holdings. Since the purpose of holding cash is to buffer expensive-to-adjust spending flows, such as investment, against unexpected changes in cash income or other expenses, we would expect firms to spend down cash reserves in response to tighter credit conditions, before reducing investment. Yet during 2009, when the steepest fall in investment occurred, corporations increased their cash holdings by \$470 billion. This is more than double the \$230 billion reduction in fixed investment in the same period. Cross-sectional evidence also does not support the idea that firms were spending down cash to buffer against change in fixed investment, as one would expect if those changes were compelled by credit conditions. (Kahle and Stulz, 2010)
4. Corporate borrowing did fall steeply in 2008-2009, from about 6% of trend GDP to -1%, after rising about the same amount over the previous five years. But payouts to shareholders (i.e. dividends plus net share repurchases) followed almost exactly the same pattern, rising by a bit over 6 points over 2003-2007 before falling by 6 points over 2008-2009. So the net funds flowing to corporations through the financial markets, for investment and other purposes, were essentially flat over the whole cycle.
5. Measured as shares of trend GDP, corporate profits and corporate debt both passed their pre-recession peaks in 2011. Business fixed investment, however, has been practically flat through the recovery, and is still 15 percent below its

Table 1.3: Percent Change in Investment, 2008-2009, US Corporations

Firm Type	Count	Aggregate Change	Median Change
All	4,672	-22	-27
Large	466	-22	-11
High rated	726	-24	-22
Debtless	540	-31	-24

Source: Compustat; author's analysis.

The table shows the percentage change in total capital expenditure in each class, and for the median firm in the class, over the recession period of 2008-2009. Large firms are the largest 10%, by total assets. High rated firms are those with investment-grade bond ratings (Bbb- and better.) Debtless firms are those that report no debt in the three years prior to the recession. These firms would be expected to see the least direct effects from any tightening of credit constraints.

2007 peak. This is a notable departure from the close association of corporate profits and corporate investment seen in earlier decades. It is also a challenge for the view that the fall in business investment was mainly due to lack of financing, i.e. to an unwillingness or inability of the financial system to hold business liabilities.

None of these points is dispositive; and none speaks to the possibility that the financial crisis was responsible for the fall in business investment indirectly, for instance by cutting off credit to households, with businesses then cutting investment spending in response to lower sales.¹⁵ But they are hard to reconcile with a story in which changes in corporate investment are *directly* driven by shifts in the supply of external funds. More broadly, they suggest that corporations' investment and financing decisions have changed in important ways since the postwar era described by Minsky.

¹⁵It's important to note that this channel, while plausible and possibly important, is incompatible with the fundamental New Keynesian commitment to intertemporal equilibrium under rational expectations. For a critique of this commitment, see Stiglitz (1993).

This final point is illustrated in Figure 1.4, which plots corporate investment and shareholder payouts against cashflow from operations and net borrowing respectively. Again, all four flows are normalized by the total asset stock. (This is the same data as presented in Table 1.2, but here in levels rather than differences.) Here the series are broken into three periods: 1952 to 1984, as in the rest of the paper; 1985 to the business-cycle trough in 2001; and 2002 to 2013. The upper two panels of Figure 1.4 show that the strong relationship between corporate sources of funds and investment in the 1950s, 1960s, 1970s and early 1980s: the points of the scatters fall clearly along an upward-sloping diagonal, indicating that periods of high corporate earnings and high corporate borrowing were consistently also periods of high corporate investment. The time-series relationship between investment and the two sources of funds is still present, though weaker, in the 1985-2001 period. But in the most recent business cycle and recovery, the correlations appear to have vanished entirely. The rise, fall and recovery of corporate cashflow over the past dozen years is not associated with any similar shifts in corporate investment. Similarly, the very large swings in credit flows to the corporate sector do not correspond to any similar shifts in aggregate investment. Conversely, as shown in the lower two panels of Figure 1.4, there appears to be only a weak relationship between shareholder payouts and the two sources of funds in the earlier period. Annual net payments to shareholders are stable at between 1 and 2 percent of corporate assets, regardless of whether cashflow from operations and borrowing are high or low in that quarter. In the most recent period, by contrast, payouts to shareholders vary much more, and appear more strongly associated with variation in cashflow and borrowing. 1985-2001 is intermediate between the two.

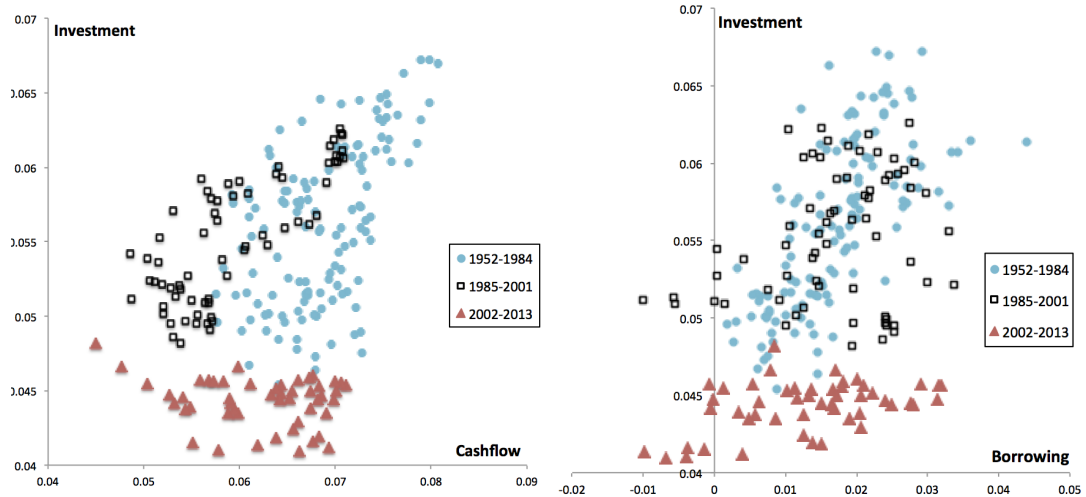
Because of strong serial correlation in the data, these plots must be interpreted with care. The regression coefficients reported in Table 1.2 are a more reliable guide to the change in relationships. But the plots do give visual confirmation of the shift and a sense of its magnitude. Note that from the plots, it would appear that the

change in payout behavior came first, and investment behavior changed second, only after the 2001 recession. (In the upper two panels of Figure 1.4, the black squares lie more or less in line with the blue circles, while the red triangles have a much flatter distribution. In the lower two panels, the black squares lie closer to the triangles.) As we will see in the next section, this particular sequencing is not supported in the firm-level data, where investment shows a sharp transition in the early 1980s, but payouts do not. This difference may reflect inconsistencies between the two data sources. For example, the fact that cash acquisitions show up as shareholder payouts in the aggregate data but not in the firm level data mean that takeover wave of the 1980s boosts the payout correlations for the middle period here, but not in the firm-level regressions. The difference may also reflect the fact these plots reflect variation over time, while the regressions in the next section look at variation across firms. It is not implausible that these two kinds of variation might behave differently. These are important issues, to which it will be worth returning in the future. But they do not affect the basic agreement between the time-series and firm-level analysis on the larger shift after the early 1980s: toward a weaker relationship between investment and borrowing and cashflow from earnings, and a stronger relationship between payouts to share holders and those two flows.

1.5.3 Cross-Sectional Data

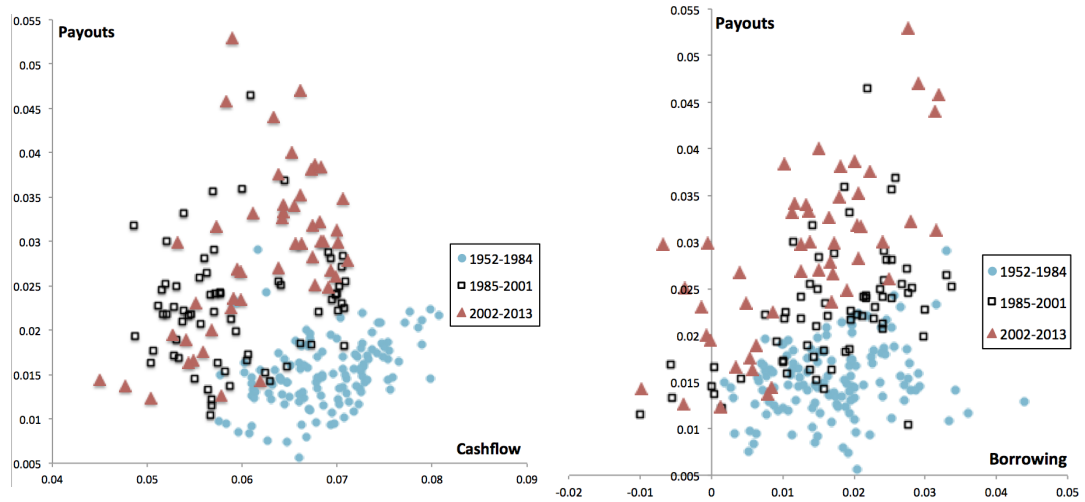
Next, I investigate the same predictions using firm-level data from Compustat. While the underlying hypothesis is the same here as in the time-series tests, the source of variation is entirely different. Instead of looking at the joint distribution of investment, shareholder payouts, borrowing and cashflow from operations across periods, I now look at it across firms in a given period. While my analysis makes similar predictions in both cases – with certain differences discussed below – there is

Figure 1.4: Corporate Sources and Uses of Funds, 1952-2014



(a) Investment and Cashflow

(b) Investment and Borrowing



(c) Shareholder Payouts and Cashflow

(d) Shareholder Payouts and Borrowing

Source: Flow of Funds. The figure shows aggregate quarterly fixed investment spending and cashflow from operations for US nonfinancial corporations, at annual rates, normalized by the sector's total assets. See text for variable definitions. The small circles show 1951Q4 through 1984Q4; the boxes show 1985Q1 through 2001Q3; and the triangles show 2001Q4 through 2014Q1.

no reason that variation across firms should look anything like variation over time. So the two sets of results constitute independent tests of my hypothesis.

An important challenge in moving from aggregate for firm-level data is the extremely skewed distribution of firms. The majority of publicly traded firms are relatively small, but aggregate activity is dominated by the largest firms. The largest 25 percent of firms in the Compustat database for each year typically account for over 90 percent of total assets, investment, borrowing and shareholder payouts, while the smallest 25 percent account for 1 percent or less. This is not just a question of size: small firms are systematically less likely to participate in the transactions of interest here. If we divide firms into size classes by assets for each year, a large majority of the smallest 25 percent for each year report no payouts to shareholders, and a majority report no credit market borrowing. A significant minority (around 10 percent in recent years) also report no capital expenditure. By contrast, large majorities of the largest 25 percent engage in credit-market borrowing and shareholder payouts each year, and the overwhelming majority (over 99 percent in most years) report some capital expenditure. So treating large and small firms as independent observations of the same underlying data-generating process seems treacherous. And to the extent that there are different relationships between the four flows in small and in large flows, it is relationships at the large firms that matter for aggregate outcomes.

Furthermore, there are good prior reasons to think large firms are the relevant ones for my hypothesis. The shareholder value revolution was very much focused on the largest corporations, where the separation of ownership and control and the autonomy of management had been most fully developed. Smaller firms are more likely to be closely held, with less professional management in the first period and less pressure from external shareholders in the later one. In addition, a large majority of smaller firms never report positive profits, even in boom years. Others will be rapidly growing young firms, with strong investment demand. In both these cases, there will not be

any excess cash to disgorge. Large, mature firms are more likely to have high supplies of funds relative to demand, which they will have come under pressure to pay out. In general, the story of the shift away from managerialism is generally focused on the largest firms.

Finally, as shown in Table 1.4, small firms have greater variance for all four variables, especially cashflow. In the majority of years, the standard deviation of cashflow for the smallest quarter of firms is over 10 times the standard deviation for the largest quarter. This means that if all firms are included in the regression, observations of small firms will dominate the results. Yet these are the least relevant observations, both for macroeconomic outcomes and for our hypothesis. It is therefore essential that we limit our sample to larger firms if we wish to get economically meaningful results. Accordingly, we limit the sample to the largest quarter of firms from each year. To the extent that the underlying process are the same among large and small firms, this will not affect our analysis (except by reducing sample size). To the extent that the underlying processes are different, the process affecting large firms is the one we are interested in, both because larger firms are most relevant for the question of interest here and because large firms dominate macroeconomic outcomes.

Investment is capital expenditure, payouts are total dividends plus stock repurchases, net borrowing is the year-over-year change in debt, and cashflow is income before extraordinary items plus depreciation and amortization.¹⁶ All variables are normalized by firm total assets, and then winsorized at the 1% and 99% levels. The sample is limited to the largest 25% of firms, by assets, for each year.

The cross-sectional results are reported in Figures 1.5 through 1.8. These are OLS regressions of investment and payouts, respectively, on borrowing and cashflow, one regression for each year. The central line shows the estimated coefficient on each of

¹⁶In an alternative specification, I treat research and development as investment, which means also adding R&D expenditures to cashflow. The results are qualitatively similar.

Table 1.4: Descriptive Statistics, Firm-Level Data

		Investment	Payouts	Cashflow	Borrowing
Period 1: 1952-1984					
Large Firms					
	Mean	8.4	3.0	9.4	2.7
	Std. Dev.	6.1	2.1	4.5	6.9
Other Firms					
	Mean	7.8	2.3	8.5	2.0
	Std. Dev.	7.5	2.8	11.5	10.8
Period 2: 1985-2013					
Large Firms					
	Mean	6.4	3.3	7.7	2.0
	Std. Dev.	5.5	4.6	8.2	11.0
Other Firms					
	Mean	6.1	2.2	-4.4	1.2
	Std. Dev.	7.2	5.1	48.0	17.8

Source: Compustat, author's analysis.

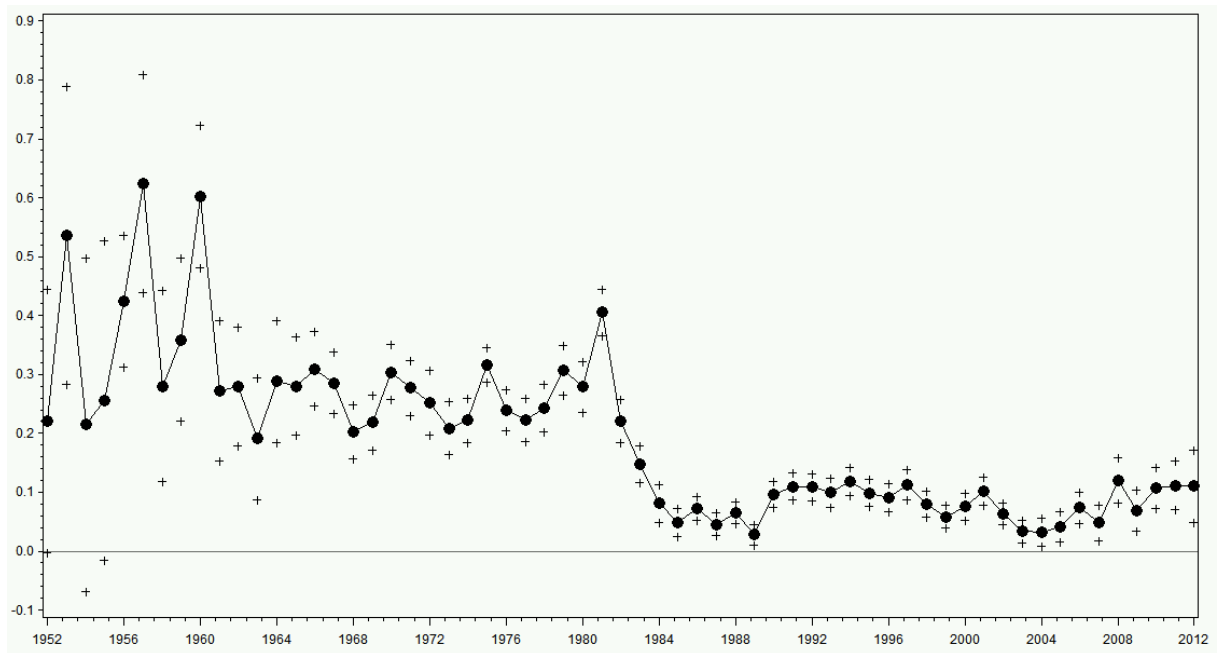
Large firms are the top 25% by assets for each year. Other firms are the remaining 75%. Figures reported are averages of annual averages for each period.

the two right hand side variables. The crosses show a range of two standard errors above and below the point estimate. Share repurchases are reported only on cashflow statements, which are not included in Compustat for years before the early 1970s. So the payout regressions begin in 1973.

These are the key results for the essay's argument.

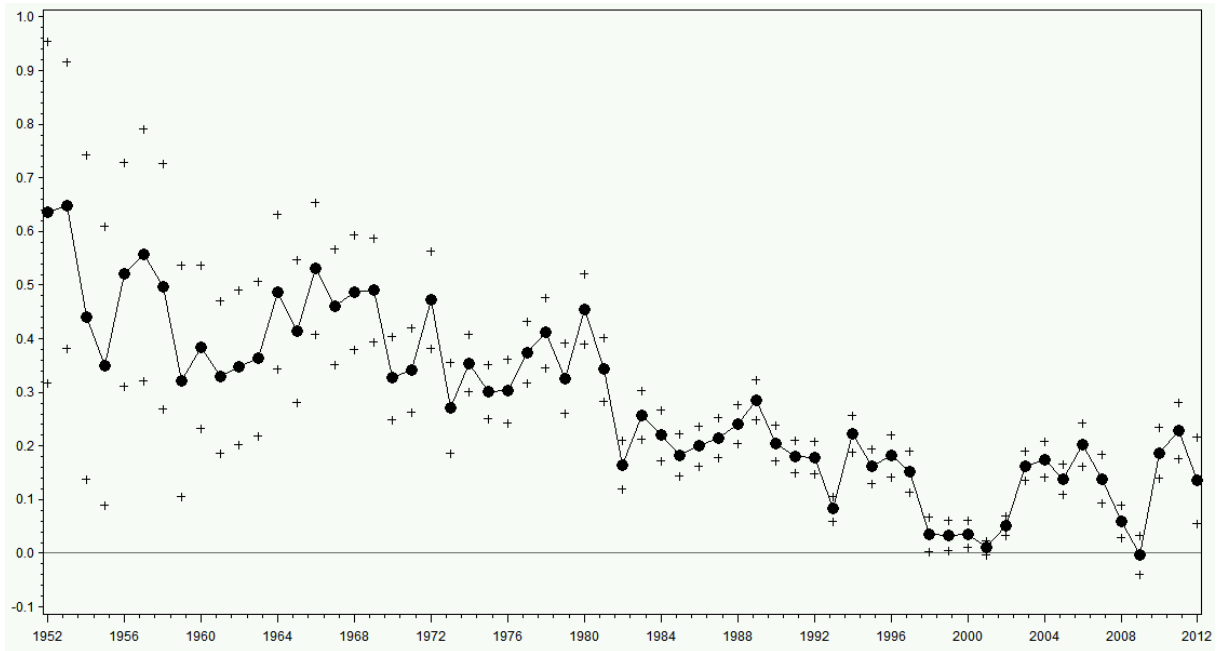
As Figures 1.5 and 1.6 show, firm-level variation in investment also suggests a regime shift in the mid-1980s, consistent with the aggregate variation over time described in Section 1.5.1. For investment and borrowing, the coefficient averages around 0.3 for the pre-1985 period, and less than 0.1 in the later period. There is a sharply defined transition between the two periods and, as can be seen from the confidence intervals, this change in the relationship between the two variables would easily pass conventional tests of significance. Again, the argument here does not depend on which way causality runs between investment and borrowing. In the managerial model of the financing decision, an increase in the supply of funds from the credit

Figure 1.5: Coefficients and 95% Confidence Interval, Regressions of Investment on Borrowing



The figure shows the coefficient on borrowing of annual regressions of capital expenditure on borrowing and cashflow for the largest 25% of nonfinancial corporations by assets, as reported in Compustat. Variables are normalized by total assets. The crosses show two standard errors above and below the estimated coefficient.

Figure 1.6: Coefficients and 95% Confidence Interval, Regressions of Investment on Cashflow



The figure shows the coefficient on cashflow of annual regressions of capital expenditure on borrowing and cashflow for the largest 25% of nonfinancial corporations by assets, as reported in Compustat. Variables are normalized by total assets. The crosses show two standard errors above and below the estimated coefficient.

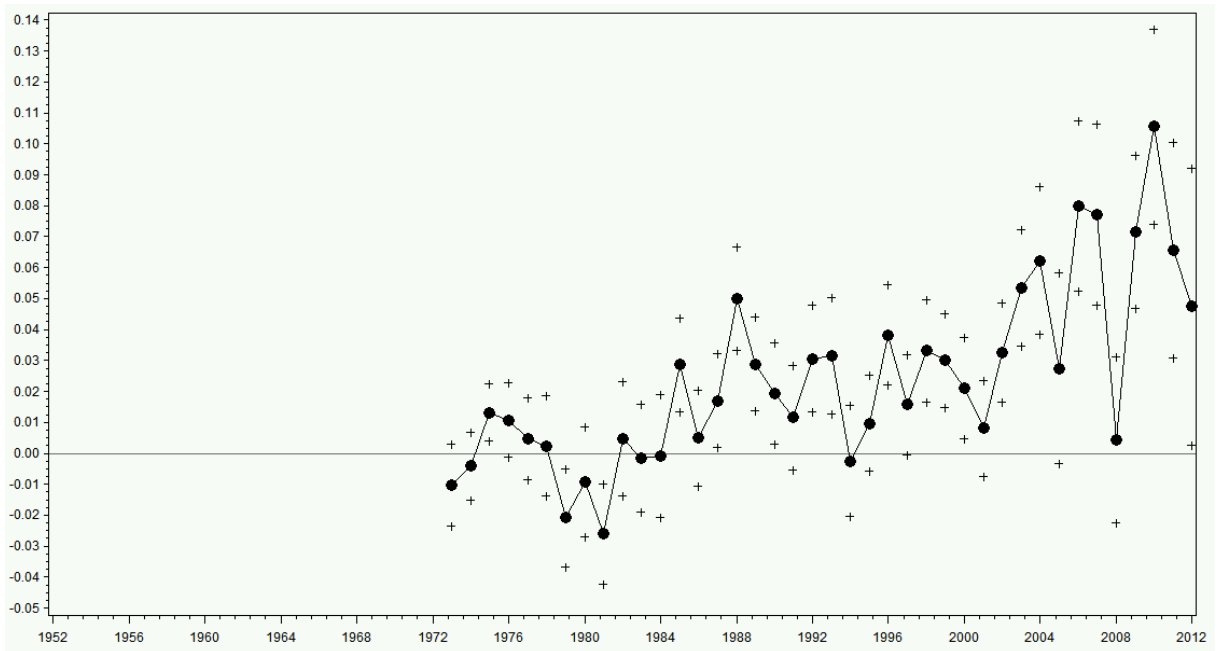
market leads to higher investment, and an increase in investment demand leads to greater borrowing. So we do not need to worry about isolating exogenous variation in the independent variable. All that matters is the existence of a strong link between the two flows in the earlier period and a weaker one in in the later period.

For cashflow and investment, there is also a clear transition in the early 1980s from a stronger to a weaker relationship, with coefficients averaging 0.4 before 1985 and 0.15 in the later period. Not surprisingly, the relationship is especially weak during the tech boom years of the late 1990s. The relationship also disappears during 2009, when the bulk of the most recent fall in investment occurred. This is a problematic fact for the view that credit constraints were a major factor reducing investment in the Great Recession, since stronger credit constraints should be associated with a stronger investment-cashflow sensitivity. Fazzari, Hubbard and Petersen (2000)

The large decline in investment-cashflow and investment-borrowing sensitivities after the early 1980s is robust across a range of alternative specifications. When I consider all firms rather than just large firms, in fact, these relationships simply don't exist after the mid-1980s. The weakening or disappearance of the link between investment and firms' two main sources of funds is an important macroeconomic shift; it creates problems in particular for accounts of investment fluctuations that depend on the direct effects of credit constraints on business investment.(Credit conditions could still be important indirectly, via changes in households' ability to finance consumption or residential investment.) In the absence of a strong relationship across firms between investment and sources of financing, it may be challenging to translate the "financial theory of investment" that fit the world before the 1980s into terms that describe today's corporate sector.

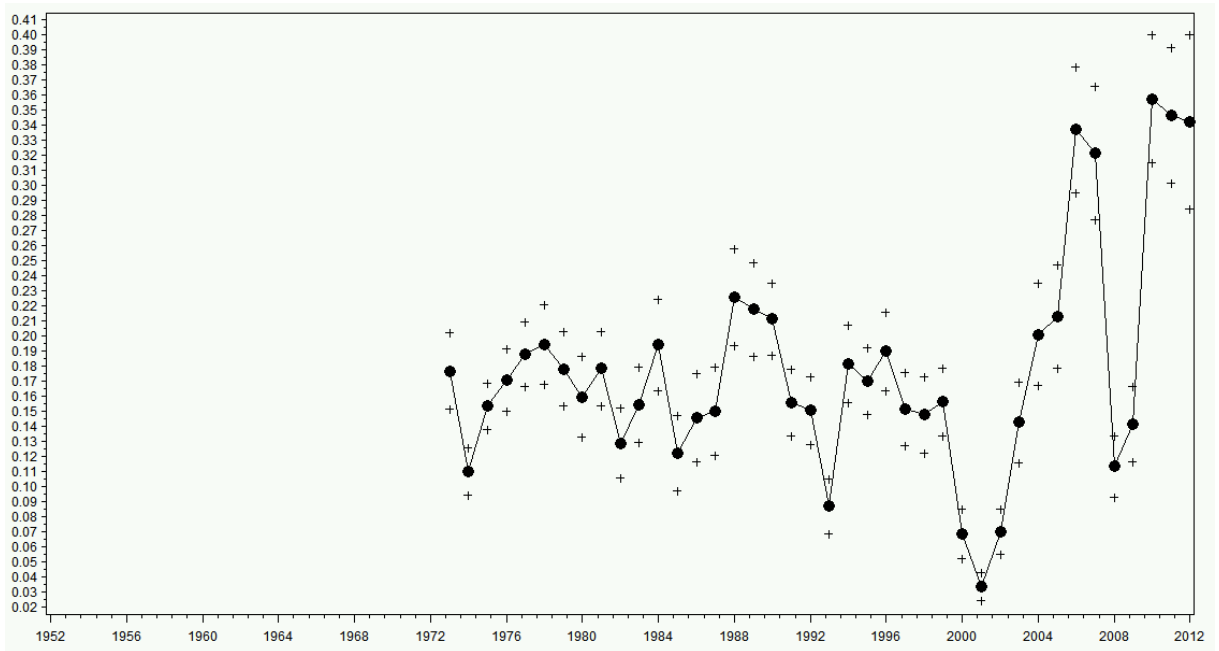
Turning to shareholder payouts, while there is only a decade of data from the early period, there is still evidence of a regime change. For payouts and borrowing, there is a clear strengthening of the relationship over time: The coefficient is not significantly

Figure 1.7: Coefficients and 95% Confidence Interval, Regressions of Payout on Borrowing



The figure shows the coefficient on net borrowing of annual regressions of shareholder payouts on borrowing and cashflow for the largest 25% of nonfinancial corporations by assets, as reported in Compustat. Payouts are defined as total dividends plus share repurchases. Variables are normalized by total assets. The crosses show two standard errors above and below the estimated coefficient.

Figure 1.8: Coefficients and 95% Confidence Interval, Regressions of Payout on Cash-flow



The figure shows the coefficient on cashflow of annual regressions of payouts to shareholder on new borrowing and cashflow from operations for the largest 25% of nonfinancial corporations by assets, as reported in Compustat. Variables are normalized by total assets. The crosses show two standard errors above and below the estimated coefficient.

greater than zero for any year before 1985, but is significantly greater than zero for two-thirds of the years after 1985. The average coefficient value is very close to zero for the pre-1985 period, and around 0.05 in the later period. In the 2000s it reaches 0.1. The relationship also shows a cyclical pattern, weakening in 1994 (after the end of the official recession, but while corporate borrowing was still falling), in 2001, and in 2008.

For payouts and cashflow, there is little evidence of a secularly strengthening relationship, but we do see increasingly large cyclical variation in it. The most dramatic feature of Figure 1.8 is how much the cashflow-payout relationship weakens in each of the last two recessions, and how much it strengthens in each following recovery. This strongly cyclical behavior is exactly as predicted with our hypothesis. Recall that in Figure 1.2, variation in internal funds (i.e. horizontal shifts in the supply of funds curve) only generates variation in payouts when the supply of funds curve crosses the ROC to the right of the demand for funds curve. When profits and borrowing capacity are low, it is more likely that the supply of funds curve will cross the demand for funds curve above the ROC. In this case, there will be no correlation between internal funds and payouts. Put another way, the Jensenian injunction to "disgorge the cash" applies only to funds in excess of the firm's (rentier-approved) requirements. Given that firms' financing needs do not vary too much over the cycle, a much larger share of funds will be excess in the boom than in the slump. So the boom is when we should expect to see the strongest relationship between cashflow and payouts.

Another view of the changing relationship between sources and uses of funds across firms is shown in Table 1.5. Here I have used the average value of each flow over the previous three years, instead of just one, for 1960, 1975 and 2005. These results can be seen as snapshots of the financing decision across firms before and after the shareholder value revolution.

Table 1.5: Firm-Level Regression Results, Selected Years

Dependent Variable	Coefficient		r^2
	Borrowing	Cashflow	
1960			
Investment	0.76 (0.09)	0.48 (0.07)	0.27
1975			
Investment	0.44 (0.03)	0.35 (0.03)	0.22
Payout	-0.02 (0.01)	0.16 (0.01)	0.19
2005			
Investment	0.06 (0.02)	0.20 (0.02)	0.08
Payout	0.13 (0.02)	0.40 (0.02)	0.25
2010			
Investment	0.11 (0.02)	0.19 (0.02)	0.07
Payout	0.11 (0.02)	0.36 (0.02)	0.22

The table shows the results of cross-sectional regressions of gross fixed investment and corporate payouts (dividends plus net share repurchases) on borrowing and cashflow (income before extraordinary items, plus depreciation and amortization.) All variables are normalized by the total asset stock. Standard errors in parentheses. Because stock repurchase data only begins in 1972, payouts are not reported for 1960.

As Table 1.5 shows, in the early period, knowing the size of the main flows of funds into a firm is sufficient to predict its level of investment with a reasonable degree of precision. When we look across the large corporations in a given year, we can say with confidence that the ones that are borrowing much more than average, are also investing much more than average. Similarly, we can confidently say that investment is concentrated at the firms with the largest flows from operations. Crudely, it appears that 50-75 cents of each dollar of additional borrowing goes to investment, and 35-50 cents of each additional dollar of cashflow. Shareholder payouts, by contrast, are unrelated to borrowing. This is not surprising – in standard models of corporate investment, a given firm is either borrowing or making payouts to shareholders, but never both at once. And while payouts are also higher at firms with high cashflow, the link is noticeably weaker than the cashflow-investment link. So a story in which investment is the most important use for additional funds available to the firm, and conversely where the availability of funds is a major constraint on investment, is broadly consistent with the data.

In the later period, there is very little joint variation of investment with cashflow and borrowing. Unlike in 1960 or 1975 that a firm's recent earnings and borrowing are unusually high does not allow us to predict with much confidence that its investment will also be high. On the other hand, there is now a clear relationship between sources of cash and payouts to shareholders. In particular, there is a large, positive relationship between borrowing and payouts, which did not exist at all in the earlier period. So the statement that "firms borrow to fund investment" was a reasonable shorthand description of the financing decisions of large corporations in the 1950s, 1960s, or 1970s. But today, it would be more accurate to say, "firms borrow to increase payouts to shareholders."

1.6 Conclusions

This paper argues that the increasing power of rentiers over corporate management since the 1980s has important macroeconomic implications. The new pressure on corporations to payout “free cashflow” to shareholders reduces fixed investment in absolute terms, but also makes it less sensitive to changes in financing conditions, since for most large corporations fixed investment is no longer the marginal use of funds. In the simple picture presented in Section 1.4, under managerialism the firm financing decision took the form of adjustment along a single margin – investment demand against the effective marginal cost of external funds. In the rentier-dominated firm, by contrast, when investment demand is not too high relative to the supply of funds, the decision takes the form of independent adjustment on two separate margins, investment and borrowing respectively against rentiers’ opportunity cost for leaving funds in the firm. In the latter case, since the main immediate effect of a fall in cashflow from operations or in credit availability is to reduce payouts to shareholders, fixed investment is in effect buffered or insulated against changes in credit conditions.

One important implication of this argument is that it is hard to explain the large fall in corporate investment in 2008-2009 as the direct effect of the disruptions in credit markets as a result of the financial crisis. But in a world where managers know the true expected return on investment projects, and where demand-driven fluctuations do not affect the economy’s long-run growth path, the current level of economic activity should not have a large effect on fixed investment in the absence of changing credit constraints. So to sustain the New Keynesian account of the recession, it is essential that the large fall in business investment be directly attributable to a lack of credit. (Hall, 2010)

If we reject the idea of credit constraints as the main proximate cause of the fall in corporate investment in 2008-2009 (and in previous recessions), some other story is needed. A natural alternative is the idea of inherently unstable demand dynamics,

along the lines of the multiplier-accelerator models of cycles developed by the first generation of Keynesian economists. (Harrod, 1939; Kaldor, 1940) If income adjustments dominate price adjustments, then multiple and unstable equilibria are possible and we do not need credit constraints to explain investment fluctuations. Fazzari et al. (2013) is an interesting recent example of this type of model. An advantage of this approach is that it naturally accommodates the case – not really possible in the New Keynesian framework – where tighter credit constraints restrain spending by households and small businesses, and the resulting fall in aggregate demand leads to reduced investment by unconstrained larger firms, perhaps in a self-reinforcing spiral. A second alternative is to try to explain investment fluctuations in terms of variations in the rate of profit. While aggregate profitability is given a relatively minor place in contemporary macroeconomics, it was a central concern for classical economists. And it may matter even in the absence of binding financing constraints, since profit rates affect investment demand as well as the supply of funds. (Glyn, 1997) Attempts to analyze US business cycles in terms of cyclical fluctuations in the profit rate go back to Sherman (1979) and Weisskopf (1979); a more recent example is Kotz (2011). Evaluating the merits of these approaches is beyond the scope of this paper. But if it is true that credit constraints have become relatively unimportant for investment at large corporations, then presumably some mix of aggregate-demand and profit-rate stories will be needed to explain its continued large cyclical swings.

Another implication is that policy interventions that imply raise the aggregate lending capacity of the financial system may be ineffective at increasing business investment. The results here suggest that even if measures to strengthen bank balance sheets (or, as the banks would prefer, regulatory forbearance) did ease the terms on which corporations could borrow, the majority of the additional funds flowing into the corporate sector would simply flow out again to shareholders. Both conventional monetary policy and quantitative easing and related policies target only the terms

on which financial institutions can fund themselves. This analysis suggests that to effectively boost demand, policy interventions would instead have to reach further down the intermediation chain, channeling credit specifically to the smaller borrowers who may still face binding credit constraints. In other words, monetary policy would have to be supplemented or replaced with “credit market policy.” (Pollin et al., 2011)

CHAPTER 2

THE DYNAMICS OF HOUSEHOLD DEBT IN THE UNITED STATES, 1929-2011

2.1 Introduction

In the wake of the Great Recession there has been a renewal of interest in changes in the ratio of debt to income and net worth, for private as well as public borrowers. This is not surprising, given that the implications of leverage for macroeconomic performance are most dramatically evident in periods of financial distress. In most discussion of changes in leverage, it is assumed that these changes are driven primarily by changes in borrowing behavior. The starting point of this paper is the observation that this is not necessarily the case. When there are existing large stocks of debt, changes in income growth and inflation and nominal interest rates affect the evolution of debt-income ratios independently of the decisions of lenders and borrowers. In other words, while we typically assume that interest rates, growth rates, and other parameters facing economic units are stable enough that the debt stock can be assumed to be fully adjusted to those parameters, in reality economic units face changes in these parameters with large stocks of debt incurred in previous periods. This means that the debt-income ratio cannot always be represented as an equilibrium.

An important early attempt to link these debt dynamics to macroeconomic outcomes was Irving Fisher's debt-deflation theory of depressions. (Fisher, 1933) The key dynamic in that analysis was that (1) even as households reduced borrowing during the crisis, falling prices and incomes led to rising debt burdens. (2) Rising debt ratios led to cutbacks in expenditure, reducing incomes further and – via bank failures and general disruptions in the financial system – (3) putting downward pressure

on the price level. (4) The fall in incomes, asset values and prices implied higher leverage, forcing households and businesses to attempt further expenditure cuts, in a self-reinforcing cycle.

I offer a more general account of step one in that process: a change in leverage resulting from a change in growth, inflation/deflation, and/or interest rates. This paper is primarily an exercise in accounting. The main positive claim is that we must distinguish changes in household debt-income ratios from household borrowing; periods of rising debt-income ratios need not be periods of higher borrowing, and historically often have not been. The focus here is on household debt to income ratios (as opposed to public or business leverage). I argue that “Fisher dynamics” – understood as the mechanical effects of changes in these three variables on debt-income ratios independent of borrowing behavior – are an important but largely neglected factor in more recent changes in leverage of the household sector as well. I suggest that since it is universally agreed that the rise in household debt-income ratios between 1929 and 1933 was not chosen by households, but was the result of unanticipated income declines and deflation, later changes in debt-income ratios might in principle be explained in similar terms. In particular, the 1980s can be understood as a slow-motion debt deflation (or debt-disinflation), with the combination of slower nominal income growth and higher interest rates producing rising debt-income ratios despite a substantial *fall* in household spending relative to income. This suggests a very different understanding of the post-1980 increase in household debt (until the housing boom of the first half of the 2000s), in which there was no increase in desired borrowing. Rather, higher nominal interest rates and then disinflation raised the growth rate of debt at any given level of borrowing; while households did reduce new borrowing after 1980, they did not do so fast enough to offset these dynamic effects.

The fact that the period between 1980 and 1998 saw an increase in household leverage despite a substantial reduction in household borrowing, suggests that house-

hold debt increases between 1980 and 1998 were not the result of an increase in household credit demand, nor of a failure of households to respond appropriately to higher interest rate, but rather to the impact of what I am calling Fisher dynamics. From 1999 to 2006, there was indeed a substantial increase in new borrowing by households. But even in this period, about a third of the rise in leverage arose from the fact that real interest rate growth on the existing stock of debt was higher than real income growth for households during this period. Finally, in the period from 2007 and 2011, household borrowing turned sharply negative; despite this, there was little reduction in leverage ratios since income growth again was low compared to real interest rates.

Along with ?, this essay appears to be the first complete decomposition of historical changes in the debt-income ratio for the household sector.¹ But the methodology is familiar for public debt. It is well-known that changes in the ratio of public debt to GDP can be decomposed changes into the primary balance (i.e new borrowing), the real growth rate, the nominal interest rate, and inflation as independent determinants of public leverage. (Escolano, 2010) The primary goal of this paper is to shed light on the causes and consequences of the increase in household leverage after 1980; a secondary goal is to make the case for accounting decompositions as an empirical methodology. This methodology is particularly appropriate for the Keynesian paradigm, oriented as that is toward the evolution of macroeconomic variables in historical time.

The remainder of the paper is organized as follows. I begin with a consideration of the renewed focus on private debt as a key macroeconomic variable. I then discuss the value of focusing on debt levels as opposed to net wealth. The sections that follow describe the accounting procedure used to model Fisher dynamics, and the

¹Barba and Pivetti (2009) describes such a decomposition, but does not carry it out.

data sources I use for the task. I move then to a description of the evolution of U.S household debt over the period 1929-2011, suggesting a division into distinct periods where Fisher dynamics and borrowing behavior respectively have had very different impacts on overall leverage. I also note the very large fraction of recent deleveraging accounted for by defaults, which has received little attention in either scholarly or policy-oriented work, and suggest that in the absence of a substantial fall in interest rates and/or rise in inflation, additional write-offs are the most realistic path to further household deleveraging. I then compare my account to some alternative explanations of the rise in household debt, and clarify the behavioral assumptions needed to convert my accounting results into a causal story. Finally, I provide some simple counterfactual simulations to underline the importance of debt dynamics.

2.2 Motivation

2.2.1 Accounting and History

In examining leverage trends, one is often concerned with the ratio of outstanding debt to some measure of the capacity to repay debt, typically income. In this paper we use a measure of income that reflects household's ability to repay debt, which we describe more fully later. Using this measure, during the 1960s and 1970s, the ratio of debt to income for the US household sector was roughly constant. In 1983, the ratio stood at around 75 percent, the same as 20 years earlier. Then between 1983 and 2008, the ratio doubled, to over 160 percent. Why did household leverage rise so sharply after 1983, after being stable for the previous 20 years? And what were the macroeconomic implications of this rise in household debt ratios? Did the rise in household debt help sustain aggregate demand, in the face of other factors that tended to hold down demand after 1980?

Any attempt to answer these questions using macroeconomic data must use an appropriate accounting framework. It is normal to discuss both the evolution of

household debt and aggregate demand in terms of household savings behavior. The savings concept in national accounts, however, is not appropriate for either of those purposes. Savings in the national accounts includes all spending that is not directed toward current consumption, with mortgage interest payments included in consumption. Dissaving in this concept does not correspond to credit-market borrowing. While it is natural to suppose that the rise in household debt after 1980 is connected with the similarly-timed fall in personal savings, in fact there is no direct connection between the two trends.

At the outset, it is useful to have a sense of the overall trends in leverage in the economy. Figure 2.1, drawn from the Flow of Funds, shows private and public debt to GDP ratios for the three main nonfinancial sectors since 1929.² GDP is used as the denominator for all three series in order to allow comparisons of the magnitude of the different sectors' debt. The first notable feature is the large swings in leverage in the early period. The large increases in household and business debt relative to GDP between 1929 and 1933 are especially striking since the nominal value of debt fell substantially for both of those sectors. The leverage increases during this period are entirely due to the fall in nominal GDP, which in turn is due in about equal parts to deflation and the fall in real output. This is a stark reminder that changes in leverage ratios depend on the behavior of the denominator as well as the numerator. The second notable feature is the very large increase in federal debt during World War II; by comparison, the recent increases are relatively modest departures from the long-run average. Third, in more recent decades we see a long-term upward trend in overall debt to GDP ratios. Between 1950 and 1980, the ratio of total nonfinancial debt to GDP was quite stable around 1.3, but over the past three decades it has nearly

²The pre-1950 figures of business debt are from Goldsmith (1955), which gives figures only for selected years. Since Goldsmith does not provide a category strictly equivalent to credit market liabilities as reported in the Flow of Funds, I use the sum of payables to financial intermediaries, mortgages, and bonds.

doubled, to around 2.5. This trend is common to most OECD countries (Cecchetti and Zampolli, 2010). Fourth, looking at this same period, while the rise in public debt is responsible for the largest part of the most increase in leverage over the past five years, over the longer term increases in business and, especially, household debt have been more important. Only about a third of the total increase in leverage since 1980 is accounted for by federal borrowing. Fifth, both household debt and nonfinancial business debt have consistently exceeded public sector debt since the mid 1960s. And sixth, while in some periods the private and public balances show roughly offsetting movements (1950-1980, 2008-2010), in others they move roughly together. In the 1980s and 2000s, there are significant increases in all three sectors' leverage.³ As a whole, Figure 1 suggests that policymakers have good reason to be concerned with rising leverage; but also suggests that private leverage should be at least as much a focus of discussion as public leverage.

2.2.2 The Significance of Private Leverage

Leverage is normally defined as the ratio of debt to either income or net worth; in this paper, I use the ratio of debt to income. Traditionally, economists have attributed only a minor role to leverage in the determination of macroeconomic outcomes. Conventional economic analysis had suggested that consumption choices depend on debt only to the extent that debt affects household net wealth. (Benito and Zampolli, 2007). While a minority of economists going back at least to Fisher have seen leverage as an important factor constraining aggregate demand, the predominant view, at

³While it is true that net borrowing must sum to zero across sectors, there is no such adding-up constraint on gross debt. Increases (decreases) in inflation or income growth rates will lower (raise) leverage for all sectors simultaneously. Changes in asset positions also can cause one sector's debt to change without an offsetting change elsewhere. Increased debt across domestic sectors taken as a whole can also reflect borrowing from the rest of the world. However, there was no increase in the gross stock of foreign-owned assets in the United States (measured as a share of GDP) prior to 1990, so at least the first two decades of rising aggregate leverage do not appear to reflect borrowing from abroad.

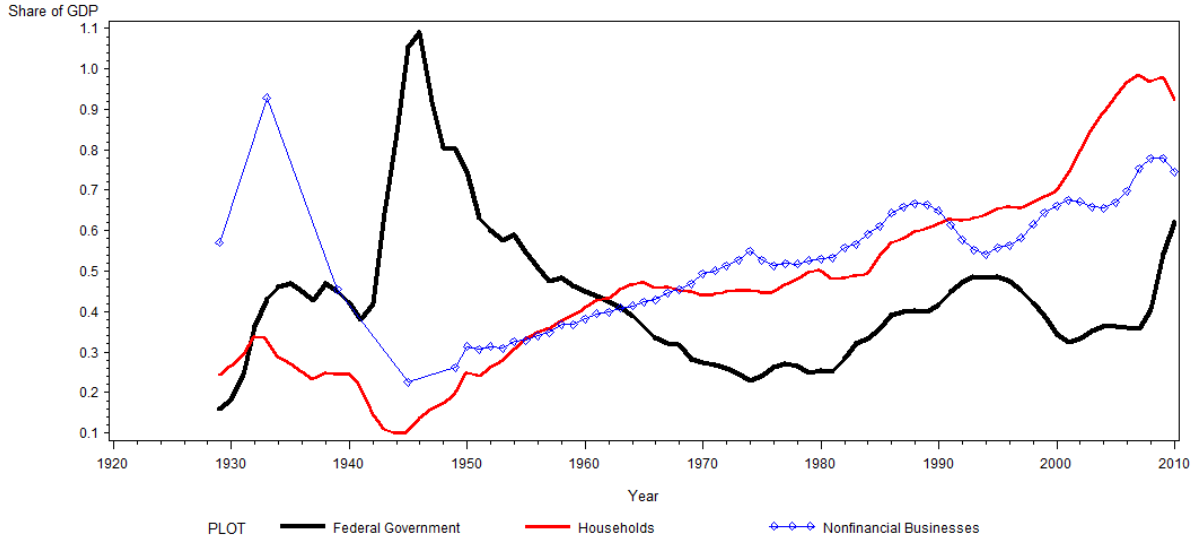


Figure 2.1: Nonfinancial Leverage, 1929-2011.

The lines show the gross nominal debt of the three domestic nonfinancial sectors relative to nominal GDP. For nonfinancial businesses, pre-1945 data is taken from Goldsmith (1955), which includes estimates only for selected years.

least until the last few years, was well summarized by Bernanke (2000, p. 215): since one unit’s liability is another unit’s asset, changes in leverage

represent no more than a redistribution from one group (debtors) to another (creditors). Absent implausibly large differences in marginal spending propensities among the groups... pure redistributions should have no significant macroeconomic effects.

For governments, which are assumed to not have substantial asset positions, gross debt has long been seen as a central variable.⁴ But for households and private businesses it has not generally been considered of first-order importance.

In the wake of the Great Recession, however, there has been a renewed interest in private leverage, both among macroeconomic theorists and policymakers. Recent theoretical and empirical work has sought to show that the accumulation of debt

⁴See Arestis and Sawyer (2009) for a criticism of the usual assumption that the public sector lacks significant assets.

in the household sector, and the subsequent behavioral adjustment of heterogeneous households to shocks in household balance sheets, might be seen to be the key factor in the prolonged state of depressed demand observed currently in the U.S. and elsewhere. (Hall, 2011*a,b*; Eggertson and Krugman, 2010; Guerrieri and Lorenzoni, 2011; Philippon and Midrigan, 2011) Similar arguments have been made for the Great Depression (Olney, 1999; Mishkin, 1978) and for the Japanese “lost decades.” (Koo, 2008) In these more recent macroeconomic models, heavily indebted households cut back consumption in the face of a sudden shock to assets (such as a fall in house values), but less indebted households do not increase consumption in similar proportion for various reasons (financial frictions, zero lower bounds), thereby causing a recession that cannot easily be remedied by traditional monetary policy. Mian, Rao and Sufi (2011) provide strong empirical evidence on the importance of gross liabilities, particularly household debt accumulated in the mid 2000s, in depressing consumption and contributing to the recession of 2007-2009. These papers suggest reasons to care about the level and distribution of gross private sector debt independent of the net position of the sector, and offer theoretical justification for a focus on the process of household leveraging and deleveraging.

A focus on leverage is motivated by the idea that the relationship between current income and cash commitments matters. In emphasizing the ratio of liabilities to income, I am following the work of Hyman Minsky:

The fundamental speculative decision of a capitalist economy centers around how much, of the anticipated cash flow from normal operations, a firm, household, or financial institution pledges for the payment of interest and principal on liabilities. (Minsky, 1975, p. 84)

The importance of gross liabilities becomes obvious in periods of financial distress, when the ability to meet cash commitments through asset sales or emission of new liabilities may be limited, and a significant fraction of units face difficulties in servicing their debt. A focus on net wealth by contrast assumes (implicitly or explicitly) that

assets are always liquid, and can be mobilized (either through sale or as collateral) to meet debt obligations. But assets cannot always be reliably converted to means of payment, either because their market value fluctuates, because they are inherently illiquid, or because they become so in a crisis. Thus leverage, as opposed to net wealth, matters mainly in the context of liquidity constraints. If units' assets are not reliable sources for either funding or market liquidity, then the capacity to service debt out of current income becomes paramount. (Tirole, 2011) These are the conditions in which leverage matters.

The need to reduce leverage following a financial crisis may be a large part of the reason why recovery from such crises has been so slow historically. Because debt is a stock, its adjustment must take place over time; an economic unit targeting a substantially lower level of leverage will typically seek to reduce its consumption relative to its income over a number of periods, producing an ongoing drag on aggregate demand. Unlike other factors depressing output whose effects should not be expected to persist once the initial cause is removed, a crisis that results in many units finding themselves with leverage levels that are seen to be “too high” may lead to a long period of depressed output even after the initial crisis is resolved. Indeed a key finding of Reinhart and Rogoff (2010) is that deleveraging recessions are almost always longer and more painful than others. Put another way, the debt built up in bubbles, beyond the fluctuations of asset prices themselves, is a major component of the macroeconomic costs of asset bubbles.

This factor might help explain why the macroeconomic effects of the housing bubble were so much more severe than those of the dot-com bubble, even though the loss of wealth at the end of the two bubbles was very similar. The fall in the value of corporate equity owned by households over 2000-2002 equalled 61 percent of GDP, compared with 62 percent of GDP for the fall in housing wealth from 2006 to the present (from Flow of Funds). The idea that debt contributed to the difference

between the two episodes has been emphasized by policy makers. For example, Joseph Gagnon:

The harm of a bubble arises almost entirely if it is leveraged. ... The tech bubble wasn't leveraged, and when it burst it had little effect. The housing bubble was leveraged, and it had a major effect. (Gagnon, 2011)

Similarly, Alan Greenspan:

I very much doubt that in September 2008, had financial assets been funded predominately by equity instead of debt, that the deflation of asset prices would have fostered a default contagion much beyond that of the dotcom boom. (Greenspan, 2010)

2.3 Debt Dynamics

Discussions of leverage typically focus on the saving and expenditure decisions of individual units. It is sometimes insufficiently recognized that such changes in borrowing behavior are only one of several ways in which leverage levels can change.⁵ It is true that changes in sectors' net savings can be important drivers of (de)leveraging episodes. But in the presence of existing stocks of debt, changes in behavior are not the whole story; changes in interest rates, growth rates and inflation also play an important role in the evolution of leverage over time.

To understand the evolution of private-sector leverage over time, I adopt the accounting framework long used to understand the evolution of public debt. This framework differs in two essential ways from the standard conventions used for private units. First, it focuses on gross liabilities, rather than net wealth. (i.e. rather than netting out asset purchases from borrowing, it treats them as current expenditure.)⁶ Second, it focuses on the primary balance, or borrowing net of interest

⁵For example, a recent paper on the causes of “The Rise in U.S. Household Indebtedness” begins with the sentence, “During the past several decades in the United States, significant changes have occurred in household saving and borrowing behavior,” without any acknowledgement that this represents a significant narrowing of the question posed by the title. (Dynam and Kohn, 2009)

⁶Both Peter Skott and Perry Mehrling responded to early drafts of this paper by suggesting that a better way of capturing the argument would be to focus on asset-liability mismatch. That is,

payments. This framework is clearly not appropriate for all discussions of household sector financial positions, but it is to the extent that we are interested specifically in the evolution of the ratio of liabilities to income.⁷ The primary surplus is related to conventional savings as follows:

savings = primary surplus + tangible investment + net acquisition of financial assets
 - interest payments

This convention allows us to make use of “the least controversial equation in macroeconomics” (Hall and Sargent, 2011, p. 2), the law of motion of government debt:

$$b_{t+1} = d_t + \left(\frac{1+i}{1+g+\pi}\right)b_t$$

$$\Delta b_t = b_{t+1} - b_t = d_t + \left(\frac{i-g-\pi}{1+g+\pi}\right)b_t \tag{2.1}$$

in principle one should neither net assets from liabilities completely, as in the conventional savings measure, nor not at all, as in my primary-balance measure, but partially, to the extent that they can be readily sold or hypothecated to meet immediate cash commitments. While I agree that, conceptually, this might be a superior approach, the practical difficulties in assessing the degree of liquidity of various household assets are formidable. To the extent that the Skott-Mehrling approach is the ideal one, the primary balance can be seen, in combination with the conventional savings measure, as bracketing the household sector’s true liquidity position.

⁷Whether the primary balance or the conventional savings measure is more appropriate depends on the question we are asking. If we are concerned about saving because we think that is what releases real resources for investment, then whether saving takes the form of reducing liabilities or increasing financial assets makes no difference. A household that reduces its borrowing by 1 percent of income or that increases its net financial asset purchases by the same amount has reduced its claim on current output by the same amount either way. In such an example, the conventional approach of treating a net increase in assets and a net decrease in liabilities as equivalent is clearly appropriate. But insofar as policymakers are interested in the evolution of the liability side of balance sheets specifically, because of the importance of the debt stock for financial fragility or because leverage is an important determinant of household and firm behavior, it is necessary to distinguish changes in assets from changes in liabilities. A unit that increases its assets and its liabilities by equal amounts has increased its leverage, even though its conventionally measured savings are unchanged.

where b is the ratio of gross debt to GDP, d is the ratio of the primary deficit – that is, deficit net of interest payments – to GDP, i is the *nominal* interest rate, g is the *real* growth rate of GDP, and π is the inflation rate. The key point, well understood in the context of public debt, is that the evolution of debt ratios is not solely determined by public-sector borrowing; the primary balance, interest rates, growth rates and inflation each play an independent role. (Escolano, 2010) The equation itself is (almost) an accounting identity.⁸ A common application is to consider the primary balance that is required for the debt-GDP ratio to converge to a finite value given a starting debt stock and some values of real growth and interest rates. Another application, more interesting for my purposes, is to decompose changes in the debt-GDP ratio over time, typically into changes due to the primary balance, the real growth rate, the nominal interest rate, and inflation.⁹ Similarly, it allows for decomposition of the divergence between different long-run debt-GDP trajectories. In this latter case one can also distinguish the contributions of spending from revenue.

Decompositions of the changes in the debt-GDP ratio have been carried out for various countries and periods, including the US (Hall and Sargent, 2011; Aizenman and Marion, 2009), the UK (Buiter, 1985; Das, 2011), India (Rangarajan and Srivastava, 2003), and more or less broad sets of countries (Giannitsarou and Scott, 2008; Abbas et al., 2011). Because these are essentially accounting exercises rather than econometric estimates, there are relatively few major methodological differences

⁸The equation may not hold exactly because of the existence of government actions that result in changes in the debt stock but that, depending on accounting conventions, are not reflected in the primary balance. These include off-budget operations such as privatizations or assumptions of private debt, as well as default. For countries borrowing in foreign currency, a term capturing changes in leverage due to exchange rate movements is also needed. Additionally, in practice the equation will not hold exactly due to measurement errors. This may require the addition of a stock-flow adjustment (SFA) term.

⁹The use of the nominal interest rate and real growth rate is standard. It depends on the uncontroversial assumption that changes in inflation are passed through one for one to nominal growth (true almost by definition) and the slightly less accepted assumption that changes in the inflation rate are *not* passed through one for one to nominal interest rates, at least not immediately.

between them. Differences that do exist include the reconciliation of stock-flow discrepancies, the correct computation of yields on government debt, correctly netting out taxes on government interest payments, and accounting for the effect of inflation on nominal interest rates. Notably, almost all of these studies use nominal interest rates and an inflation term, allowing for the possibility that changes in inflation move real interest rates at least in the short run, and are fully passed on to nominal rates, if at all, only with some delay.¹⁰ Only Abbas et al. (2011) includes an explicit stock-flow adjustment term; it is not clear how the other studies handle divergences between the observed debt stock and the stock implied by Equation 2.1. A common finding of these studies is that, while theory may predict a real interest rate that equals or exceeds the growth rate and that is unaffected by inflation except in the very short run (Blanchard and Sartor, 1991), in practice we observe a variety of relationships between these variables. In particular, changes in inflation are not passed through to nominal rates one for one over even long time horizons, and many countries experience long periods of real interest rates below growth rates.

To apply the public debt decomposition to private debt, we must replace the usual concept of sectoral savings with sectoral primary balances, defined by analogy with the government primary balance. As noted above, this differs from the conventional savings rate in that it excludes interest payments from current expenditure, but includes net asset purchases. Since leverage is computed as the ratio of debt to some measure of repayment capacity – GDP for governments, disposable income for households, and net worth or total assets for firms – it is also affected by the growth rate of the denominator. When debt must be periodically rolled over (or carries adjustable interest rates), changes in interest rates are another independent source of variation in leverage. The appropriate interest rate here is the effective interest rate, com-

¹⁰Other approaches use only real variables and omit the inflation term, implicitly assuming that the Fisher equation holds strictly over the relevant time frame.

puted as the ratio of total interest payments to the stock of debt. While continuously rolled-over debt might or might not be a reasonable assumption for an individual household, the sector as a whole does not have a lifecycle; its debt is continuously rolled over, just as with governments. Changes in market interest rates also change the effective interest rates on fixed rate loans to the extent that they affect refinancing opportunities.

To the extent that changes in inflation rates are not immediately incorporated into nominal interest rates, inflation can be an independent determinant of leverage. The minimum time for unexpected changes in inflation to be passed through to nominal effective exchange rates is determined by the range of maturities of debt contracts, but there is good reason to believe that nominal market rates on new loans also do not fully incorporate changes in inflation, at least over an economically relevant horizon.¹¹

2.4 Decomposing Changes in Leverage

2.4.1 Data and Variable Definitions

Except where otherwise noted, data used for the decompositions is drawn from the National Income and Product Accounts and their predecessor series. In order to separate out the contributions of the variables, I write a linear approximation of Equation 1:

$$\Delta b_t \approx d_t + (i_t - g_t - \pi_t)b_{t-1} \quad (2.2)$$

For the range of values of i , g and π observed historically (almost never above 0.1 in absolute value, and seldom above 0.05), the approximation is very close. The variables are defined as follows.

¹¹This is a voluminous empirical literature. A useful and comprehensive summary is provided by Cooray (2002, p. 10-11), who concludes that “while the majority of studies on the US appear to suggest a positive relationship between interests rates and inflation, they do not establish a one-to-one relationship.”

- **Income.** I adjust reported disposable personal income first by subtracting rental income of persons, which consists of the imputed flow of housing services flowing to the personal sector less the cash and noncash costs associated with the housing stock; and then by subtracting property taxes. This adjustment is necessary because the NIPA treatment of housing is inconsistent with the general NIPA convention of not including non-market transactions. Other tangible goods purchases are treated as outlays in the year they are made, but the NIPA convention for housing is that “owner-occupants are treated as owning unincorporated enterprises that provide housing services to themselves in the form of the rental value of their dwellings.” This means that housing purchases are not directly counted as consumption at the time they are made, but instead the BEA imputes both a flow of rental payments (consumption) and rental income to home-owning households. The stated goal is to make measured consumption and saving invariant to households’ decision to own or rent homes, but this is not consistent with the procedure followed elsewhere. For example, there is no conceptually equivalent effort to make measured GDP invariant to whether households purchase child-raising or food-preparation services or provide them domestically, by treating households as implicitly operating unincorporated businesses providing those services. Whether this inconsistency is justified in general is beyond the scope of this paper, but for my purposes treating the flow of housing services as income is clearly inappropriate. Credit market borrowing depends on the difference between cash outlays and cash income; imputed flows of non-market services are irrelevant. Depreciation, similarly, besides involving major measurement difficulties, is not a cash expense and should not be subtracted from income here. Furthermore, the NIPA convention, by treating mortgage interest as a deduction from the income of households’ unincorporated home-rental businesses, would result in double-counting

if I did not subtract rental income, since I include mortgage interest as an independent component of changes in leverage. Property taxes, however, are appropriately subtracted from disposable income. So since they are treated as a deduction from rental income in the NIPAs, I must subtract them again if I subtract rental income.

- **Debt.** The stock variable b is the end-of-period value of total credit market liabilities, divided by adjusted disposable personal income. For years prior to 1947, these are taken from the Historical Statistics of the United States.
- **Primary balance.** Household net borrowing is equal to the change in credit market liabilities from the previous year. This the same way that standard credit market series are derived; borrowing is not observed directly in the Flow of Funds, but computed from the change in liabilities.¹² Since flows are not observed directly (unlike with government borrowing), there is no stock-flow adjustment term.

The household primary deficit d is calculated as net borrowing minus interest payments, divided by adjusted disposable personal income. Interest payments are taken from Table 7.11 of the NIPAs. (Interest payments are gross, not net; this is appropriate since interest income is included in disposable personal income.) This is equivalent to the way the primary deficit is calculated for governments. For households, it is also equivalent to the sum of consumption, tangible investment and net acquisition of financial assets, divided by adjusted disposable income, minus one.

¹²Among other things, this means that defaults show up as lower net borrowing (and more positive primary balances). Unfortunately, there is no good data on household defaults prior to the 1980s, so it is not possible account for this for the whole period. I make a correction for defaults for the more recent period in Section 2.6.

- **Interest, growth, and inflation rates.** The effective interest rate i is total interest payments divided by the stock of debt at the beginning of the period. In other words, it is not based on observation of market interest rates; it is the *average*, not the marginal interest rate. Growth g is the annual change in adjusted disposable personal income. Inflation π is the year over year percent change in the personal consumption expenditure (PCE) deflator. The contribution of i , g and π to the change in leverage is equal to the variable multiplied by the previous period's debt stock.

Figure 2.2 shows the behavior of the three variables over the whole 1929-2011 period. There are three distinct periods in the data. Before 1945, nominal growth rates fluctuate wildly, with periods both well above and well below the effective nominal interest rate. Between 1945 and 1980, nominal growth and nominal interest rates are stable and approximately equal. And since 1980, nominal growth is consistently below the nominal effective interest rate. It's also worth noting that through World War II, price and income changes are strongly correlated, while in the later periods they are not – indeed the relationship is negative.¹³ Figure 2.3 summarizes the main results, showing the respective contributions of net borrowing and debt dynamics to changes in the ratio of household debt to household income. The primary deficit is total borrowing minus interest payments, as a fraction of income; the debt dynamics term is equal to the real effective interest rate minus the real growth rate, time the start of period stock of debt divided by income. As discussed below, these terms must sum approximately to the change in leverage. Note that between 1980 and 2000, the rise in leverage is driven entirely by real interest rates exceeding growth rates.

¹³This may be due to the larger role of monetary policy in driving income fluctuations in the postwar period. It also could be interpreted as reflecting a larger role for supply shocks in the later periods.

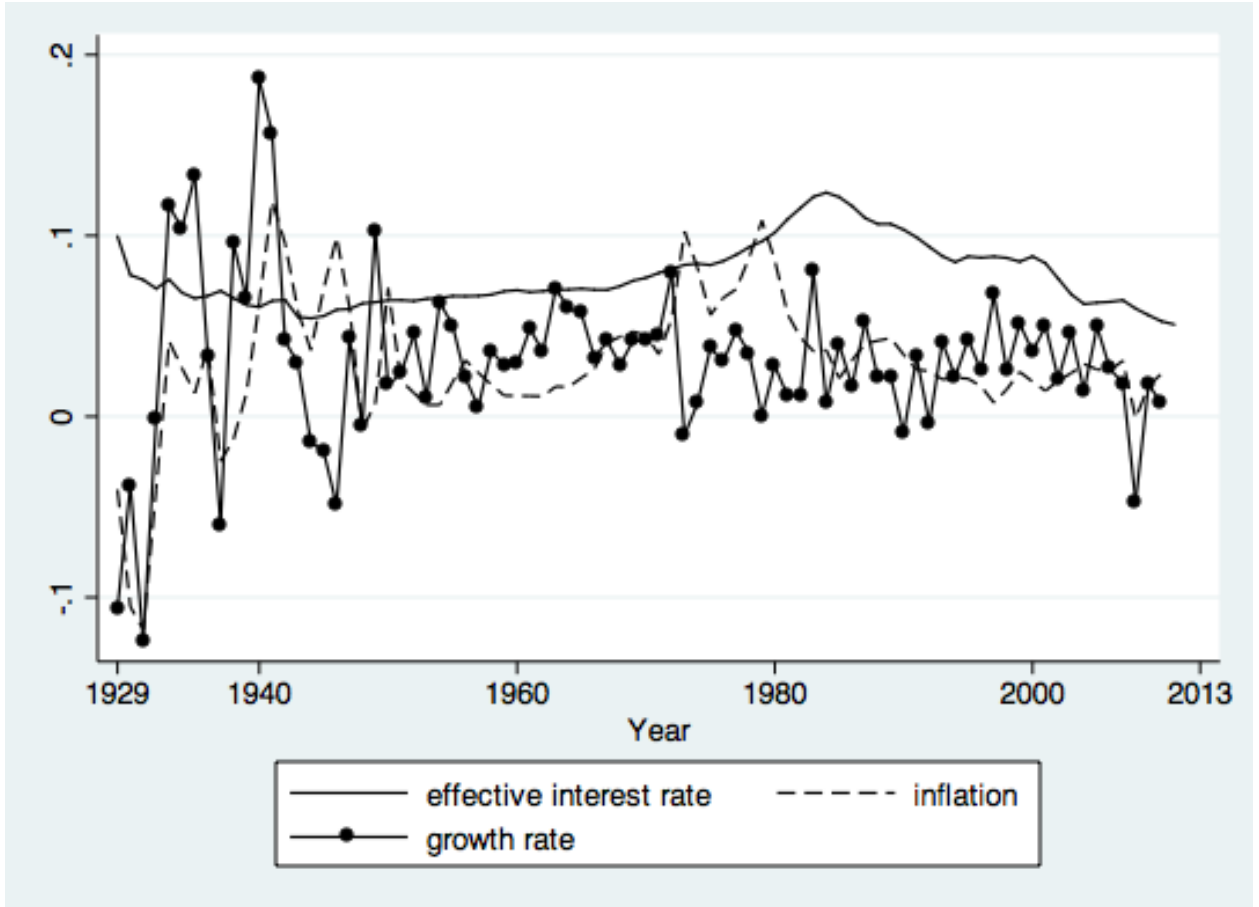


Figure 2.2: i , g and π for Household Debt, 1929-2010.

The lines show the behavior of the three key Fisher-dynamics variables since 1929. Adjusted income is calculated as described in the text; nominal income growth is the sum of real income growth and inflation. The effective interest rates is total household interest payments divided by the stock of household debt. When the effective interest rate exceeds nominal income growth, a household primary balance of zero produces rising leverage; when nominal growth exceeds the effective interest rate, a primary balance of zero produces falling leverage.

Figure 2.4 compares the effective interest rate with some representative consumer rates – the 30-year conventional mortgage rate, the new auto loan rate, and the average credit card rate reported by commercial banks. Not surprisingly, my calculated effective rate looks like a smoothed, somewhat lagging average of the market rates. It is worth noting that given that inflation since 1990 has been significantly below

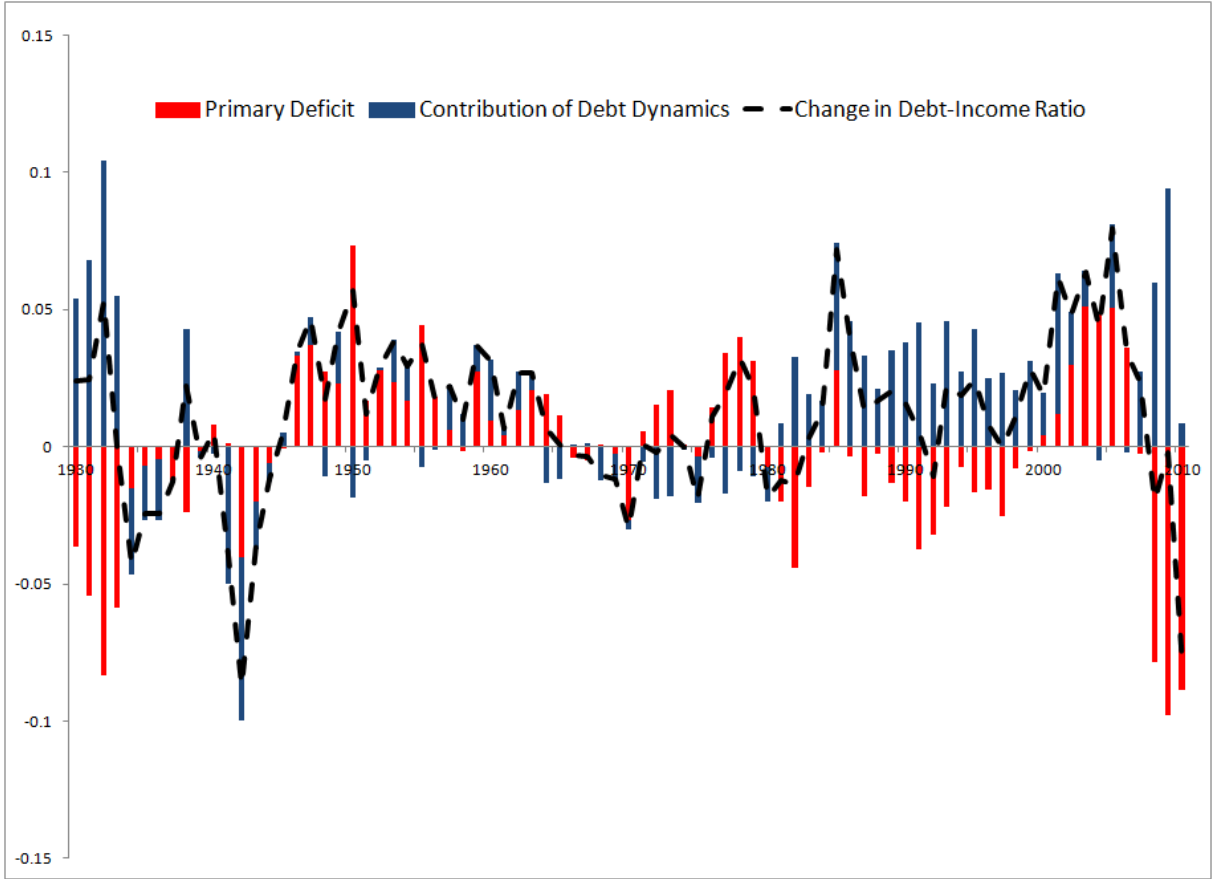


Figure 2.3: Borrowing and Fisher Dynamics Contribution to Changes in Household Leverage.

The heavy dotted line shows the annual change in the ratio of household debt to household income. The red bars and blue bars show the respective contributions to the change in leverage of net new borrowing and of the interest, inflation and growth rates. Negative borrowing corresponds to running a primary surplus. See text for data sources.

the postwar norm (averaging 2.5 percent over 1990-2009, compared with 3.9 percent for the full post-1945 period), the real effective interest rate faced by households was *not* unusually low in the period leading up to 2007, contrary to common perceptions. As Woodford (2010a) notes, focus on the headline interest rates can give a misleading picture of credit supply given changes in spreads due to shifting conditions of intermediation.

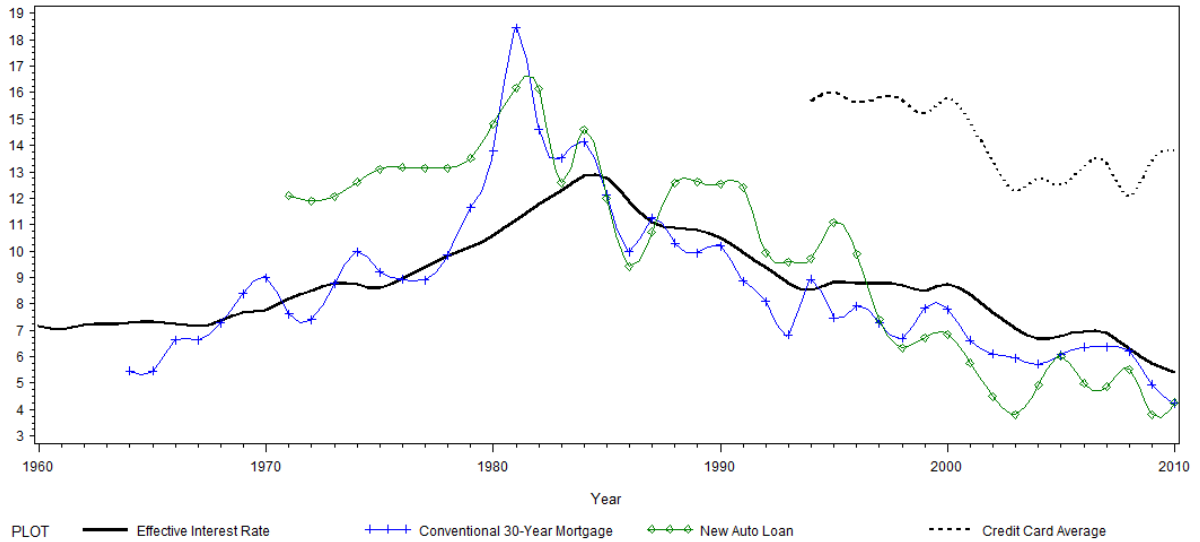


Figure 2.4: Selected Interest Rates, 1960-2010.

The heavy black line shows the effective interest rate faced by households, calculated as total interest payments divided by the stock of debt. The other three lines show market interest rates as reported by the Federal Reserve. The increase in the effective rate relative to the market rates is mainly due to the increasing share of household borrowing accounted for credit cards and similar forms of consumer credit; it may also reflect a decline in borrower quality.

2.4.2 The Household Primary Balance

Typically, economists do not speak about the “primary balance” of a non-government unit or sector; the term is normally reserved for the fiscal position of the central government. From an accounting framework, however, the concept is equivalent whether the borrowing is public or private. Again, for the household sector, the primary balance is equal to income, minus personal consumption, minus net acquisition of tangible and financial assets; equivalently, the primary surplus equals personal savings, minus net acquisition of financial assets, plus gross interest payments. The primary deficit represents net new borrowing by households, or the difference between income and total expenditure on consumption and investment of all kinds. It is the net flow

of funds to the household sector from the credit markets. So a primary deficit of zero corresponds to the maximum level of spending the household sector could sustain without net borrowing.

The obvious differences between the primary surplus and the conventional personal savings measure are that the primary balance measure treats net acquisition of assets as expenditure, and does not treat interest payments as expenditure. An additional difference is the treatment of housing, as discussed above.¹⁴ Most important for the long-term results is the treatment of interest.

Figure 2.5 compares the personal savings rate as measured by NIPA and the Flow of Funds as well as the primary surplus. There are some conceptual and measurement discrepancies that exist between the two measured savings rates that are reflected in the figure.¹⁵ Nevertheless, these track very closely together (the correlation coefficient is 0.95 over the period). This is not true, however, of the primary surplus. The thick black line shows the primary surplus over the period as defined above. The differences in the series are striking. Both the NIPA and FOF savings rate display the conventional narrative of roughly stable savings rates from the 1950s to the 1980s, and declining savings from the peaks of the mid 1980s onwards to the early 2000s, followed by a recovery in savings rates thereafter. The primary balance however shows roughly the opposite story. Households ran (modest) primary deficits for most of the period between 1950 and 1980. Between 1980 and 1998, households ran modest primary surpluses. From 1999 to 2006—the period of the housing bubble—households ran large primary deficits, and reversed these equally sharply in the period that followed. As measured by the primary deficit, American households' spending was significantly

¹⁴In practice, removing the imputed components of disposable income has only a modest effect and is not important to the qualitative results of the paper.

¹⁵A more detailed examination of the conceptual and measurement differences between the two series is provided at <http://www.bea.gov/national/nipaweb/Nipa-Frb.asp>

lower, relative to their income, between 1980 and 2010 than during the previous three decades.¹⁶

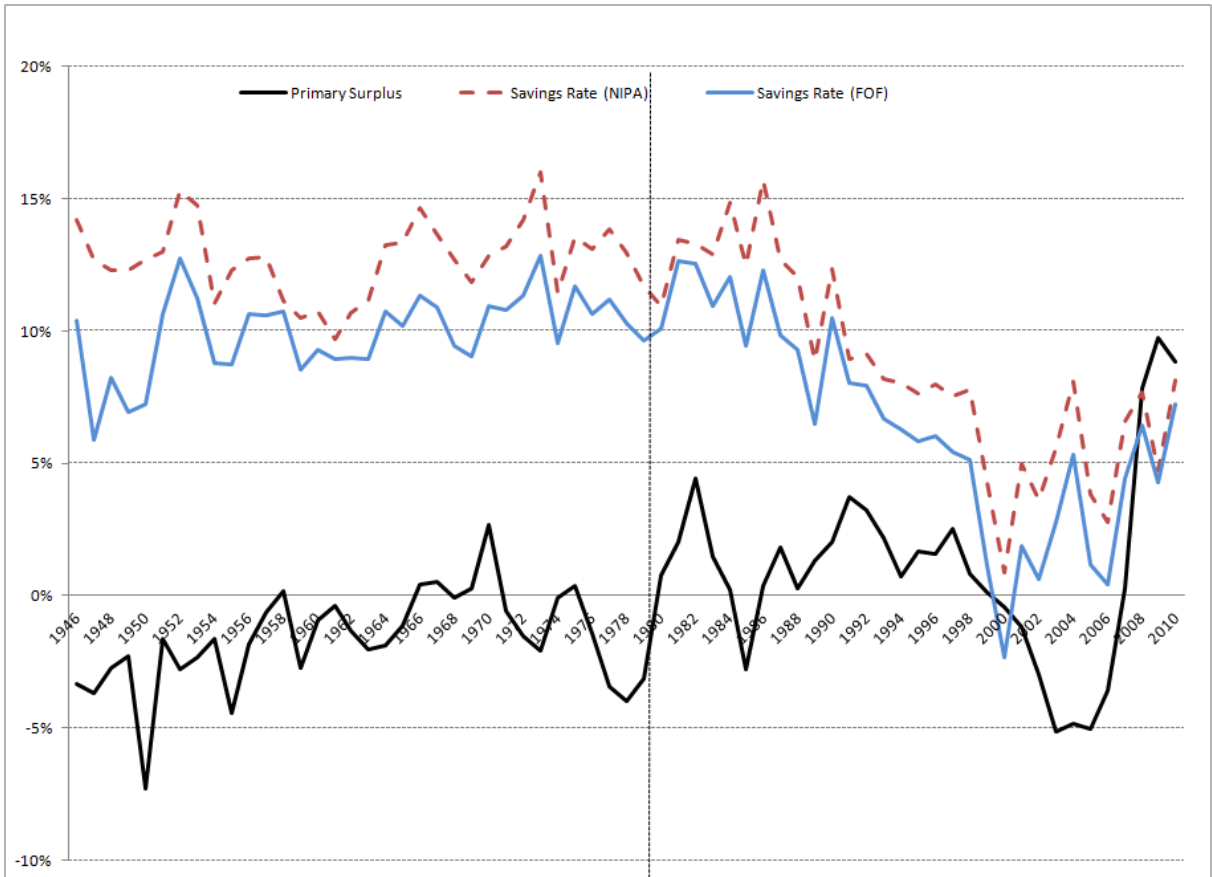


Figure 2.5: Savings and Primary Surplus as Percentage of Disposable Income, 1946-2010.

The red and blue lines show two measures of the conventional savings rate. The heavy black line shows my preferred measure, the household primary balance, equivalent to negative net new borrowing. The most important differences between the primary balance and the conventional savings rate are that the household balance includes net acquisition of financial and nonfinancial assets as household expenditure along with consumption, and that it does not include interest payments in consumption.

¹⁶Among the few mainstream economists to point out that there is no determinate relationship between conventional savings measures and changes in household debt is Barnes and Young (2003).

Table 2.1: Factors Contributing to Differences Between Primary Surplus and Savings Rate.

	1946-1979	1980-2010	Change
Primary Surplus – Savings Rate	-11.6	-5.5	6.1
Explained By: Interest	3.7	7.4	3.7
Res. Investment	-4.8	-3.4	1.4
Nonres. Investment	-1.3	-0.8	0.5
Net Acq. Fin. Assets	-10.8	-11.4	-0.6
Noncredit Liabilities	1.1	1.6	0.5

The table decomposes the difference between my primary balance measure (here given as the primary surplus rather than the primary deficit) into the five items that are treated differently between the two series. Net acquisition of financial assets, at 11 percent of personal income, accounts for the largest part of the difference, but does not explain why the primary surplus rises after 1980 while the conventional savings rate falls.

2.5 Results

Figure 6 expands on Figure 3 and decomposes the trajectories of the three key variables driving Fisher dynamics. The heavy black line shows the annual change in the household sector’s debt-income ratio, while the other lines show the contribution of the primary balance, interest, growth and inflation. (Note that interest, growth and inflation are the respective contributions to the growth of leverage from those variables, not the variables themselves.) One clearly sees here the extent to which falling income raised leverage in the early 1930s and in 2009, and how deflation raised leverage in the 1930s and inflation held it down in the later 1960s and 1970s. Another striking feature is the large increase in the contribution of interest payments to leverage in the 1980s, and stability thereafter. The relatively constant interest contribution over past 25 years reflects fact that interest rates facing households have declined at about the same rate as debt ratio has increased, resulting in constant debt-service burden. Another way of looking at this is that while average interest rate has declined since 1980s, it has declined more slowly than inflation, so that real interest rates facing households have remained higher than in the pre-1980 decades. In effect,

the contribution of interest payments to rising leverage after 1990 is a reflection of the disinflation of the 1980s.

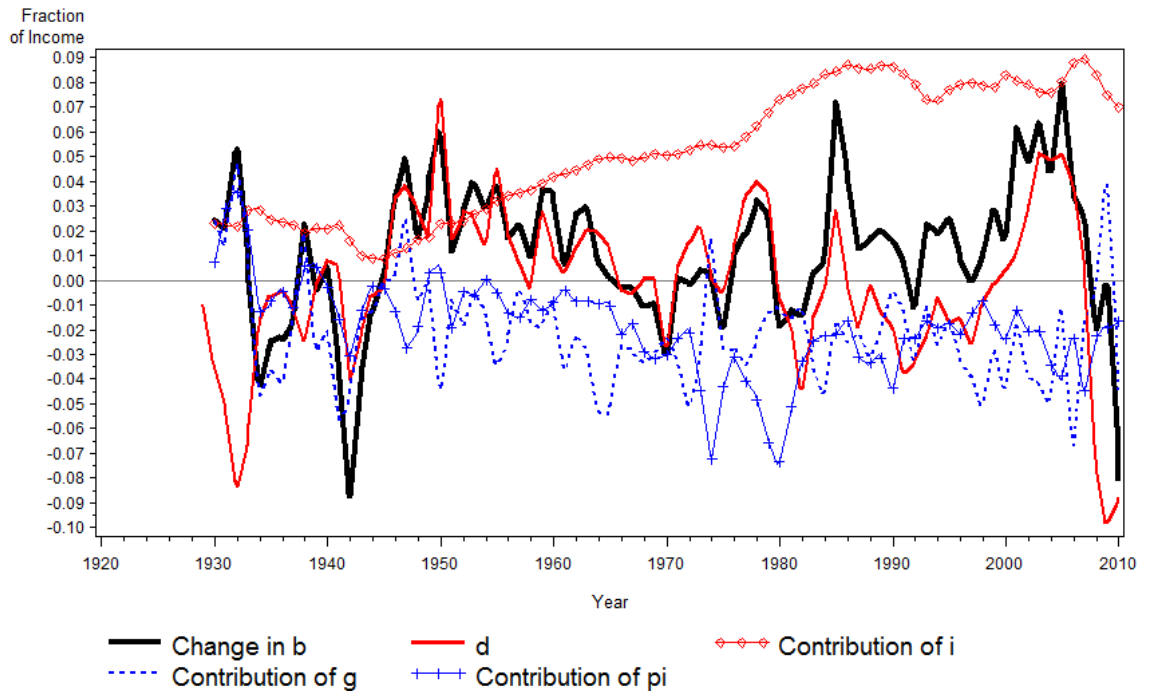


Figure 2.6: Annual Change in Household Leverage and Components, 1929-2010.

The heavy black line shows Δb , the annual change in the household debt-income ratio. The other lines show the shares of this change accounted for by the four variables. d is the household sector primary deficit, i is the effective nominal interest rate on household debt, g is the real growth rate of household income and π is inflation. The contributions of the latter three variables to the change in the debt ratio are equal to the underlying variable times beginning-of-period leverage (b), and times negative one for g and π .

2.5.1 A Periodization of Debt Dynamics

A more detailed examination suggests seven distinct periods in the evolution of household leverage since 1929, as shown in Table 2.2. The numbers in the table indicate the contribution of each term to the change in leverage, so g , i and π are not growth, interest and inflation themselves, but the rates times the stock of debt. (The four latter terms don't sum exactly to the change in leverage because of interaction

effects.) The exact periodization is not based on any formal test, and nothing hinges on the precise dates chosen; but visual inspection of the figures does suggest a clear division between periods of rising, stable, and falling household debt-income ratios. What this table shows is that changes in debt-income ratios are not a good guide to household borrowing. These periods are also reflected in the vertical lines in Figure 6.

Table 2.2: Average Annual Change in Household Leverage and Components.

Period	Δb	Attributable to:			
		d	i	g	π
1929 to 1933	0.025	-0.049	0.024	0.023	0.023
1934 to 1945	-0.021	-0.010	0.019	-0.025	-0.008
1946 to 1964	0.028	0.023	0.031	-0.017	-0.009
1965 to 1980	-0.001	0.008	0.055	-0.027	-0.038
1981 to 1999	0.014	-0.015	0.081	-0.025	-0.025
2000 to 2006	0.050	0.033	0.080	-0.038	-0.025
2007 to 2011	-0.020	-0.067	0.079	-0.006	-0.026

This shows the change in the household debt-income ratio in seven distinct periods (first column) and the contributions to that change of primary deficits, interest, growth and inflation rates. A negative number represents a component reducing in leverage and a positive number one increasing it. The sum of the contributions is not exactly equal to the change in the debt ratio due to interaction effects. The variables are defined as in Figure 6.

Looking at the first two lines of Table 2.2, we see that household debt-income ratios rose at 2.5 points per year between 1929 and 1933, and then fell at an average rate of 2.1 points from 1934 through 1945. But this did not imply any shift on the part of the household sector from deficit to surplus. On the contrary, households were paying down debt at a rate of 5 percent of income per year over 1929-1933, compared with a rate of only 1 percent of income per year over 1934-1945. The dramatic shifts in household debt-income ratios in this period are almost entirely explained by the large movements in nominal income during this period. Between 1940 and 1945 (not broken out in the table), household debt-income ratios fell by 19 points, from 0.35 to

0.16. Yet households did not pay down any debt during this period. Accumulated primary surpluses totaled 5 points, compared with accumulated interest payments of 9 points. The entire fall in debt ratios was explained by inflation (11 points) and income growth (16 points). The role of falling incomes and prices in rising debt ratios in 1929-1932 was emphasized by Irving Fisher and other writers on debt deflation. But while the gap between the household primary balance and the change in debt ratios is larger for the early 1930s than for any subsequent period, the same factors continue to operate.

Moving to the immediate postwar era, we see that the 2.8 point per year increase in debt ratios in the immediate postwar period was close to the 2.3 point average primary deficit in this period. This reflects the similar levels of interest and nominal growth rates during this period. The high level of mortgage borrowing in the 1950s presumably resulted from, in addition to pent-up housing demand, a number of regulatory changes intended to encourage home mortgage borrowing, such as mortgage guarantees through the Federal Housing Administration and the Veterans Administration, and more favorable treatment of mortgage borrowing in the tax code. (Garriga, Chambers and Schlagenhauf, 2012) The stabilization of leverage after the mid-1960s reflects lower household expenditure relative to income; but this was not the most important factor. While household primary deficits were on average 1.5 points lower in 1965-1980 than in 1946-1964, the contribution of accelerating inflation was almost twice as large, reducing debt ratios by 2.9 points more per year in the second postwar period than in the first. Faster growth also played a role, reducing debt ratios by 1 points more per year in the second period. This was offset, however, by a 2.4 point increase in the contribution of interest payments. So while it is true that household debt ratios rose over 1946-1964 and were stable over 1965-1979, and that household borrowing was greater in 1946-1964 than in 1965-1980, it would be wrong to straightforwardly attribute the former fact to the latter.

A more dramatic divergence between leverage and borrowing appears in the fifth period, 1981-1999. New borrowing by households in this period averaged 2.3 points lower than in the previous period – an even larger fall than that between 1946-64 and 1965-1980. This fall in new borrowing was enough to move the household sector into primary surplus. Yet despite this sharp fall in household borrowing, household debt-income ratios rose in this period by 1.4 points per year, after remaining constant in the previous period. This increase in debt took place despite the fact that funds flowing to households through credit markets amounted to 0.8 percent of income in 1965-1980 and *negative* 1.5 percent of income in the 1980s and 1990s. The difference is attributable to higher interest payments, which added 2.6 points more annually to the ratio than in the preceding period (and 5 points more than in 1946-1963), and by lower inflation, which reduced debt by 1.3 points less per year than in the previous period. Stabilization of debt ratios in the later 1990s (not broken out in the table) owed nothing to any change in borrowing behavior. Both primary deficits and total borrowing were the same in 1994-1999 as in the post-1980 period as a whole. Rather, the slower rise in debt ratios in the late 1990s was entirely the result of faster income growth.

Only the housing bubble and its aftermath do we see something like the conventional story of changes in debt ratios reflecting changes in debt-financed expenditure. The majority of the 35 point rise in household debt-income ratios during this period is accounted for by households' accumulated household primary deficits. In fact, the swing from surplus to deficit during the housing boom was even greater than it appears in this table since, as we will see in Section 2.6, defaults were also greater than in the preceding period. Similarly, the 7 point swing in annual debt ratio growth – from plus 5 points per year to minus 2 points – after 2006 is still not as large as the 10 point swing in the household primary balance. The dramatic fall in household borrowing (plus a further increase in debt reduction through default) was offset by lower

inflation and near-zero income growth. So while treating changes in debt ratios and changes in borrowing as equivalent is more reasonable for the housing boom period than for the 1980s, it still misses important parts of the story.

Over the full period from 1946 to 2011, household debt-income ratios increased by 104 percentage points. Exactly half this increase – 52 points – occurred between 1946 and 1980, and half occurred between 1981 and 2011. But this superficial similarity between the two 30-year periods is misleading. In the first period – 1946-1980 – total borrowing by households exceeded total interest payments by 57 points (as a share of income.) So the increase in debt was almost exactly equal to the net flow of funds to households through credit markets, that is, to household expenditure financed by new borrowing. In the second period, by contrast, total interest payments were 33 points *greater* than total borrowing (again as a share of income). So in the aggregate, borrowing was not financing additional household expenditure after 1981. From an intertemporal perspective, the household sector as a whole was incurring new debt before 1980 and repaying it afterwards. yet the debt-income ratio rose by an equal amount in both periods.

So if the goal is to explain the long-term trajectory of household debt, the answer should not focus on changes in borrowing behavior. This is even more clear if we focus on the contrast between stable debt-income ratios over 1965-1980, and rising debt ratios in 1981-1999. In the first period, household expenditure exceeded current income, and in the second period, expenditure was less than current income. Yet household debt-income ratios rose in the second period but not in the first. So any explanation of rising household debt of the form “households borrowed more because...” does not apply to the historical facts for this period. The growth of household debt after 1980 is explained by the combination of higher interest payments and lower inflation. The question is not why households borrowed more after 1980;

they did not. The question is why the operation of the monetary system increased the value of already-incurred debt much more rapidly after 1980 than before.

One other striking result of this analysis is the similarity between 2009 and 1930-33. Over the initial Depression years, the household sector's primary surplus averaged 5.8 percent of disposable income. But negative growth, deflation, and interest each raised leverage by 2.5 percentage points annually, resulting in an overall increase. In Fisher's view, this was the key to the severity of the Depression. Attempts to reduce leverage by reducing spending resulted in falling prices and incomes and rising real interest rates (despite falling nominal rates), leading to higher leverage and intensified efforts to reduce spending. If units are forced to reduce their debt-income ratios, they will have to reduce spending; but if unfavorable debt dynamics mean that spending reductions do not actually lower debt burdens, then the effort to reduce spending may continue indefinitely. Similarly, in 2009, the household sector had a primary surplus of 9.5 percent, the highest in the entire series.¹⁷ But the combinations of low and falling inflation, relatively high and stable effective nominal interest rates, and a sharp fall in output (2.4 percent, increasing the debt-income ratio by 3.1 points) meant that this primary surplus reduced household leverage by less than one point. If even large surpluses do not reduce debt-income ratios, then units seeking to deleverage must continue trying to run surpluses, putting downward pressure on income and prices. If policy interventions had not prevented outright deflation and restored positive income growth in 2010, it is easy to imagine how continued efforts to deleverage by households (and businesses) could have produced a full-fledged debt-deflationary spiral.

¹⁷As discussed below, 4 percentage points of that was really defaults, which the Flow of Funds does not distinguish from reduced borrowing. Some fraction of the household surpluses in the early 1930s must have been accounted for by defaults as well.

2.6 Defaults

An important difference between private and public sector debt dynamics is that for public debt, defaults are discrete events, occurring rarely (never for the United States, and almost never for other advanced countries in modern times.)¹⁸ By contrast some fraction of private debt is written off by lenders every year. So the law of motion for private debt should include an additional term on the right-hand side for defaults. Unfortunately, I have not been able to construct a good series for defaults covering the full period under consideration. The Flow of Funds does not record defaults; since net borrowing is computed from the change in debt stock, defaults appear as reduced borrowing. I have followed this same approach for my main results. However, since 1985 the Federal Reserve has tracked the fraction of loans in various categories written off by commercial banks.¹⁹ Figure 2.7 shows the fraction of loans to households written off.²⁰ Until 2007, the share of household debt written off annually was always less than one percent, but in 2009 and 2010 it was over 3 percent. (It has come down somewhat in 2011, but remains above pre-recession levels.) So while the failure to distinguish defaults from the primary balance probably does not affect the results for most of the postwar decades, it may be important for the most recent period.

If we assume the default experience of commercial banks is not systematically different from other lenders for a given category of loan, we can estimate the total change in debt due to defaults in each period. So for the past 25 years, we can recalculate the results properly distinguishing a movement in household primary balances

¹⁸Municipal defaults are more frequent and may play an important role in the evolution of debt ratios for the state and local government sector. This is a topic I hope to return to in future work.

¹⁹The Federal Deposit Insurance Corporation has a series for bank and thrift charge-offs going back to the 1930s. But it is not suitable for my purposes, because it does not distinguish borrower type, and defaults by business borrowers (especially for commercial real estate) are substantially higher than household defaults, and not strongly correlated with them.

²⁰Note that this is the fraction of loan value charged off, not delinquencies. Charge-offs are conceptually the correct measure here.

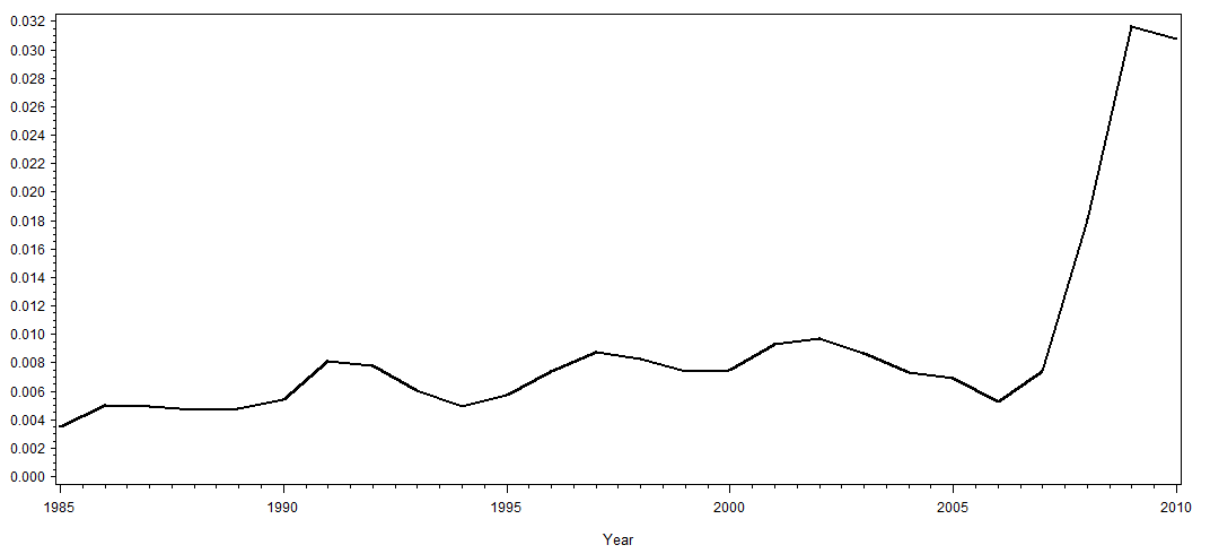


Figure 2.7: Annual Share of Household Debt Written Off, 1985-2010.

The source is the Federal Reserve's series on commercial bank writeoffs of mortgage and consumer debt, which begins in 1985.

toward surplus from an an increase in defaults. Figure 8 and Table 2.3 show the results.

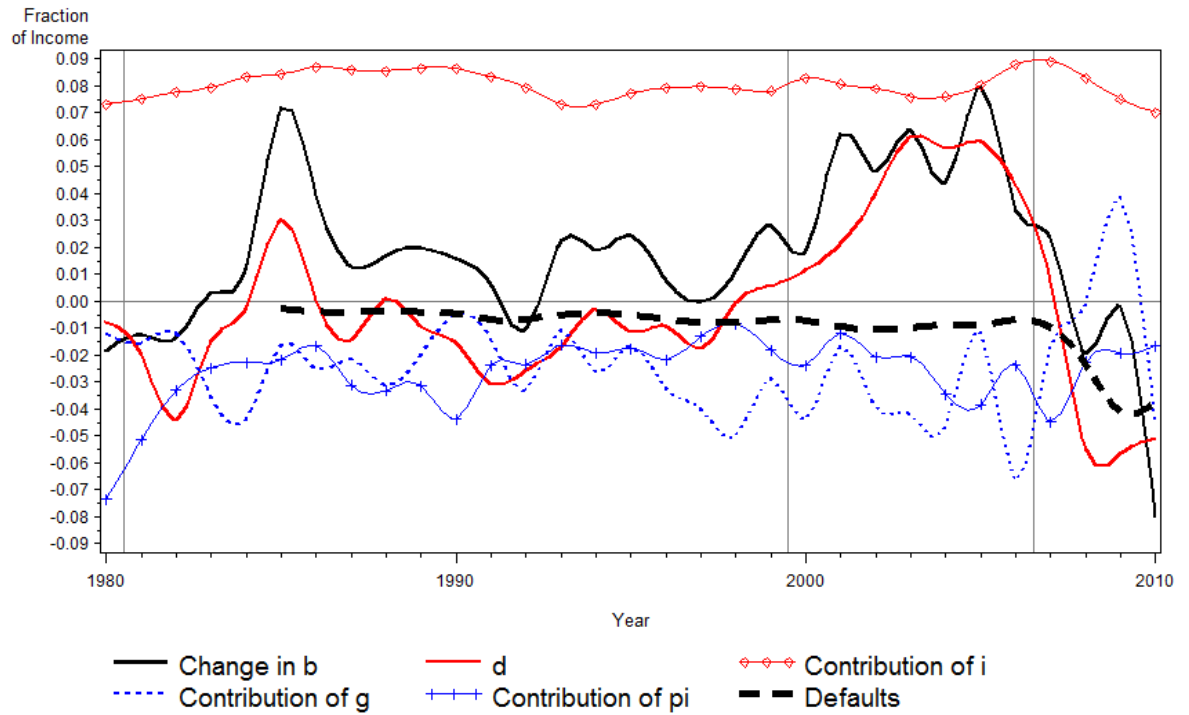


Figure 2.8: Average Annual Change in Household Leverage and Components Accounting for Defaults, 1985-2010.

This is equivalent to Figure 6, except that defaults are counted as a separate component of leverage changes rather than subtracted from the primary deficit.

While the reduction of leverage attributable to defaults is small for the first two periods, it is substantial in the final one. Indeed, nearly half of the apparent primary surplus (6.7 percent average over 2007-2010) is actually due to writeoffs rather than reduced household expenditure. Since the two point increase in the default contribution almost exactly equals the two point average reduction in leverage over 2007-2010, even the enormous 8-point swing in household balances toward surplus would have been insufficient to reduce leverage if default rates had not increased relative to the

Table 2.3: Average Annual Change in Household Leverage and Components Accounting for Defaults.

Period	Δb	Attributable to:				
		d	Default	i	g	π
1981 to 1999	0.014	-0.010	-0.005	0.081	-0.025	-0.025
2000 to 2006	0.050	0.042	-0.009	0.080	-0.038	-0.025
2007 to 2010	-0.020	-0.039	-0.028	0.079	-0.006	-0.026

This is equivalent to the last three rows of Table ??, except that defaults are counted as a separate component of leverage changes rather than subtracted from the primary deficit.

previous periods. This makes it even less likely that changes in household saving behavior will be sufficient to reduce leverage in the future.

While it is unlikely that defaults played a major role in household debt dynamics in the postwar period prior to 2007,²¹ it has been argued that defaults were an important factor in the trajectory of household debt in the 1930s. (Olney, 1999) Unfortunately, we have not been able to produce an estimate comparable to that in Table 2.3 for the fraction of household primary surpluses in the pre-World War II period that should be attributed to defaults. But for residential mortgages, at least, the contribution of default was probably less in the 1930s than in the most recent period. The Federal Housing Authority publishes data on the fraction of mortgages in foreclosure. In 1926, the earliest year available, 0.6 percent of nonfarm structures were in foreclosure. That proportion increased to an average of 1.2 percent over 1931-1935. Mortgage debt was equal to about 30 percent of household income in this period, so even if the fraction of debt charged off equaled the share of properties entering foreclosure, this would have reduced leverage by less than 0.4 points annually, or less than a tenth of the apparent primary surpluses. This does not mean that defaults were not important,

²¹They may have been more important for business debt. In particular, the widespread defaults on commercial mortgages in the late 1980s made a nontrivial contribution to the reduction in business leverage in that period.

since consumer debt may have been written down at higher rates. And default may have been more important for businesses than for households. In any case, for the most recent period default certainly is a large factor in deleveraging.

2.7 Household Behavior

Sections 2.4, 2.5 and 2.6 of this paper focus on clarifying the accounting of the evolution of household debt. A clear accounting is necessary for a full understanding of changes in leverage historically. But some additional assumptions are needed to turn it into a causal story. So in this section I clarify the behavioral claims implicit in my causal story, and explain what it contributes that is missing from existing explanations for increases in household debt.

As noted above, I define the household “primary balance” by analogy with the government public balance, as household expenditures exclusive of interest payments. This might seem somewhat arbitrary. Why is a change in interest rates any different from a change in the price of any other component of consumption? Clearly an increase in the price of any consumer good or service may tend to lead to higher levels of household borrowing, if we hold other categories of expenditure constant; why is interest special? One difference is that interest is not included in the CPI, so personal income growth will be overstated in periods when households face rising interest rates. (Nilsson, 1999) Another is that in the short run, interest costs are perfectly price-inelastic – there is no possibility of substitution between any other category of expenditure and meeting contracted interest payments. For my purposes, though, the important difference is that debt, uniquely among household expenditures, compounds. An increase in healthcare or housing costs in one period does not increase households’ demand for healthcare or housing in future period. But, assuming that changes are not fully anticipated and households cannot instantly and costlessly adjust expenditure, an increase in interest costs in one period raises “de-

mand” for interest payments in subsequent periods. The larger the existing stock of debt, the stronger this effect is. It is thus possible for a rise in interest costs to produce a rise in household debt ratios, even if households rationally reduce their desired borrowing in response to higher interest rates. Such “perverse” adjustment dynamics are not possible for other components of household expenditure. Both this and the price-inelasticity of short-run debt payments help explain how what appears to be a positive shift in demand for credit might really be, in effect, a negative shift in supply.

2.7.1 A Simple Formalism

Here I present a simple schematic account of how in the presence of preexisting debt stocks, changes in the Fisher variables (growth, inflation and interest rates) can produce persistent, seemingly perverse changes in debt ratios even if households behave rationally.

If leverage is initially stable, and the ratio of debt to income then increases for any reason, a more positive primary balance will be needed in subsequent periods to prevent it from continuing to rise. This is why we can say that higher interest payments drove the increase in debt through the whole post-1980 period, even though interest rates by the late 90s they had returned to their pre-Volcker levels. By that point the stock of debt was much higher – due to the previous period of high i – so that the same level of i , g and π required a larger primary surplus to keep leverage constant. Using Equation 2.1, we can see this clearly if we draw a phase diagram in i - d space, loosely following Taylor (2011)’s phase diagram for public debt.

In Figure 2.9, the interest rate is on the vertical axis and the primary balance is on the horizontal axis. The diagonal curve running from the upper left to the lower right is the leverage *nullcline* – those combinations of i and d for which $\Delta b = 0$, i.e. where leverage is constant. Above this locus, leverage is rising, below it, leverage is

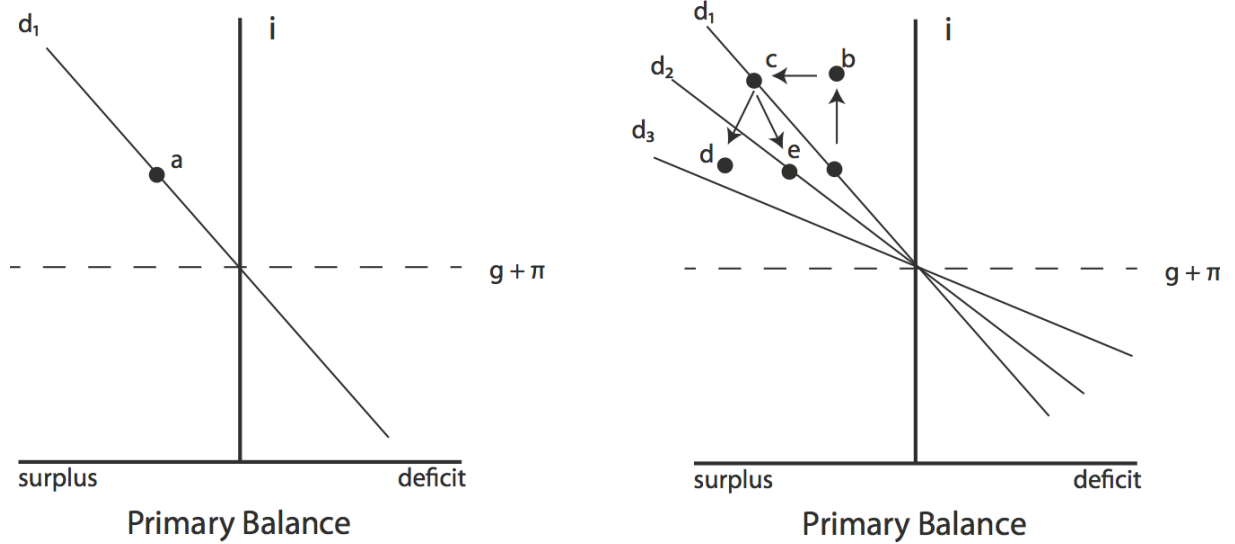


Figure 2.9: Leverage Dynamics in i - d Space.

The diagonal nullclines show combinations of primary balance and interest rate that keep the debt-income ratio constant. Changes in g or π shift this locus vertically. Increases in the debt ratio rotate the nullcline counterclockwise. The second panel shows how a positive shock to interest rates can result in a persistent rise in leverage even if households respond rationally by increasing their primary surplus, and interest rates subsequently return to their original level.

falling. Since the diagram is drawn in nominal terms, the dotted line is drawn at a level equal to the sum of inflation and growth rates. Then the constant-leverage curve passes through the point where the vertical axis (corresponding to a primary balance of zero) intersects the growth rate, since a primary balance of zero keeps the debt GDP ratio constant if and only if $i = g + \pi$. Changes in inflation or growth shift the leverage nullcline vertically, while changes in the stock of debt rotate the constant-leverage curve around the point where it crosses the vertical axis. Since the slope of the nullcline corresponds to the current debt-income ratio, it is obvious that when leverage is low, it takes only a small change in the household primary balance to counterbalance a shock to i , π or g , while if leverage is already high, larger adjustments to the primary balance will be needed to keep leverage constant. Finally,

it is evident from this diagram that departures from a constant-leverage path when we are in the lower right – i.e. when nominal interest rates are less than nominal growth rates – will eventually result in leverage stabilizing at a new level, since a position above the nullcline will lead it to rotate upward while a position below the nullcline will lead it to rotate downward. In the upper-left part of the diagram, on the other hand, departures from the nullcline lead to leverage running away to (positive or negative) infinity unless there is some counteracting change. Thus, if households face an upward shock in interest rates that throw them off the nullcline, even if they respond rationally by reducing spending, every period that they are above the nullcline it will rotate counterclockwise. If they can't adjust spending instantly (or if they are uncertain about the future path of interest rates), there is no assurance that they will ever be able to get back to a point of stable leverage. And even if they do so, it may be at a much higher level of leverage, even if interest rates eventually return to their old level.

For example, suppose we are initially at a point like a in the left panel of Figure 12, where interest rates slightly above growth rates are balanced by moderate primary surpluses, yielding stable leverage. Now suppose there is a positive shock to interest rates, so we jump to point b , as shown in the second panel. In response to higher interest rates, households reduce their spending, moving left to point c . But that does not happen instantly, and the time spent above the nullcline increases the debt ratio from d_1 to d_2 , rotating the nullcline, so that c is now above it. Now say that interest rates eventually fall back to their old level. If households are still trying to stabilize debt, we might end up at d ; if the fall in interest rates stimulates increased spending, we might end up at e . Either one is good enough to at least stabilize debt at d_2 . But meanwhile, the time spent above the d_2 curve has increased the debt further and rotated the nullcline down to d_3 , so households still have not stabilized leverage. Households may continue to reduce spending (if we think they respond to leverage

and not just to marginal interest rates) but there is no assurance they can do so fast enough to catch up with the d curve, which continues rotating counterclockwise as long as the current position is above it. (Alternatively, households may increase spending, as they did after 1998, moving to the right in the phase diagram, but even then the rise in debt will be in part accounted for by the earlier interest-rate shock.) This is the logic by which we can say that a large part of the faster growth in debt in the 2000s as compared with the pre-1980 decades was due to higher interest, even though interest rates were no higher in the 2000s than in the earlier period. It also makes clear that the existence of Fisher dynamics does not depend on irrational behavior by households. It is sufficient that changes in i , π and g are not fully anticipated, and that expenditure cannot be adjusted instantly.

A final point is that I have been speaking so far as if households can reach whatever primary balance they choose by adjusting their expenditure. This is unproblematically true for an individual household, but for the sector as a whole, it is true only insofar as some other sector increases spending, or assets are transferred from debtor to creditor units. If neither of these conditions are met then the reduced expenditure will show up in lower income instead. Thus any attempt to reduce spending by households will produce a combination of a leftward shift in the current position, plus a downward shift of the nullcline; the net effect on the change in leverage is indeterminate, and, as in the 1930s, it may be that attempts to reduce spending result in higher leverage. This is the second half of the Fisher story; in this paper, I am interested in the first half, the effect of changes in prices and income (and interest) on changes in leverage, but this second obstacle to returning to the nullcline from a position above it is important as well. I won't discuss it more here, but it is important to keep in mind that to the extent that changes in income depend on changes in expenditure, changes in borrowing decisions explain an even smaller part of changes in debt-income ratios.

2.7.2 Alternative Accounts of the Post-1980 Rise in Household Debt

In a framework in which agents behave as if they know the true future values of interest rates, inflation, and income growth – either because expectations are correct or because fundamentals persist long enough for behavior to fully adjust – we can ask why households choose the debt levels they do. But if households are faced with unanticipated changes in interest rates, income or inflation, debt levels will change even if households don't wish them to. This is my claim about the post-1980 increase in household debt. Faced with higher interest rates and lower inflation, households with existing debt stocks found their debt-income ratios rising. They did reduce expenditure, but were not able to do so fast enough to fully offset these “mechanical” effects of compounding interest and slower nominal income growth.

The question “why did debt levels rise” is only equivalent to “why did households choose to borrow more” if we assume a baseline in which expenditure adjusts instantly to changes in interest rates and inflation – i.e. both that adjusting expenditure is costless for households, and that the permanent component of changes in these variables is correctly perceived. By contrast I am proposing a story in which fundamental variables are nonstationary and there is considerable inertia to expenditure decisions, so the former cannot be considered “slow” and the latter “fast”. So we cannot assume debt levels are fully adjusted; over some period, changes in debt will be dominated by the effect of unexpected changes in interest rates, income and inflation rather than borrowing choices. Nor is this necessarily limited to the short run. Because interest compounds, when interest rates exceed growth rates a unit with above-optimal debt will be carried further from the optimum. There is no assurance that expenditure decisions will adjust fast enough to ensure convergence to equilibrium debt levels. In other words, to the extent that households seek to maintain an optimal or equilibrium level of debt, I suggest that the increase in debt-income ratios after 1980, exactly like the increase in debt income ratios after 1929, is best understood as a movement away

from that equilibrium. In short, this is a specific instance of the general principle that capitalism cannot be fully understood in terms of equilibrium states; dynamics matter.

As shown above, the flow of funds to households through the credit markets fell rather than rose after 1980; households' noninterest expenditures as a share of income did not increase between 1980 and 2000, even as debt ratios rose.²² This is what it means to say that household primary balances were generally negative before 1980 but positive between 1980 and 2000. But we cannot go from this accounting fact to a causal story without specifying a counterfactual. My preferred story is that households were slow to change income-expenditure ratios in response to the interest rate and inflation shocks around 1980, either because rapid changes in expenditure are costly (due to habit formation, adjustment costs, complementarities among different components of expenditure, etc.) or because expectations were slow to adjust so that it took time for households to realize the new, lower "correct" level of expenditure. The corresponding counterfactual is that *if* interest rates had not increased, debt levels would have remained constant. Logically, however, one might just as well argue that desired debt levels rose at the same time as interest rates and it just happened that the new borrowing roughly equalled the increase in interest payments. In this story, the counterfactual is that *if* interest rates had not increased, noninterest expenditures would have. There are several variations on this theme.

The simplest explanation for increased borrowing is a shift in preferences and/or (perceived) technologies – in simple models of intertemporal consumption smoothing an increase in either pure time preference or expected rates of income growth would lead to increased desire to shift income forward, leading to higher debt levels, lower

²²This fact is seldom acknowledged in part because of the fall in measured savings. The fall in measured savings in part is a result of the fact that interest payments are counted as consumption, along with the anomalous treatment of housing, which is counted as saving but is unambiguously an expenditure from a financial standpoint. See Table 2.1.

savings rates and higher interest rates. “Prime candidates for explaining the consumption boom are factors that increase the effective discount rate of the representative agent.” (Parker, 1999) One obvious problem with an explanation in terms of a shift in households’ intertemporal discount rate is the ad hoc and unobservable nature of such a change in preferences. A higher expected income growth is more *a priori* reasonable, but seems most plausible for the late 1990s. Alternatively, slower income growth and greater income inequality, in combination with consumption norms that are inelastic and/or set according to some higher-income reference group, could increase desired consumption relative to income for those lower down the income scale. (Pollin, 1988, 1990; Sturn and van Treeck, forthcoming) The basic argument is that consumption preferences are not set in a vacuum, but with respect to some reference level based on past levels of consumption or some social standard, which is often strongly influenced by those higher up the income ladder. This doesn’t imply irrational behavior, only that utility of consumption is endogenous and other-regarding. This second story is to a large extent complementary to the one proposed here; both hinge on the idea that consumption or expenditure does not adjust instantly to changes in fundamentals.

There are two versions of the deregulation claim. The more straightforward claim is that financial regulation before the 1980s excluded large numbers of potential borrowers from credit markets, either directly or via limits on interest rates that made it unprofitable to lend to borrowers with higher default risk and/or higher intermediation costs. The mainstream view on rising household debt in the 1980s is stated clearly by Large (2004): “Liberalization of markets has meant new approaches to lending and new credit instruments, enabling credit to be available to a wider variety of participants and reducing credit constraints.” More concretely, it is often argued that “financial liberalization in the United States in the 1980s may have increased effective credit demand,” while reduced deposit requirements and the changed treat-

ment of home equity credit under the 1986 Tax Reform Act increased the supply of credit to households. (Barnes and Young, 2003)

A more subtle version of the argument hinges on the decline in inflation. It is sometimes claimed that there is a positive relationship between real interest rates and inflation, so that lower inflation reduces real and not just nominal rates. This was not the case in the 1980s. However, lower inflation can still boost debt levels in the presence of liquidity constraints, even if it is associated with constant or rising real interest rates. If borrowers are limited to a maximum ratio of debt-service payments to income – as will be the case if either creditors impose such restrictions as a way of dealing with adverse selection and moral hazard, or if there is a floor on the portion of current income that must be devoted to current expenditure – then with lower inflation, feasible debt levels will be higher. This is because with a fixed-interest loan, higher inflation implies that payments on a loan with a given principal amount and given real interest rate will be higher relative to income in early periods and lower in later periods. (Debelle, 2004)

These stories have several implications. First, most of the increase in debt-income ratios should have occurred among households that were more likely to have faced credit rationing under regulation, presumably those with lower incomes. Second, we should see an increase in household assets. Many households hold both assets and liabilities; while this would not be rational in a world where all assets carried the same interest payments, in reality households have many arbitrage opportunities where the return on an asset exceeds the interest rate on a liability – either because assets are lumpy (like houses), or because there are nonpecuniary returns from asset ownership, or because of tax treatment or other subsidies, or the borrower believes they can get a higher return on the asset than is reflected in its market price. In any case households that wished to engage in debt-financed asset purchases would have been limited in their ability to do so by regulation, so we should see an increased number of these

positions if the rise in debt was due to deregulation. Third, most obviously, we should see a rise in consumption. And fourth, we should see some association of interest rate increases with default risk and intermediation costs – interest rate increase should be smaller or nonexistent once these changes in borrower composition are controlled for. With the partial exception of higher consumption, none of these predictions are borne out for the 1980s.

More broadly, in the deregulation story the association of higher debt and higher interest rates after 1980 is neither surprising nor problematic – it is the natural result of ending an artificial restriction on credit demand. Given a theoretical framework in which the function of credit markets is to allow people to optimally allocate consumption over time, it is natural to conclude that “the increasing availability of debt is beneficial. Debt helpfully allows households, companies and even countries to smooth their spending patterns. ... The rise in debt is a logical response to a more stable economic environment and the relaxation of credit constraints.” (Large, 2004)

2.7.3 The “Fisher Dynamics” Story Compared to the Alternatives

The fundamental reason I prefer an account of the rise in household debt in the two decades after 1980 (and a significant part of the rise in debt in the 2000s) that focuses on the dynamic effects of changes in interest rates, income and inflation rather than on an increase in household borrowing, is that the net flow of funds to households from the credit markets was negative for almost this entire period. Like most of this literature, Sturn and van Treek (forthcoming) treats “decreased saving” and “increased borrowing” as synonymous, but since most economic units, and all sectors, have both assets and liabilities, these two concepts need to be distinguished. While it is true that household savings declined after 1980, this was more than accounted for by lower acquisition of assets; by contrast the flow of funds to households through credit markets turned negative after 1980. In other words, it is not the case that

households increased new borrowing after 1980; rather, they reduced it, but not by enough to offset the increased interest burden on their existing debt.

During the period between World War II and the Volcker shock, household borrowing exceeded interest payments in almost every year; over the period as a whole, the gap averaged 1.6 percent of household income annually, and in the immediate postwar period it was much higher. So for the 1945-1980 period, it is correct to say that increased household debt financed higher levels of household expenditure. This relationship reversed at the end of the 1970s - interest payments exceeded borrowing in 1978 and continued to do so, almost without interruption, until 1998, when the household sector moved back into primary deficit. In the 1980s and 1990s, annual interest payments exceeded borrowing by 1.1 and 1.6 percent of income, respectively. In other words, higher debt was not financing higher expenditure in this period. For the faster growth of debt in the 20 years after 1980 compared with the 20 years before to be explained primarily by higher household expenditure (as in any of the stories above) there would have to be a period in which debt in fact increased the funds available to households. But there was no increase in debt-financed expenditure by households before the late 1990s. While this to some extent reflects a choice to reduce asset holdings rather than increase liabilities, average total nonfinancial expenditure (i.e. consumption plus purchases of tangible assets) was no higher relative to income over the 1980-2000 period than over 1950-1980. As a whole, the household sector's primary balance did not show any sustained movement toward deficit before 1998.

Besides this general point, I have some more specific concerns with the particular stories sketched out above. With respect to the deregulation story, the problem is that for mortgages – representing about 80 percent of both the stock of household debt and its increase over the period – there is no evidence that credit became significantly more available before the late 1990s. Between the late 1970s and the early 1990s, mortgage debt as a percent of income rose by about 20 points (about half as much as during

the housing bubble) and then stabilized until the late 1990s. But this historically large increase in mortgage debt does not appear to have been a symptom of increased availability of housing credit. During the 1980s, residential investment was not higher than in previous expansions; there was no increase in the proportion of families owning homes; and the average loan-to-value ratio for mortgages did not increase. (See Figure 2.10.) The housing boom of the late 1990s and 2000s, by contrast, was associated with rising residential investment, rising homeownership rates and (initially) higher loan to value ratios – exactly what we would expect in conditions of easier housing credit. Given the absence of these trends in the 1980s, the earlier increase in mortgage debt seems better explained by higher interest rates and lower nominal income growth, which meant that the same, or even a lower, level of mortgage borrowing led to a higher ratio of mortgage debt to income.

Second, more tentatively, the relationship between debt and income doesn't seem to fit a story that emphasizes changes in income distribution in explaining rising debt. Examination of subsets of households is not possible using Flow of Funds data. However, evidence from the Survey of Consumer Finance does not suggest that there were sharply differing patterns of leveraging across households. Figure 2.11 shows the trends in median debt to income ratio by income quintile from 1989 to 2007. The solid black line is the median debt to income ratio for the whole distribution. It roughly parallels the findings from the Flow of Funds, with slow but steady growth in leverage between 1989 and 2001 and a sharp increase thereafter. There do not appear to be major differences in the patterns of growth among the richest four quintiles of the population, all of which follow broadly the same pattern as the overall trend. The lowest two quintiles were the least leveraged segments while the third and fourth quintiles have seen sharply rising leverage ratios from 2001-2007. Note that since both income and debt-to-income ratios are higher in the higher-income quintiles, that means the majority of increased household debt is accounted for the

top quintile, and over 90 percent by the top two quintiles. This is not dispositive, since the change distribution of income over the past 30 years has mostly been in favor of the top 5 percent or 1 percent or even smaller top fractiles, not the top 20 percent. Still, both the income-stagnation and reference-group accounts of debt being used to finance increased consumption imply that over some range there should be a negative relationship between income and debt growth. Further work will be needed to see if this relationship appears higher in the income distribution.²³

2.7.4 Household Behavior: Conclusions

This paper is primarily intended to clarify the determinants of changes of household debt in an accounting sense, rather than advance any strong claims about household behavior. Nonetheless, my causal claims do imply some behavioral assumptions. Specifically, they require that households do not fully anticipate changes to the “Fisher variables” – inflation, income growth and interest rates – and/or that they are unable to instantly adjust expenditure decisions in response to such changes. In a model in which households were always able to choose their preferred level of expenditure with full knowledge of the future path of inflation, income growth and interest rates, no causal claims could be inferred from the accounting. I do not believe that such a model is a good approximation for the conditions under which households make their expenditure and balance sheet decisions. For instance, I do not find it plausible that either lenders or borrowers in 1929 were made decisions in expectation of the *ex post* real interest rates implied by the deflation of the next four years.

For the purposes of the argument here, we can remain agnostic about what specific form the “inertia” in household expenditure decisions takes. The simplest story is that expectations are backward-looking or adaptive, perhaps in combination with a story

²³While the Survey of Consumer Finances does not allow for a more disaggregated analysis of the very high end of the distribution, since income data is topcoded, the IRS Statistics of Income does potentially do so. I hope to return to this question in future work.

about endogenous consumption norms or expenditure that is costly to adjust, perhaps because it is lumpy (like houses). The story here is also compatible with a more purely behavioral as opposed to optimizing account of household expenditure, as in Cynamon and Fazzari (2008). All that we need is sufficient stickiness in household expenditure such that household cannot change their leverage infinitely faster than the Fisher variables. This is enough to ensure that we cannot assume an equilibrium where debt is endogenous, or fast, and the Fisher variables are exogenous or slow. While more empirical work on the micro-level determinants of household borrowing behavior is certainly needed, I feel confident that in any plausible account this condition will be met.

More concretely, it seems clear that the accounting is not consistent with any story that explains the rise of household debt between 1980 and 1998 mainly or exclusively in terms of households choosing higher expenditure relative to income in this period, since, given the *ex post* behavior of the Fisher variables, the actual effect of household borrowing was to shift purchasing power *away* from this period.

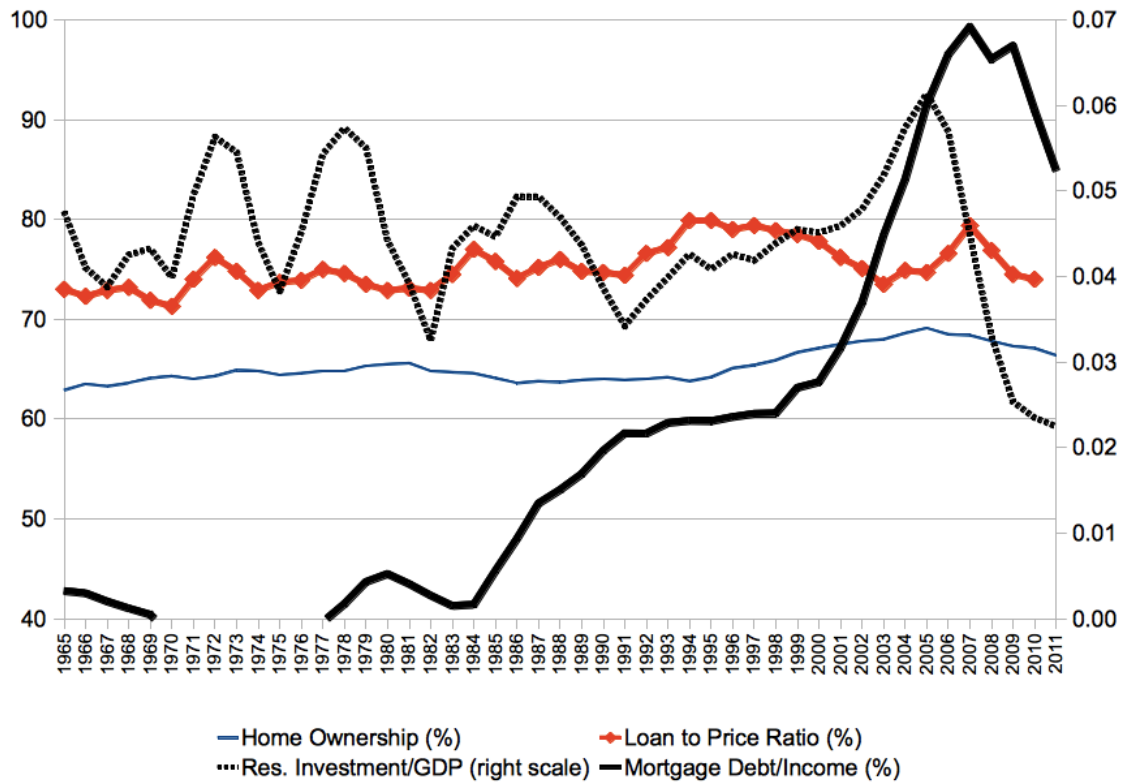


Figure 2.10: Indicators of Mortgage Credit Availability, 1965-2012.

The heavy black line shows mortgage debt as a percentage of adjusted household income. The thin blue line shows the proportion of families owning their homes, the orange line with diamonds shows the average loan-to-value ratio for mortgages originated in that year, and the dotted line shows residential investment as a share of GDP. These latter three variables should be associated with broader availability of housing credit. Note that while all three increase sharply in the late 1990s, none show any increase in the earlier period of rising mortgage debt in the 1980s, relative to the pre-1980 period.

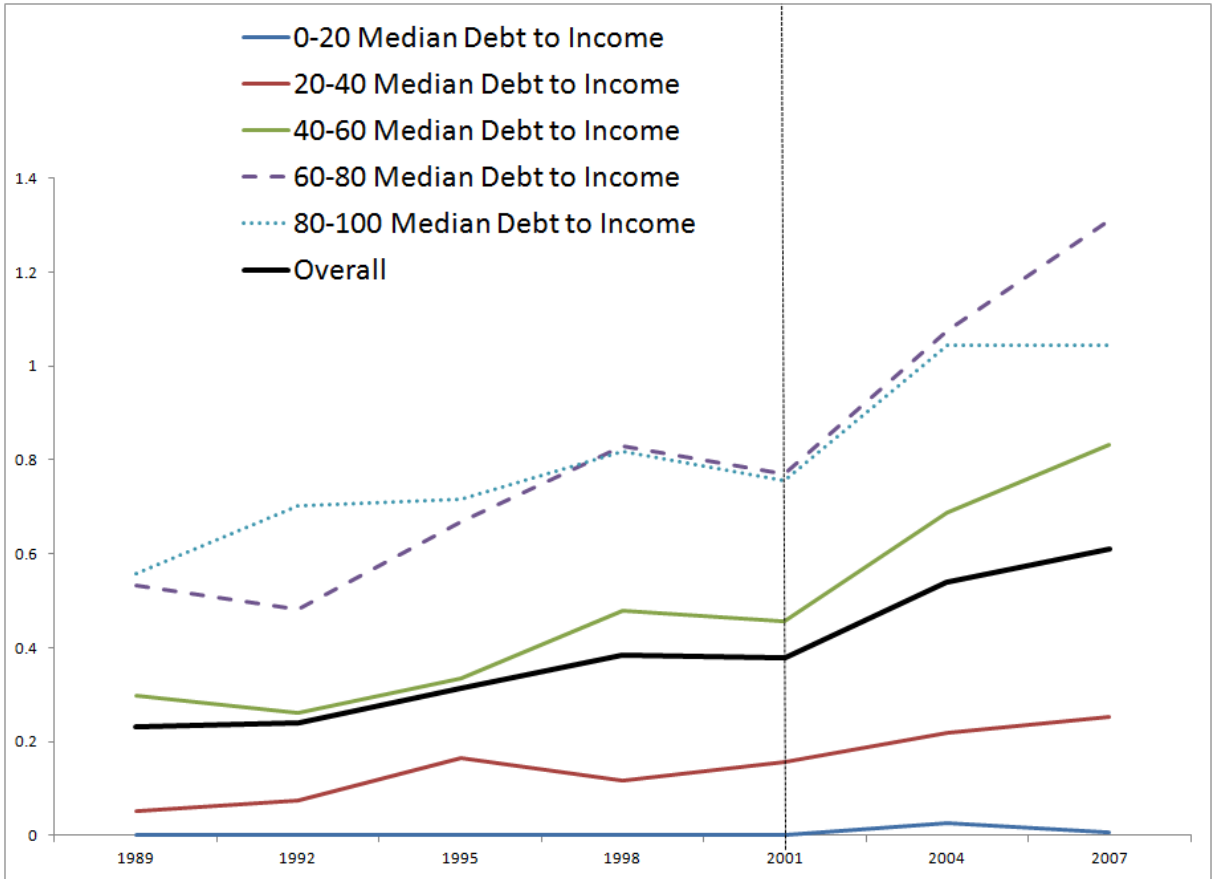


Figure 2.11: Median Debt to Income Ratio by Quintile, 1989-2007.

Source: Survey of Consumer Finances.

2.8 Counterfactuals

Another way of framing the question is to ask what would have been the trajectory of household leverage if household primary balances had been the same as in reality but growth, interest and/or inflation rates had remained constant. The result of that simple simulation exercise is shown in Figure 2.12. The heavy black line in the figure shows the actual trajectory of household leverage, while the solid red line shows what the trajectory would have been if i , π , and g had been fixed at their 1945-1980 average levels for the whole period.²⁴ The other three lines show scenarios with growth, inflation, nominal interest rates and real interest rates ($i - \pi$) respectively fixed at their average levels while the others vary historically. The main message of the graph is that for the past 50 years as a whole, household borrowing has made *no* contribution to the growth of household debt; if interest rates, inflation and growth had been constant, then the actual pattern of household borrowing would have led to roughly stable leverage over the whole period from 1960 to 2010. Second, while higher growth reduced leverage somewhat in the late 1960s, and very low growth increased leverage in 2008-2009, the overall picture is basically unchanged in the constant-growth scenario. The big differences come from interest rates and inflation. In the constant-inflation scenario, leverage rises rapidly in the 1970s, rather than the roughly flat trajectory actually experienced as high inflation offset high primary deficits; then after 1990, the constant-inflation scenario shows a path of leverage that is flat overall rather than rising, illustrating how the stable prices of the past two decades led to rising leverage by reducing the “inflation erosion” to which household debt had previously been subject. In between these two periods, in the 1980s, the difference between the counterfactual scenario and the actual trajectory is due to higher nominal rates. So apart from the two great housing booms of 1946-1960

²⁴The scenarios all involve the same total growth from 1945 to 1980 by construction. The lines do not coincide exactly at 1980 because arithmetic rather than geometric means were used.

and 1999-2005, household debt ratios have been driven by Fisher dynamics. In this sense, the common narrative of the profligate American household is applicable only to a fairly short period of sharply increased borrowing in the 2000s (following which households have cut back more than proportionately).

One possible interpretation of the counterfactual exercise is that if households form their expectations of average growth, inflation and interest rates in the future by looking at historical averages over past decades, then they chose the right level of net borrowing in the 1980s and 1990s to produce a gradual fall in leverage. Alternatively, the simulation results are compatible with households in the 1980s and 1990s seeking to maintain a constant level of leverage and gradually updating their expectations for growth, inflation and interest rates. Either way, the fact that the reduction in household borrowing after 1980 was insufficient to maintain stable leverage ratios in the face of the actual trajectories of interest rates and inflation cannot be used to infer either that households intended to increase their borrowing or that they were behaving irrationally. Borrowing behavior in this period is broadly consistent with what one would expect from households attempting to maintain a stable leverage ratio, given adaptive expectations. Similarly, if households were seeking in 2008-2010 to reverse the debt buildup of 2000-2005, then they chose exactly the right level of (negative) net borrowing on the assumption of stable income growth. The parallel with 1929-1933 is striking. The essence of debt-deflation episodes is that when all agents across the economy attempt to increase their savings simultaneously, their plans are incompatible; income adjustments then ensure that the *ex post* increase in savings is less than that intended *ex ante*. While the paradox of thrift is usually treated as a textbook curiosity, it is striking how well it fits the 2008-2010 period. It was precisely the fall in income (and to a lesser extent prices) due to households' (and firms') attempts to simultaneously deleverage, that may have prevented the deleveraging attempts from succeeding to the extent desired.

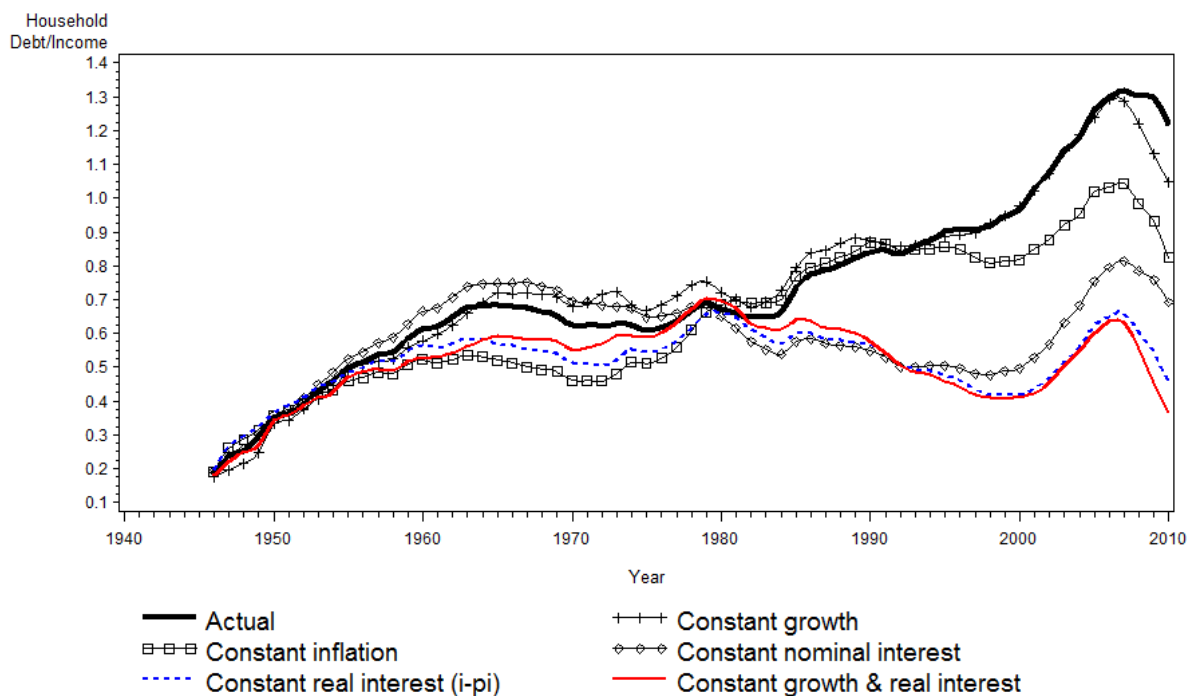


Figure 2.12: Counterfactual Evolution of Household Leverage 1981-2010, Given 1946-1980 Average Values of i , g , and π .

The figure shows the result of simple simulation exercises where the real growth rate of income, the inflation rate and the nominal interest rate respectively are fixed at their 1946-1980 averages, while the other variables and the household primary balance take their historical values.

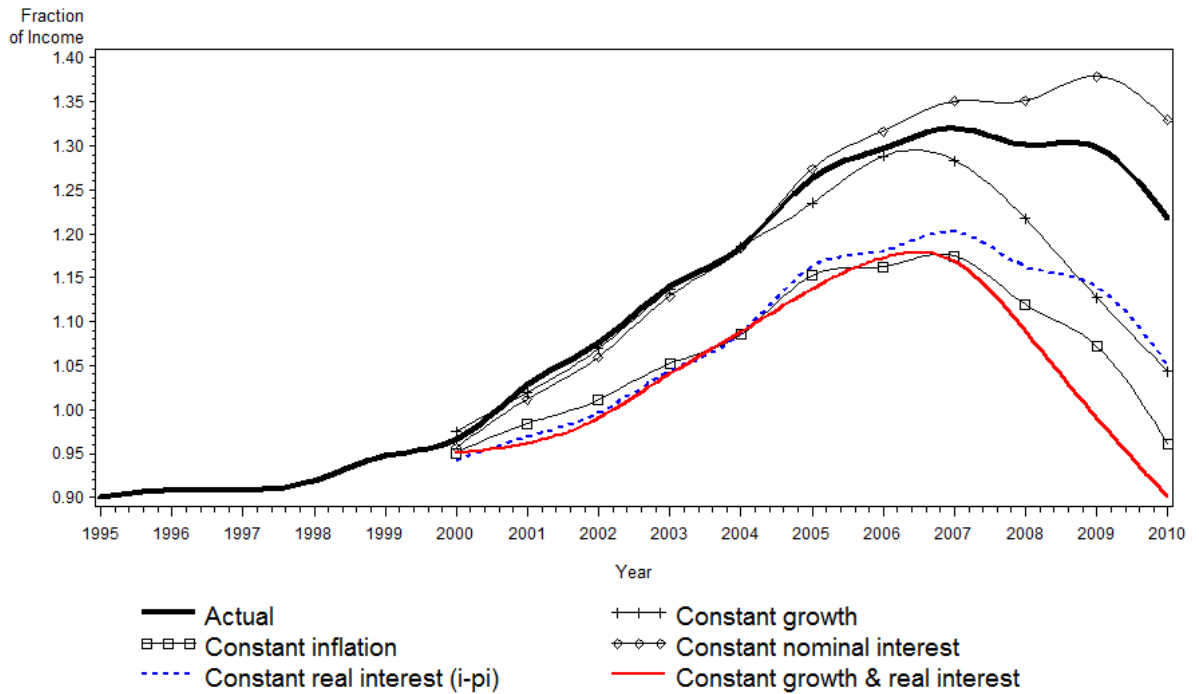


Figure 2.13: Counterfactual Evolution of Household Leverage 2000-2010, Given 1946-1980 Average Values of i , g , and π .

This is the same simulation as shown in Figure 2.12, except that the starting point is the actual debt ratio in 2000. Real effective interest rates remained relatively high after 2000, contributing approximately one-third of the debt growth in 2000-2007. Low interest rates after 2007 helped with deleveraging, but were more than offset by the sharp fall in income.

2.9 Conclusion

The main contribution of this paper is to argue that any analysis of changes in debt ratios over time must consider the effect of changes in interest rates, inflation and growth rates on leverage, and not just changes in borrowing. A clear picture of the relationship between changes in household leverage, household borrowing, and aggregate demand is obscured by the failure to use appropriate accounting. Conventional savings rates combine changes in the asset and liability sides of balance sheets; they have no reliable relationship to changes in credit flows to households. A conceptually appropriate accounting framework shows that while some of the evolution of household debt-income ratios since 1929 have been driven by changes in household borrowing behavior, over much of this period this has not been the exclusive or even primary factor in changing household leverage. In particular, the rise in household leverage since the early 1980s is mainly attributable to higher interest rates, lower inflation, and lower income growth, in that order; new household borrowing played little role. Credit-financed expenditure by households, far from rising in line with debt, has in fact been lower in the three decades since 1980 than in the preceding period. In this sense, the rise in debt following the “Volcker coup” (Duménil and Lévy, 2011) is appropriately thought of as a debt-disinflation analogous to the debt-deflation of the 1930s.

2.9.1 Debt as a Monetary Phenomenon

It was one of the great insights of Keynes that modern economies cannot be conceived of only as “real exchange” economies; many important questions can be answered only in terms of a model of a “monetary production” economy. (Leijonhufvud, 2008) After Keynes, the real-exchange vision was reasserted by allowing for the existence of money as a special asset required for exchange, but ignoring liabilities, an approach sometimes called “Monetary Walrasianism.” (Mehrling, 2013)

Admittedly, Keynes left the way open for this interpretation by retreating from the sophisticated account of financial markets in *The Treatise on Money* to the exogenous money supply assumption of the *General Theory*. (Bibow, 2000a) But in a world where liquidity cannot be identified with any particular asset but is essentially a social relation, analysis of the financial side of the economy requires discussing the asset and liability side of balance sheets independently, rather than netting them out as the pseudo asset “net wealth”. (Beggs, 2012). Any discussion of debt, in particular, must start from the fact that it is a financial liability, and not simply a negative asset nor an accumulated excess of consumption over income. To understand the evolution of debt over time and its macroeconomic implications, we need a framework that focuses specifically on the liability side of household balance sheets. Regarding debt as merely a counterpart of some broader aggregate like saving, consumption or wealth mixes it up with payment flows that behave quite differently, and therefore gives a misleading picture of its evolution over time.

Most economic analyses of debt approach it in terms of real flows. Given the current political salience of debt, and given concerns about performance of the real economy, it is natural to look for story that links debt to real economic outcomes in a straightforward way. In such stories, debt is determined by the intertemporal allocation of consumption, by the level of desired spending on real goods and services, or perhaps by the distribution of income. But in fact, the financial relationships reflected on balance sheets and the real activities of production and consumption compose two separate systems, governed by two distinct sets of relationships. Explanations that reduce debt to the financial counterpart to some real phenomena ignore the specifically financial factors governing the evolution of debt. The evolution of demand and production has to be explained in its own terms, and the evolution of debt and other financial commitments has to be explained in its terms. No simple story combining the two is likely to be useful or reliably consistent with the facts. As

we have shown in this paper, this is not merely a theoretical critique. As a historical matter, the evolution of household debt in the US bears little resemblance to any of the real variables whose financial counterpart it is imagined to be. They do interact, but they are not tightly linked. While some of the turning points in household leverage are indeed associated with turning points for production and consumption, most are not, but are the result of purely monetary-financial factors. Indeed, as a first approximation, it would be better to imagine household income and expenditure as evolving according to one set of systematic relationships, and household balance sheets evolving according to an entirely separate set of relationships. Balance sheets and real flows do interact, sometimes strongly. But conceptualizing the two systems independently is an essential first step toward understanding the points of articulation between them.

2.9.2 Policy Implications

From a policy standpoint, the most important implication of this analysis is that in an environment where leverage is already high and interest rates significantly exceed growth rates, a sustained reduction in household debt-income ratios probably cannot be brought about solely or mainly via reduced expenditure relative to income. Even a modest increase in household expenditure from its very depressed levels of 2008-2011 would be sufficient to put leverage back on an increasing path, especially if default rates return to more historically typical levels. There is an additional challenge, not discussed in this paper, but central to both Fisher's original account and more recent discussions of "balance sheet recessions": reduced expenditure by one sector must be balanced by increased expenditure by another, or it will simply result in lower incomes and/or prices, potentially increasing leverage rather than decreasing it. (Eggertson and Krugman, 2010; Koo, 2008) To the extent households have been able to run

primary surpluses since 2008, it has been due mainly to large federal deficits and improvement in US net exports.

I conclude that if reducing private leverage is a requirement of renewed growth, some combination of higher g , lower i and higher π will be necessary. While growing out of debt would be ideal, it would require a large increase in net exports, government spending and/or private investment, none of which seems plausible for the US at present.²⁵ So lower nominal interest rates and/or higher inflation is probably essential. How, or whether, monetary policy could deliver the latter is beyond the scope of this article; here it is sufficient to point out the central importance of changes in inflation rates for episodes of (de)leveraging historically. As for the former, there are two basic approaches. One is to lower market interest rates through some combination of unconventional monetary policy, direct regulation of interest rates (or more broadly “financial repression”), and direct public lending to households. The other is to accelerate the convergence of effective rates to (lower) market rates by facilitating refinancing of existing debt, as has been proposed on occasion for mortgages and student loans. Finally, defaults may remain an important part of the deleveraging process. A recent IMF staff report (Gottschalk et al., 2010) notes that for public sector debt, defaults are most likely to lead a long-term improvement in the fiscal position (and have generally occurred historically) in countries with small primary deficits, or primary surpluses. In such cases unsustainable debt growth is driven by the interaction of high effective interest rates with a large existing debt stock; a one-time reduction in the debt stock can change an unsustainable path to a sustainable one, even if the interest rates on new borrowing rise as a result.²⁶ A similar logic might apply to private sector debt. If so, some form of systematic debt forgiveness

²⁵For some smaller countries, export-driven growth is a feasible route to deleveraging.

²⁶As Gottschalk et al. (2010) note, if the goal is to stabilize the debt-income ratio, the amount by which default reduces the required adjustment in the primary balance is directly proportional to the interest rate-growth differential.

may be the logical, and eventually unavoidable, solution to the problem of excessive household leverage.

CHAPTER 3

LOOSE MONEY, HIGH RATES: INTEREST RATE SPREADS IN HISTORICAL PERSPECTIVE

3.1 Introduction

Interest rate spreads in the US have widened over the past 50 years. As shown in Figure ??, since the 1960s the average rate on 30-year mortgages has increased by approximately 2 points relative to the current rate on short-term federal debt, while the rate on typical corporate bonds has increased by 3 points. Relative to *ex post* realized policy rates, the increase in spreads is even larger, and takes the form of a sharp transition in the early 1980s. Despite being quantitatively large, and challenging to most established theories of interest rate determination, the increase in interest rate spreads has not received much attention in either the mainstream or heterodox literature. The goal of this paper is to call attention to the divergence of risky long rates from the risk free overnight rate, to assess various possible explanations for this divergence, and to show how this question is well suited to Post Keynesian theory.

The starting point for Post Keynesian analysis of credit markets is that “the rate of interest [is] determined by ... the terms on which the public desires to become more or less liquid and those on which the banking system is ready to become more or less unliquid.” (Keynes, 1937*a*) If credit markets are analyzed systematically in terms of liquidity (rather than saving), with the interest rate as the price of liquidity, then the sharp analytic distinction between the “riskfree” policy rate and the various market rates loses its salience. We can no longer speak of “the” interest rate but only the complex of interest rates, with the same interplay between supply and demand

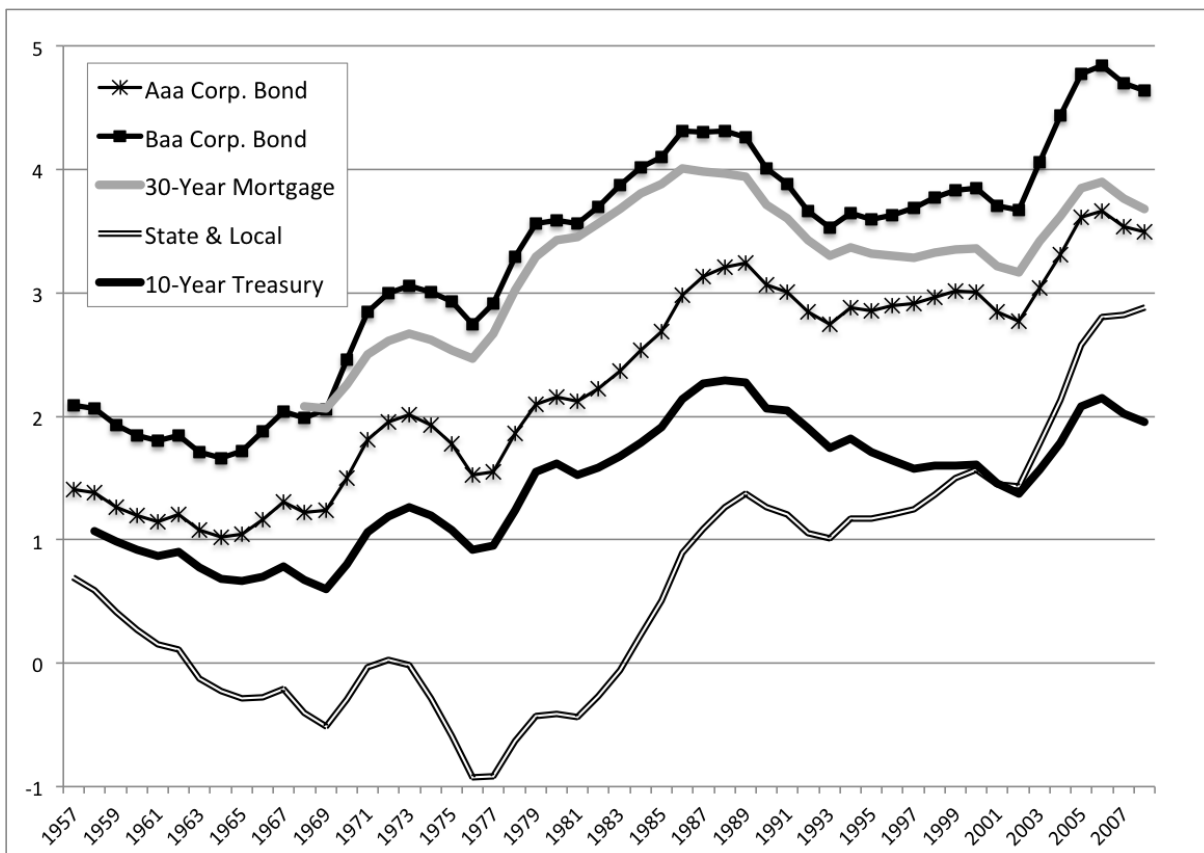


Figure 3.1: Selected Interest Rate Spreads, 1953-2013

Source: FRED

The figure shows 10-year rolling averages of the difference between the rates shown and the 3-month Treasury bill. The averages are centered at the year shown on the horizontal axis; the first observation is for the 10-year period beginning in January, 1953, and the last observation is for the 10-year period ending in December 2013. Compared with the 1950s and 1960s, long rates on federal debt have risen by about one point relative to short rates, and rates on corporate bonds have risen by an additional point relative to long rates on federal debt.

for liquidity determining both the spread between individual rates and shifts in the complex as a whole. Indeed, from a liquidity-preference viewpoint, the policy rate, as the difference between the yield of overnight interbank loans and the yield of money, is just one spread among others, and need not have any special importance. From this point of view, there is also no sharp distinction between conventional monetary policy, unconventional monetary policy, and financial regulation. A reduction in the policy rate, a purchase of private assets, and a relaxation of regulatory limits on lending are all simply ways of increasing the banking system’s readiness to become more unliquid. The second premise of Post Keynesian theories is that “rational” expectations are neither coherent logically nor a reasonable approximation empirically. In any forward-looking transaction – of which long-maturity loan contracts are a paradigmatic example – the expectations process must be explicitly described, and inevitably includes an important element of convention. A more critical perspective on expectations formation, I argue, is an important tool in understanding the historic behavior of interest rates. Finally, and more concretely, this essay seeks to advance the discussion of the question posed by Pollin (2008): If we assume

“that the Federal Reserve exogenously sets the Federal Funds rate, does that also imply that the Fed exogenously controls the full complement of market rates...? In particular, can the Fed exogenously set the

	1953-1960	1961-1970	1971-1980	1981-1990	1991-2000	2001-2013
	Premium over 3-Month Treasury Bill:					
10-Year Treasury	1.0	0.7	1.1	1.9	2.1	2.1
Aaa Corporate	1.3	1.0	1.8	2.7	2.9	3.7
Baa Corporate	2.0	1.7	2.9	4.1	3.6	4.8
Mortgage*	n/a	1.8	2.5	3.9	3.3	3.9
State/Local	0.7	-0.3	-0.6	0.5	1.2	2.9

* 30-year conventional. Mortgage data starts in 1964.

Table 3.1: Average Interest Rate Spreads by Decade

Source: FRED. The State/Local rate is the average rate reported in the Bond Buyer Go 20-Bond Municipal Bond Index.

long-term rates that are most important for investment and household borrowing?”

In this paper, I focus mainly on the 30-year conventional mortgage rate and the Baa corporate bond rate, but the pattern of wider spreads is broadly shared across a wide range of debt securities, in the US and elsewhere. Table ?? summarizes the evolution of interest rate spreads since World War II. As the table shows, the rise in term spreads (the premium on long term borrowing over short-term borrowing for a given borrower) was concentrated in the 1980s, while the rise in spreads between rates facing different borrowers has occurred more steadily, over a longer period. The focus in the remainder of the paper will be on federal and corporate bonds, since for other classes of debt it is more difficult to separate changes in interest rates on comparable loans from changes in the composition of borrowing. But it is worth noting that while the broad pattern of an increasing premium over short-term federal debt is shared by both the other classes of debt here, the specific patterns are slightly different. Mortgage rates have risen by less than the other classes of private debt. Meanwhile, rates on municipal bonds have risen by more, going from rates somewhat below short-term federal debt to 3 points higher. This is due primarily to the diminishing value of the tax exemption for interest on municipal debt as top income rates have fallen; municipal borrowers may also face increased risk and/or liquidity premiums. I will not discuss issues specific to these classes of debt in the remainder of the paper, but it's important to include them here to call attention to the changing structure of interest rates. These changes in spreads mean that the behavior of the complex of interest rates as a whole is not effectively captured by a single measure of “the” level of interest rates.

In the remainder of the paper, I review various theories of the determination of interest rates, and explore their suitability to explain the historical increase in spreads seen in the US.

3.2 The Determination of Interest Rates

3.2.1 The Interest Rate as the Price of Saving

Classical writers did not see the interest as a fundamental macroeconomic variable. It was the profit rate that mattered, both for distribution and for the evolution of the economic system over time, with interest regarded as a component of (or deduction from) profits. Classical writers also did not see interest as a monetary phenomenon – the link between the money supply and interest rates was one of the supposed errors for which “Mercantilist” economists were criticized. Thornton was one of very few early-19th century writers to see a systematic link between credit conditions and the money supply, and to accordingly support what we would now call discretionary monetary policy by a central bank. Admittedly, classical economists did not adhere as strictly to the “classical dichotomy” as they are sometimes supposed to have. Hume, Smith and Ricardo all suggested at points that the substitution of bank notes and other forms of credit-money for commodity money might affect interest rates and not just the price level, and that their use could have benefits in terms of increasing access to credit as well as reducing transaction costs. (Arnon, 2010, see also Taylor (2009), p. 79-93) And 19th century writers who were more oriented to the language used by financial practitioners often referred to the interest rate as the “price of money” and took it for granted that it was determined by the banking system. (Bagehot, 1999, p. 113-121) But systematic economic theory by and large continued to be developed on the assumption of pure commodity money and an interest rate determined by nonmonetary factors.

The consensus against a monetary view of interest hardened with rise of marginalism later in the 19th century. Bohm-Bawerk and Walras treated interest and profit as two interchangeable terms for the price of substituting consumption between periods. This approach was developed by the next generation of marginalists, including Cassel and Fisher. For them, interest was the price of “saving,” meaning deferring

consumption to a later period, and there was no connection between the rewards for risk-bearing, for management of the production process and the reward for deferred consumption as such. In this framework, it is natural to refer to the interest rate as only the reward for “waiting” or “abstinence” and ignore the variation among market interest rates as of secondary importance. (Arnon, 2010, see also Dobb (1975), ch. 7)

3.2.2 The Wicksellian Theme: Natural Rate and Market Rate

The innovation of Wicksell (2007, first published 1898) was to refocus attention on the existence of different rates of return. In his case, the concern was the possibility of a divergence between the return on investment by business, on the one hand, and the interest rate set by the banking system, on the other. Wicksell called the optimal intertemporal rate described by the marginalists as the “natural rate,” and claimed (for not entirely clear reasons) that the expected rate of return on new investment was connected to this natural rate. Under credit-money system, however, the market rate of interest is set by banking system, and there is no mechanism to bring it into line with the natural rate. This was a revival of the insights of Thornton, who had argued one hundred years earlier that neither the gold standard nor the real bills doctrine would produce an automatic growth of credit in line with the needs of real production, so the monetary system required active management. For Wicksell, the critical issue was that under a credit-money system, price adjustments would carry interest rate in the “wrong” direction with respect to price stability. If banks set interest rate too high or too low, desired expenditure would never converge to productive capacity and prices would rise or fall without limit. (Leijonhufvud, 1997) But Wicksell did not have a clear explanation for why the interest rate consistent with price stability must necessarily equal the interest rate derived from a process of intertemporal exchange

as described by the marginalists.¹ Nor did he have a good explanation of how market rates would be set in a pure credit economy. He describes a number of factors that might affect them, having to do with the competitive structure of the banking system, the mix of intermediation and payments activities carried out by banks, and the possibility of substitution away from banking system by self-financing entrepreneurs, but concludes only that “I am unable ... to assess the importance in actual banking practice of these various factors.” He did not see the question as important; the critical point was that, however the interest rate was set in a pure credit economy, there was no reason to expect it to coincide with the natural rate, so in such an economy the interest rate would have to be set by a public authority. The interest rate as intertemporal exchange rate still dominates economic theory, with intertemporal allocation taking place either over an infinite time horizon or a finite lifecycle, as in overlapping generations models, as popularized by Samuelson.² Meanwhile, Wicksell’s approach still dominates practical policy discussions, with the idea the monetary authority can control the interest rate, and must exercise this control to assure price stability, coinciding uneasily with a theory of the natural rate that has no place for monetary policy or inflation. (Smithin, 2006)

One weak point of the Wicksellian framework has always been the absence of a clear link between the “natural rate” as the rate consistent with price stability, on the one hand, and as the technology-and-tastes-determined price of a good today in

¹In fact, Wicksell is somewhat ambivalent on this point. Initially, he simply asserts that the natural rate is simply “the rate of interest which would be determined by supply and demand if no use were made of money.” (Wicksell, 2007, 102) But he later suggests that the natural rate is in fact somewhat lower than this, since in order for investment to take place “the probability that an entrepreneur will make a profit must always be somewhat greater than the probability that he will make a loss.” See also the discussion in Chick (1987).

²It’s worth noting that while Samuelson is often assumed to have shared the marginalist concern with the optimal rate of intertemporal exchange, the real point of this article is that market interest rates will *not* in general achieve the optimal intertemporal allocation, and that a public pension system may deliver a more efficient distribution of consumption over the lifecycle. See Mehrling (2013)

terms of a good tomorrow, on the other. This weak point was highlighted by Sraffa in his controversy with Hayek over the latter’s adaptation of Wicksell’s argument in *Money and Capital*. (Sraffa, 1932*a,b*) The essence of Sraffa’s argument was this. Suppose we take $p_{i,j}$ as the price of good i at time j . Then the ratio $p_{i,t}/p_{i,t+1}$ is the rate of interest in terms of good i . The problem is that these “own-rates of interest” will in general be different for each good. Given any two goods, if

$$p_{1,t}/p_{2,t} > p_{1,t+1}/p_{2,t+1}$$

then the interest rate measured in terms of good 1 will be greater than the interest rate measured in terms of good 2. The Walrasian system gives us no basis on which to choose any particular good as the preferred *numeraire*, so there is no way to decide which of these various own-rates corresponds to the money-rate compatible with price stability. Thus, a unique natural rate of interest is defined only for the case in which relative prices do not change. Sraffa’s challenge was never successfully answered by Hayek. (Lawlor and Horn, 1992) Nor does it appear to have been answered subsequently, despite the continued salience of the “natural rate” concept. Modern models of the natural rate normally sidestep the problem by working in terms of a single commodity. More generally, the natural rate is defined as the interest rate that will exist when “all markets are in equilibrium and there is therefore no pressure for any resources to be redistributed or growth rates for any variables to change.” (Archibald and Hunter, 2001, quoted in Cuaresma and Gnan 2007) There is no obvious way to map this hypothetical interest rate onto real-world economies in which prices are changing, nor is it clear how technological change (which typically is included in models of the natural rate) takes place without any reallocation of resources. Milton Friedman’s famous assertion that the natural rate is the rate that would be “ground out by the Walrasian system” in a market system that incorporated “the actual structural characteristics” of the real economy, including all of its “market imperfections, stochastic variability in demands and supplies, costs of gathering information..., costs

of mobility, and so on” is an example of the incoherence that comes from marrying Wicksellian policy to Walrasian theory. As Gordon (1979) observes, “The world that Friedman is talking about is not a Walrasian world.”

Woodford (2005) is the canonical effort to rigorously integrate the Wicksellian policy framework into modern models of intertemporal optimizing in a rigorous way.³ Woodford avoids the confusion embodied in the Friedman quote by explicitly constructing a model in which the interest rate that produces price stability is the same one that would prevail in market without monetary frictions. But this is achieved only by custom-designing the frictions to produce just this result, as Woodford himself acknowledges. And it also requires abstracting away from all the “actual structural characteristics” alluded to by Friedman, including everything related to the concrete practice of monetary policy. In Woodford’s core model, there are no capital goods or long-lived assets of any kind, and no private financial contracts; the central bank is able to control the interest rate because it has a monopoly on all lending and borrowing. (Mehrling, 2006) So the question of how private interest rates are set, and the extent to which they will move with each other and with the policy rate, cannot even arise in this model. In a later article, Woodford (2010*b*) offers a more realistic picture, explicitly discussing the possibility that spreads between the policy rate and rates facing nonfinancial borrowers reflect liquidity conditions within the financial system (what Woodford calls “the supply of intermediation”) and inconsistent expectations, as well as the objective risk properties of loans. Monetary policy, he argues, “should take into account changes in financial conditions – particularly changes in interest rate spreads”; furthermore, sufficiently large shifts in financial conditions will be impossible to fully offset with changes in the policy, and will require the monetary authority to directly target credit conditions for nonfinancial borrowers. This

³It is no coincidence that Woodford’s title echoes Wicksell (2007). Woodford describes his approach as “neo-Wicksellian” and opens his book with a quote from Wicksell.

more sophisticated vision of multiple, endogenously determined interest rates finds no support in Woodford's preferred theory. It is natural to think that the "supply of intermediation" is ultimately rooted in institutional structures, in trust, in uncertainty about the future, or more broadly in the difficult coordination problems posed by the reorganization of large-scale production processes. But none of these possibilities can be addressed within a framework of optimization under rational expectations. Instead, Woodford ultimately explains the supply of intermediation in terms of the intertemporal preferences of savers – precisely the factor that would govern interest rates in a hypothetical world without intermediaries.

3.2.3 The Interest Rate as Liquidity Premium

Keynes offered an alternative basis for theorizing monetary policy by offering an explicitly monetary account of interest rates. His emphasis on role of banks in setting the terms of lending is similar to Wicksell's. The difference is that Keynes saw a diversity of private rates of return as an essential feature of capitalism, rather than as a problem that could be eliminated by appropriate policy. In the *Treatise on Money*, *The General Theory*, and in several subsequent articles, Keynes developed a theory of the interest rate that begins from liquidity rather than intertemporal preferences. Liquidity preference denies that interest is paid in compensation for waiting – in general, the creation of a new loan does not require anyone to reduce current consumption. Rather, it is compensation for accepting a less liquid balance sheet position, meaning a change in one's assets and liabilities that will make it more difficult or costly to adjust payments in the future, or that increases the chance that in some period payment obligations will not be met. In *Treatise* it is clearer than in *The General Theory* that liquidity involves the full range of a unit's assets and liabilities. In the latter book Keynes chose for expositional purposes to treat liquidity as a unique service of one asset, money, the supply of which is exogenously

fixed. (Bibow, 2005, 2000b) But even in the *The General Theory*, it is clear that liquidity is a property possessed in varying degrees by many different assets, and there is no particular reason to draw the line in one particular place.⁴ Much of the argument of *The General Theory* hinges on the existence of four distinct assets – money, bonds, equities and tangible assets – and the rejection of the assumption, as in the Classical and neo-Wicksellian theories, that all four must all have equal returns, net of defaults. The most important thing for our purposes is that liquidity is not just the reason for the difference between the rate targeted by the monetary authority and the rate on money (“the” interest rate); it is an important factor in the relative prices of all financial assets. Thus, for both the classical and Wicksellian traditions the determination of the overall level of interest rates is conceptually distinct from the determination of spreads between different rates – with the latter a detail of secondary importance – for Keynes they are just two ways of looking at the same problem. In fact it is a matter of indifference which particular liquidity premium we choose to call “the” interest rate.

What is meant by liquidity preference? The term liquidity is widely used but not always consistently defined. Depending on the context, it may refer to: monetary ease, as reflected in low interest rates and the absence of credit rationing; sufficiently thick markets for an asset that it can be bought or sold without moving the market price (transaction liquidity); the extent to which economic units can acquire assets by issuing new debt (funding liquidity); or the volume of central bank liabilities, or of reserves held by the banking system. (Tirole, 2011) Keynes’ own usage was not consistent; in the *General Theory*, he often treated it as interchangeable with

⁴“We can draw the line between ‘money’ and ‘debts’ at whatever point is most convenient for handling a particular problem. For example, we can treat as money any command over general purchasing power which the owner has not parted with for a period in excess of three months, and as debt what cannot be recovered for a longer period than this; or we can substitute for three months one month or three days or three hours or any other period.” (Keynes, 1936, p. 174)

the quantity of money, which in turn was sometimes defined to include all short-dated debt contracts and sometimes to include only monetary gold and central bank liabilities. In the *Treatise on Money*, by contrast, liquidity was used in a more generic way to describe a quality possessed in greater or lesser degree by all assets, with more liquid assets being those “more certainly realisable at short notice without loss.”⁵ Further confusion arises from the conflation of liquidity preference in the sense of the desire to be able to make payments in unforeseen circumstances, with the desire to avoid capital losses.⁶ Nonetheless, the term has come to acquire a clear meaning in Keynesian and Post Keynesian Theory: “Liquidity of a balance sheet ... is a judgement of the adequacy of the liquid assets comprised in it ... to meet the claims, of whatever kinds, that may be made on them.” In other words, liquidity means the capacity to make money payments in the future whenever the need arises. The one amendment more recent work would add is that liquidity is not only a property of assets. It also depends on the ability to incur new liabilities on acceptable terms. A unit’s capacity to borrow at short notice is part of its liquidity, even though it is not formally recorded on the balance sheet. (Beggs, 2012)

From a Keynesian liquidity-centered prospective, there is no special importance to the policy rate. It is merely one tool among others available to policy makers to increase or diminish the banking system’s willingness to provide liquidity to the nonfinancial sector by becoming more illiquid itself. And indeed, historically central

⁵Hicks (1962) identifies this phrase from the *Treatise* as Keynes’ first formal definition of liquidity, and argues that the term entered general usage in this sense via Keynes’ contribution to the MacMillan Report, rather than in the more restricted sense used in the *General Theory*.

⁶In the terminology of Robinson (1951), the *General Theory* has capital uncertainty stand in for uncertainty of all kinds. As Crotty (2013) notes, “uncertainty as to the future course of the [long] interest rate is the sole intelligible explanation of ... liquidity preference” offered in the *General Theory*. But I would argue that this is a weakness with the way the concept is introduced in that book, that is the result of the decision to abstract away from the financial system and treat financial assets as if they were all owned directly by households. Keynes (1937*a*), which reintroduces the banking system, makes it clear that liquidity preference describes the desire to retain flexibility in the face of a variety of future contingencies, not just changes in the long rate.

banks have used a wide variety of tools to regulate the pace of credit creation. (Epstein, 2007) As will be discussed below, there is a substantial empirical literature that suggests that most of the spread between yields on different classes of debt security are better explained by liquidity premium in the Keynesian sense than by default risk. Not only is liquidity preference a natural way to integrate discussions of interest rate spreads with the overall level of interest rates, attention to spreads is essential to maintaining the usefulness of the liquidity preference framework itself. In a “horizontalist” perspective in which the whole complex of interest rates moves together and that the monetary authority sets the policy rate, there is no place for liquidity as an independent factor. (Smithin, 2008)

3.2.4 The Transmission of Monetary Policy

In modern economies, the usual way of thinking about interest rates is to first identify the policy rate set by the central bank, and then ask to how far other interest rates lie above the policy rate. The mechanism linking monetary policy to market rates has evolved historically, with a variety of targets and instruments being used by central banks to regulate the pace of expansion of the monetary system as a whole. In the wake of the worldwide financial crisis of 2008, it may be that another major shift is occurring in the channels through which monetary policy operates, with interest on reserves replacing open market operations and a wider range of assets being purchased by central banks. (Friedman, 2014) That said, it is useful to go step by step along the full chain of the monetary transmission mechanism as it operated (or was understood to operate) prior to the crisis. First, the central bank changes its policy rate. Second, this changes the current funding costs of financial institutions. Third, the change in current funding costs changes expectations of average funding costs over the length of a given loan. Fourth, a change in expected funding costs changes current risk-free long rates. Fifth, a change in the risk-free rate at a given maturity changes the the

rate faced by private borrowers on loans of similar maturities. And finally, sixth, a change in borrowing rates changes desired expenditure. At each of these steps, there may be factors that act as wedges, raising the next rate by some more or less stable amount, and/or that dampen changes in both directions. Most discussions of interest rates in macroeconomic contexts ignore the intermediate steps and simply ask whether the policy rate is (or can be, in the case of the zero lower bound) set at the appropriate level. Many older Keynesian writers did express doubts about the final step, from borrowing costs to real economic activity.

There are at least three important possible points at which “wedges” can appear in this chain. First, the relationship between the policy rate and the funding costs of financial institutions depends on the mix of liabilities on those institutions’ balance sheets. In particular, access to low-cost deposit funding tended to lower banks’ funding costs relative to the policy rate, and the loss of it has tended to raise them. Second, there is the issue most emphasized by Keynes, the term structure. For banks considering a longer loan, what matters is not funding costs today, but the behavior of interest rates over the life of the loan. The majority of mainstream theory, drawing on a rational expectations framework, is explicitly committed to the idea that expectations of economic variables are always an unbiased estimate of those variables’ future values, so the fact that a central bank will be following a certain policy rule in the future determines market participants’ beliefs about future rates today. In this framework, there is no reason for central banks to actively communicate future policy, since “the public has no difficulty in correctly perceiving the pattern in the central bank’s actions.” (Woodford, 2005, p. 18) Conversely, if the central bank cannot control market participants’ beliefs about *future* interest rates, it will have little control over long rates today. Finally, the spread between loans of the same maturity may vary for reasons beyond the risk of default losses. Probably the most important of these is the liquidity premium, but market power may also have an effect.

The distinction between the policy rate and rates facing nonfinancial borrowers is particularly important in contemporary debates about monetary policy preceding the Great Recession. The financial system’s failure to translate expansionary monetary policy into low borrowing costs for end users, especially given its ability to do so before 1980, raises questions about the extent to which the deregulation and growth of finance have in fact improved credit provision for the real economy. Higher interest rate spreads are part of the larger phenomenon described by Phillipon (2012), that “the unit cost of intermediation is higher today than it was a century ago, and it has increased over the past 30 years. One interpretation is that improvements in information technology may have been cancelled out by increases in other financial activities whose social value is difficult to assess.”

In the remainder of the essay, I consider interest rate spreads from three different perspectives. We may think of interest rate spreads in terms of maturity, as the difference between yields on shorter and longer duration loans. We may think about interest rate spreads in terms of borrower (or project) characteristics, as the difference between yields on loans to higher quality and lower quality borrowers. Or, we may think about interest rate spreads in terms of monetary policy transmission – that is, from the point of view of credit intermediaries, as the difference between the yield on assets and funding costs. For each of these perspectives, I offer a review of the empirical evidence and then ask how well it is handled by the Classical-Walrasian and liquidity approaches.

3.3 Term Spreads and Expectations

Term spreads refer to the difference between interest rates on otherwise similar loans of different maturities. It is generally assumed that term spreads will be positive, with higher rates on loans of longer maturities; the opposite case, in which shorter maturity debt carries higher interest rates than longer maturity, is referred to as a

“yield inversion” and considered exceptional. (As noted above, in the 19th century short rates typically exceeded long rates.) Here, I focus on the spread between the 10-year Treasury bond and 3-month Treasury bill as a measure of the term spread. It is difficult to calculate exact term spreads for other loans since it is not in general possible to get long and short rates for the identical population of borrowers.

If the interest rate is an intertemporal price, that means it is the price to transfer one unit of income or expenditure from time $t + 1$ to time t . In other words, it is equal to the ratio $p_{i,t}/p_{i,t+1}$ for any good i .⁷ Arbitrage should ensure that

$$p_{i,t}/p_{i,t+u} = (p_{i,t}/p_{i,t+v})(p_{i,t+v}/p_{i,t+u}) \quad (3.1)$$

for any intervals u and v . In other words, the expected yield on a long loan should be the same as on a series of shorter loans covering the same period. The view that, because investors have unbiased expectations of future short rates, this arbitrage condition will be satisfied on average, is referred to as the “expectation hypothesis.” It is often written in log form as:

$$i_{nt} = \frac{1}{n} \sum_{j=0}^{n-1} i_{tj}^e \quad (3.2)$$

where i_{nt} refers to the rate on an n period bond and $\frac{1}{n} \sum_{j=0}^{n-1} i_{tj}^e$ refers to the average of the expected short rates till period n . The modified version of the expectation hypothesis adds a pure forward time premium that is constant over time ρm to account for the risk of holding the long bond to maturity.

3.3.1 Empirical Evidence on the Term Spread

Table 3.2 shows term spreads for three periods: 1954 to 1980, 1981 to 2013, and 1981 to 2003. The third period is included to allow comparisons of the long rate

⁷As noted above, the existence of a unique interest rate in this framework requires either working in terms of a single representative good, or assuming no changes in relative prices between periods.

Table 3.2: Interest Rate Term Premiums Pre- and Post-1980

	1954-1980	1981-2013	1981-2003
3-Month Treasury Bill			
Mean	4.8	4.6	5.7
Standard Deviation	2.5	3.4	3.0
10-Year Treasury Bond			
Mean	5.7	6.5	7.6
Standard Deviation	2.2	3.1	2.8
Mean Yield Premium, 10-Year Bond over 3-Month Bill			
Current	0.9	1.9	1.8
Realized	-0.1	3.9	3.9

Source: FRED

The realized spread is the difference between the current 10-year bond rate and the geometric mean of the short rate over the following 10 years.

with the *ex post* average short rate. The table shows that the spread between current short and current long rates was almost 2 points wider after 1980 than before 1980, and the realized spread between long rates and short rates over the length of the loan averaged almost 4 points higher.

Figure 3.2 shows current interest rates on Treasury securities of various maturities over the full period. The wider term spreads of the post-1980 period are clearly visible. The widening applies to the whole term structure, but is more pronounced for the longer end; during much of the earlier period, there is no term premium for 20-year bonds over 10-year bonds, and often none for 10-year bonds over 5-year bonds either. The widening of the term structure is most pronounced during periods in which short rates are low, which may have implications for the causes of the increase in term spreads. Figure 3.3 shows the *ex post* spreads for 10-year Treasury bonds and corporate bonds, that is, the difference between the current rate and the geometric mean of the 3-month Treasury rate over the following 10 years. Here the break around 1980 is especially dramatic. In the two decades from 1960 through 1979, there were only two years in which the realized term premium on 10-year bonds was positive, and then by less than 0.2 percentage points in each case. By contrast, in every

single year since 1980 there has been a positive realized term premium of at least one point in every year, with much larger premiums common. Given the magnitude and abruptness of this change in realized term premiums, it is not plausible that it simply reflects increased compensation for interest rate risk, especially given the relatively modest increase in interest rate variance documented in Table 3.2. It's also worth noting from figure 3.3 that realized spreads were highest for bonds issued at the peak of monetary policy tightening episodes, when short rates were highest. A natural way to make sense of both this pattern and the long-term increase in term premiums is that market participants placed too much weight on business-cycle frequency interest movements, and too little weight on longer frequency movements. So they were surprised both when interest rates returned to their old levels after a tightening or loosening episode, and when interest rates failed to return to their old levels after rising or falling over a longer period. This is consistent with the empirical literature on expectations in bond markets, as we will see in the next section. The pattern of high realized term premiums when monetary policy is tight is also consistent with the idea of interest rate spreads driven by liquidity premiums. If the return on a long bond is compensation for its relative illiquidity, one would expect that return to be highest when liquidity is scarce.

Diebold, Rudebusch and Aruoba (2003) note that “severe failures of the expectation hypothesis” have been found in empirical tests ever since the hypothesis was first formulated in the 1930s. Their own VAR tests find that the yield curve is strongly affected by recent macroeconomic conditions, but has little predictive power for conditions in the future. Another review of the empirical literature finds that the expectations hypothesis “is strongly rejected with US interest rates”; despite considerable efforts to identify biases that might lead to false rejections of the hypothesis, “it remains inconsistent with the data.” (Bekaert and Hodrick, 2001) Numerous studies have confirmed that both the pure expectations and modified expectations lack em-

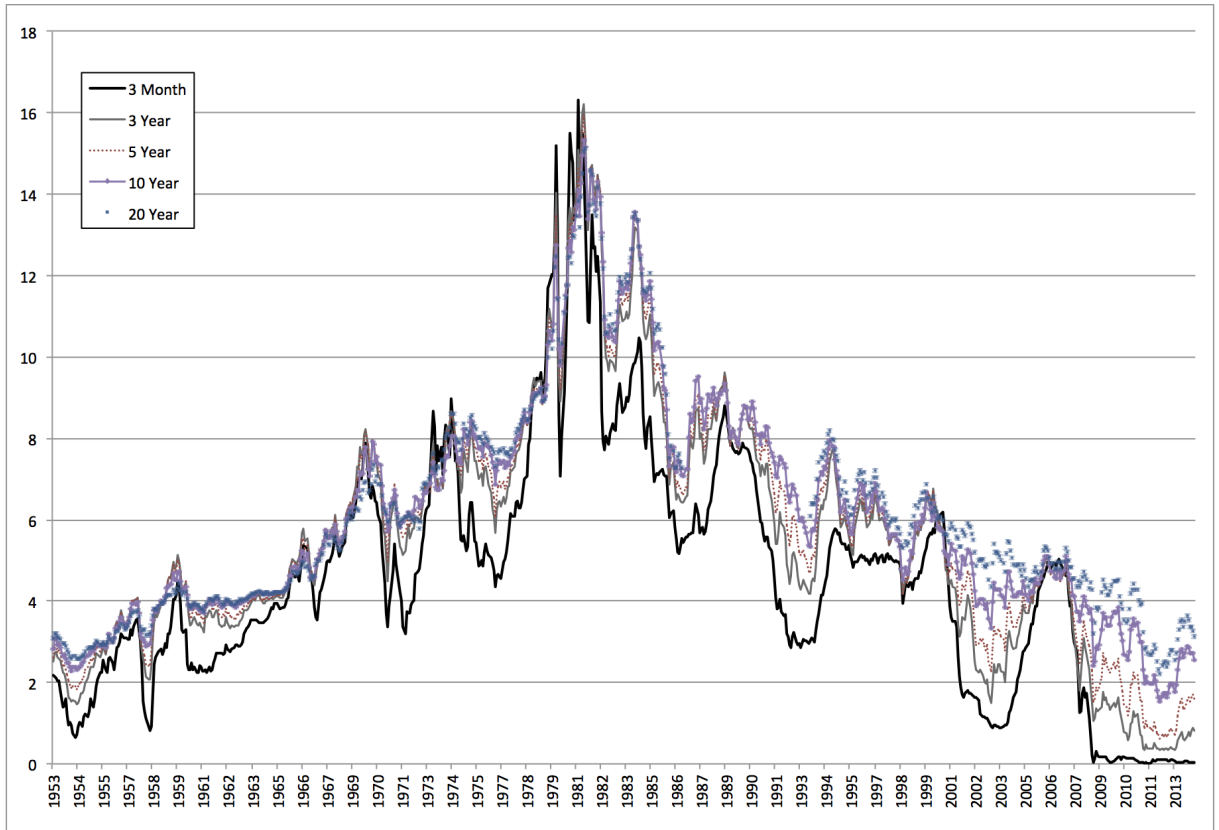


Figure 3.2: Term Structure of Federal Debt, 1953-2013

Source: FRED

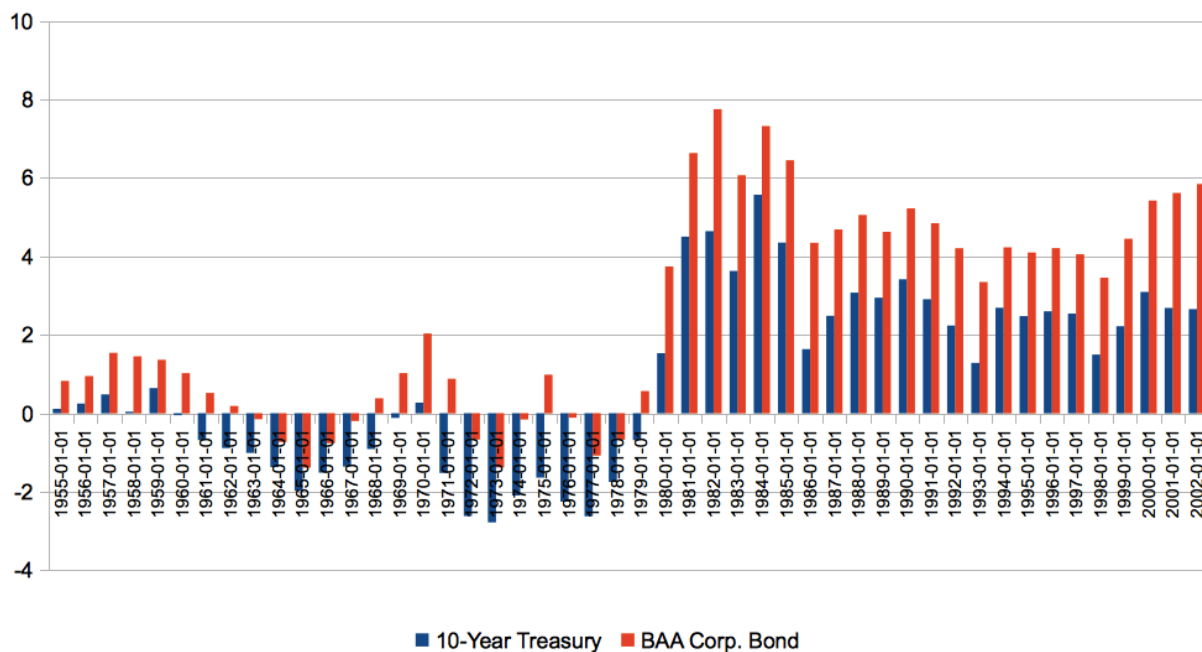


Figure 3.3: *Ex Post* Term Spreads, 1953-2003

Source: FRED

The figure shows the difference between the current 10-year Treasury and Baa corporate bond rate, respectively, and the geometric mean of the 3-month Treasury bill rate over the following 10 years. Note that the average maturity of corporate bonds throughout this period is close to 10 years.

irical backing. (See Guidolin and Thornton (2008) and Sarno, Thornton and Valente (2007) for more thorough reviews). The consensus of the this literature is that the expectations hypothesis “simply fails empirically.” (Mehrling and Neilson, 2009) As Froot (1990) observes, “If the attractiveness of an economic hypothesis is measured by the number of papers which statistically reject it, the expectations theory of the term structure is a knockout.”

There are a number of ways of making sense of the empirical failure of the expectations hypothesis. For simplicity, we will discuss them in terms of bonds, but the same logic applies to bank loans and other kinds of debt.

First, it may be that bond market participants are attempting to apply Equation 3.2, but are unable to predict future short rates. Alternatively, Equation 3.2 may not accurately describe the behavior of bond markets. If debt securities are not always held to maturity but may be traded in the secondary market, then potential bond purchasers will take into capital gains or losses that will occur if long rates change while they hold the bond, as well as the bond’s yield. This means that long rates will be influenced by expectations of future *long* rates, which may be independent of expectations of short rates. The possibility of capital gains or losses is what allows for the existence of self-sustaining interest rate conventions, and was the basis of Keynes’ conception of the liquidity trap. A third possibility is that bondholders are not simply seeking to maximize expected return, but are weighing return against liquidity. In that case, if bonds of different maturities are different in terms of the ease with which they can be resold, accepted as collateral, or otherwise used to generate cashflows, then their expected returns will be different even taking account of capital gains.

3.3.2 Do Long Rates Reflect Future Short Rates?

If bond markets correctly anticipate future interest rate movements, then the current level of a long bond should be equal to the geometric average of short rates over

the life of the bond, plus a risk premium. Given the risk premium, there should be no excess profits from holding long bonds over any particular period. Any systematic variation over time in excess profits, then, logically can be due to unrealized expectations (i.e. the failure of rational expectations), or to a time varying risk premium.

For the most part, explanation of the deviations of expected short rates from the long rate has been focused on examining differences in risk assessment of market players. (Campbell and Cochrane, 1995) More recent work however suggests that forecasts of the long rate are strongly influenced by prevailing short rates and that the failure to adequately assess future short rates may be the main reasons behind the failure of the expectations hypothesis. Piazzesi and Schneider (2009) note that for example examine professional forecaster data that historical survey data finds that “forecasts of interest rates are made *as if* both the level and the slope of the yield curve were more persistent than they appear in hindsight.” (Emphasis in original.) Piazzesi and Schneider also note that “Most asset pricing studies .. assume that investors’ historical predictions were identical to in-sample predictions derived today from statistical models, thus ruling the first reason [i.e. unrealized expectations] out.” Forecasting models used by government and businesses typically incorporate an assumption that market participants expect current short rates to be more persistent than the model itself predicts. For example, the FRBUS model used by the Federal Reserve in macroeconomic forecasting is able to generate realistic responses to interest rate shocks only because in its model of expectations, after short rates rise they are “anticipated to persist at an elevated level far longer than the actual policy model entails.” (Brayton and Tinsley, 1996)

An explicit test of the short-rate forecasts embodied in long rates find that a model that uses current long rates to predict future short rates cannot improve on a random walk. (Guidolin and Thornton, 2008) In other words, long rates include no information about future short rates. In much of the empirical literature, this

failure is explained in terms of an unobservable, time-varying risk premium. Guidolin and Thornton (2008) suggest the more natural explanation that market participants find it impossible to predict future short-term interest rates to any degree. Along the same lines, (Froot, 1990) uses survey data to compare interest rate forecasts to observed bond yields, and finds that the behavior of long rates closely follows market participants' self-reported forecasts of short rates. This suggests that varying risk premiums are not an important component of term premiums, and that the failure of the expectations hypothesis is due to the failure of rational expectations. market participants do not actively forecast the future (at least beyond a short horizon), but act as if current conditions will persist indefinitely.)

This seemingly excessive confidence that current short rates will persist is consistent with Keynes's analysis of the bond market. From his perspective, the expectation of future rates is contingent, independent of "fundamentals," and guided by prevailing market conditions. Keynes (1937*b*) describes the importance of the instability of expectations and the need to anchor them in current circumstances:

‘We have, as a rule, only the vaguest idea of any but the most direct consequences of our acts. ... The fact that our knowledge of the future is fluctuating, vague and uncertain, renders wealth a peculiarly unsuitable subject for the methods of the classical economic theory. How do we manage in such circumstances to behave in a manner which saves our faces as rational, economic men? ...

(1) We assume that the present is a much more serviceable guide to the future than a candid examination of past experience would show it to have been hitherto. ...

(2) We assume that the existing state of opinion as expressed in prices ... is based on a correct summing up of future prospects, so that we can accept it as such unless and until something new and relevant comes into the picture.

This belief that “the present is a ... serviceable guide to the future” can help explain the increase in term spreads after the early 1980s. From the end of World War Two through 1980, short rates followed a steadily increasing trend. From 1981 through the present, they have followed a decreasing trend. Anyone who expected

current rates to persist would have been surprised by both of these trends. Thus, bond market participants systematically underestimated future rates in the period of rising rates prior to 1980, and overestimated them in the period of falling rates since then. Under these conditions, the attempt to behave according to Equation 3.2 would have resulted in greater realized spreads in the second period than in the first one. In its simplest form, this cannot be the full story, since rates on long bonds also increased relative to the current short rate. As Table 3.2 shows, the increase in the term premium over current short rates accounts for about half the increase in the *ex post* realized term premium. Some of this increase might also be explained in terms of overweighting of the present, if it is not current rates which are expected to persist but some average of recent periods. While the empirical evidence is clear that expectations of short rates overweight current weights and do not incorporate information about future rates, it is doubtful whether the relative weights of current and past rates in expectation formation can be settled with any precision. So while the belief that current conditions will be more persistent “than a candid examination of past experience would show” is clearly an important factor in the rise in *ex post* term spreads and may have contributed to the rise in *ex ante* term spreads as well, we should also consider other explanations.

3.3.3 Capital Gains and Self-Sustaining Conventions

The second strand of Keynesian analysis of term spreads is the idea that, like exchange rates and stock prices, interest rates on long-maturity loans are set in large part by convention. (Hannsgen, 2004) While convention is often discussed in terms of mass psychology, conventional prices arise naturally when profit-seeking investors trade long-lived assets. The reason for this is that, over any time horizon shorter than the life of the asset, returns will incorporate capital gains or losses as well as yields. The shorter the horizon relative to the life of the asset, the more important will be

capital gains or losses due to valuation changes. (So valuation changes are unimportant for short-term debts, more important for long bonds, and most important for foreign exchange and equity, which are in effect perpetuities.) Capital gains or losses depend on changes in the price of the asset, which in turn depend on changes in its expected returns. But insofar as capital gains or losses are a major component in returns, expected returns depend in turn about expectations of future prices. The price which profit-seeking investors will pay for an asset is based on whatever they expect the price to be in the future. So once a given price becomes accepted as “normal,” rational investors should purchase the asset at any price below that, and sell at any price above it. Ironically, this kind of self-stabilizing convention is strongest when it is believed to be based on fundamentals.

As applied concretely to interest rates, the essential point is that bond prices move inversely with yields. So the holder of a given bond will experience a capital gain when the market interest rate on that type of bond falls, and a capital loss when the interest rate rises. In this case, the yield on a long bond should satisfy:

$$i_l = i_s - g_l^e$$

where i_l and i_s are the long and short rates, respectively, and g_l^e is the expected capital gain from holding the long bond for one period. The capital gain or loss in turn depends on the expected change in the *long* interest rate; if that rate is expected to fall, then holding a long bond implies an expected capital gain, while if long rates are expected to rise, then holders of long bonds will expect a capital loss. The exact value of the capital loss depends not only on the interest rate change itself, but on the maturity of the bond and whether interest is paid at regular intervals, at maturity, or some combination.⁸ The general principle, though, can be illustrated by taking the

⁸In the 19th century, the typical structure of federal bonds was the hybrid case where bonds both made regular coupon payments and were sold at a discount to face value. (Homer, 1996, ch. 16)

relatively simple case of a “consol” or perpetual bond. If the annual coupon payment is c and the prevailing interest rate is i_c , then the value of the consol will satisfy:

$$C = \frac{c}{i_c}$$

The total return from holding the bond for some period δ will then be given by:

$$R^e \delta = i_c \left(1 - \frac{i_c^e - i_c}{i_c^2}\right) \delta \quad (3.3)$$

where i_c^e is the interest rate that is expected to obtain at the end of the period. Equation 3.3 formalizes “a notably obscure numerical example” in Chapter 15 of the *General Theory*, where the idea of the liquidity trap (though not that term) is first introduced. (Taylor, 2009) What is clear from Equation 3.3 is that if future long rates are expected to be even moderately different from current rates, it will take a very large difference in yield (relative to short rates) to offset the expected capital gain or loss. For example, suppose that both long and short rates are initially at 5%. Now short rates fall to 0. Investors must now reevaluate their choice between a consol or in a short-term security. Suppose, for simplicity, that either asset will be held for one year, and that the investor believes that 5% is the normal consol rate and expects it to return to that level by the end of the year. What is the minimum rate the investor will accept on the consol? With short rates at zero, investors should be willing to accept less than 5% return on the long bond, but the yield must still be sufficiently high to compensate for the expected capital loss when the long rate returns to 5% in a year. Solving Equation 3.3 gives a current long rate for this case of 4.76%. In other words, a five point fall in short rates here leads to only an 0.24 point fall in long rates – less than one twentieth as much. The small movement in long rates, in turn, is consistent with the belief that long rates never fall much below 5%. So in retrospect, investors will not be sorry they did not take advantage of the apparent arbitrage opportunity presented by the large gap between short and long rates. In

this way, the belief in a normal level of interest rates can be self-confirming and does not require any major departure from rational profit-seeking behavior, even if there is no objective basis for the belief.

In reality, even long bonds are not normally perpetuities, and investors' belief about the future levels of long rates are not absolutely fixed. These factors will make conventions weaker. But on the other hand, the share of capital gains in overall returns gets larger as the yield itself falls. In Keynes' terms, "[A] long-term rate of interest of (say) 2 per cent leaves more to fear than to hope, and offers, at the same time, a running yield which is only sufficient to offset a very small measure of fear." (Keynes, 1936, p. 202) This tends to strengthen the role of conventions as interest rates fall. Adding to this mathematical fact is the sociological one that beliefs about "normal" interest rates are less likely to take the form of a point value than of a range, or of a floor below which rates are not expected to stay for any significant amount of time. Thus the expectation of a future rise in rates, and associated capital loss on long bonds, may be important only when current rates fall out of this range or below this floor. But in principle, strongly rooted expectations of any level of long rate will produce expectations of capital losses when interest rates fall below that level; the resulting bond sales will prevent rates from falling much below the expected level, which will confirm expectations. So while what Taylor (2009) calls the "Hicks-Krugman liquidity trap" is a distinct phenomenon of the zero lower bound on nominal interest rates, this is not true of the Keynesian expectations-based liquidity trap: "*Any* level of interest which is accepted with sufficient conviction as *likely* to be durable *will* be durable." (Keynes, 1936)

In the summary of Bibow (2005):

The problem Keynes described exists at any level of interest: if open-market purchases drive up securities prices, their running yields so-reduced will compensate for less perceived risk of a renewed future rise in interest. Yet, in a given state of expectations, this risk rises the further the rate of interest deviates from what is considered a "fairly safe level" in that

state of expectations. *Ceteris paribus* investors prefer to move into a more liquid position ... A limit is reached when selling pressure due to securities holders' move into cash fully offsets the [central bank's] open-market trades. At that point the central bank has lost effective control: the system is in a liquidity trap. This condition may arise at any level of interest.

The stability of conventions about the “normal” level of long rates is significantly enhanced by political factors. In particular, institutions with portfolios of interest-bearing assets but whose own liabilities are not-interest bearing, will see their survival threatened by a fall in interest rates below some threshold. Today, this is primarily an issue for pension funds, insurance companies and similar institutional investors with contractually fixed liabilities. Formerly, it also included banks, which funded themselves mainly with non-interest-bearing deposits. Opposition from banks for this reason may have been an important reason that the Fed did not conduct more expansionary policy in the early 1930s. (Epstein and Ferguson, 1984)

For our purposes, key point is that stability of long rates will mean large gap between long and short rates when short rates are used for expansionary policy. This has been more common since 1980 than in the immediate postwar period, in part because aggregate demand has had a stronger tendency to fall short of potential output, in part because policy has relied more exclusively on interest rates to close output gaps.

3.4 Credit Spreads: Risk, Liquidity, Institutions

In addition to the spread between longer and shorter interest rates, there is also a range of interest rates on securities of the same maturity. This is referred to as the credit spread. It is common to describe credit spreads as risk premiums. This is reasonable provided we are clear that there is a wide variety of possible risks being charged for, and that the observed premium does not necessarily have any relationship to the true *ex post* riskiness of the security by any measure. Still, to avoid confusion it

may be better to prefer the more neutral term credit spread, and reserve risk premium for that portion of the credit spread that is demonstrably explained by the costs of bearing default risk.

In general, there are five reasons we might expect positive credit spreads. First is default losses – the expected return on a risky loan is less than its yield because some fraction of loans will default, and recoveries in the case of default will generally be less than the full value of the loan. So to give the same expected return as a riskfree asset of similar maturity, a risky loan must carry a higher interest rate, with the difference equal to the expected probability of default, times one minus the recovery rate in the case of default. This product is referred to as the credit loss rate. Second, since the incidence of defaults is unpredictable, and because defaults tend to be correlated with each other and with low returns from other assets, investors will generally require some compensation for bearing default risk, so the spread will be larger than the expected default loss. Third, risky bonds typically trade in thinner markets than Treasuries, so transaction costs will be higher. Compensation for these higher costs is sometimes referred to as the liquidity premium, but I prefer to reserve that term for the fourth factor below, and call this an intermediation or transactions-cost premium. Fourth, the holder of an asset faces a danger that in a situation where current cash commitments exceed current income, the asset may not be readily convertible into cash, or only at a substantial discount from its value if held to maturity. This is sometimes called “liquidation risk.” (Ziegler and Duffie, 2001) This class of risk is treated in much of mainstream literature as an unimportant or trivial contributor to credit spreads. (Amato and Remolona, 2003). But from a Keynesian perspective it is a central factor factor in credit spreads. As discussed in Section 3.2.3 above, from this perspective the fundamental reason interest is paid as compensaton for giving up liquidity, that is, the ability to make payments as needed. Finally, to the extent that lenders enjoy market power vis-a-vis certain classes of borrowers, they will be able

to set interest rates at a higher markup over funding costs plus the premiums above. This will create a credit spread between loans to borrowers with relatively less and more capacity to switch lenders.

The bulk of the literature on credit spreads focuses on the first two factors, which connect the spread between debt securities of the same maturity as a function of default risk. Indeed, since the “risk” relevant to debt contracts is normally assumed to be default risk, the practice of referring to these spreads as “risk premia” treats this explanation as true by definition. Empirically, however, it is not easy to establish a connection between credit spreads and default risk.

3.4.1 Interest and Default Rates for Corporate Bonds Historically

Figure 3.4 shows the spread between Aaa and Baa corporate bond rates and the 10-year Treasury rate, and the annual default rates on investment-grade (Baa and better) corporate bonds and on all rated bonds. Initially, the data in Figure 3.4 might appear consistent with the idea that credit spreads reflect default risk. The premium for Baa bonds over the 10-year Treasury rate is of the same order of magnitude as the overall default rate for corporate bonds, and the two seem to follow a similar pattern over time, with peaks and troughs coming in the same years. In addition, there has been a secular increase in both credit spreads and default rates. Between 1946 and 1979, the overall default rate for corporate bonds was only 0.3 percent, and there were a number of years in which no defaults on rated corporate bonds. By contrast, the corporate bond default rate has averaged 1.5 percent in the period since 1980.

This apparent fit between credit spreads and default rates may be misleading, however. In the first place, periods of high default involve bonds of various vintages, so a rational risk premium should vary less over the cycle than default rates themselves do. Thus, the tight link between fluctuations in default rates and fluctuations in credit spreads is evidence *against* the idea that credit spreads primarily reflect default

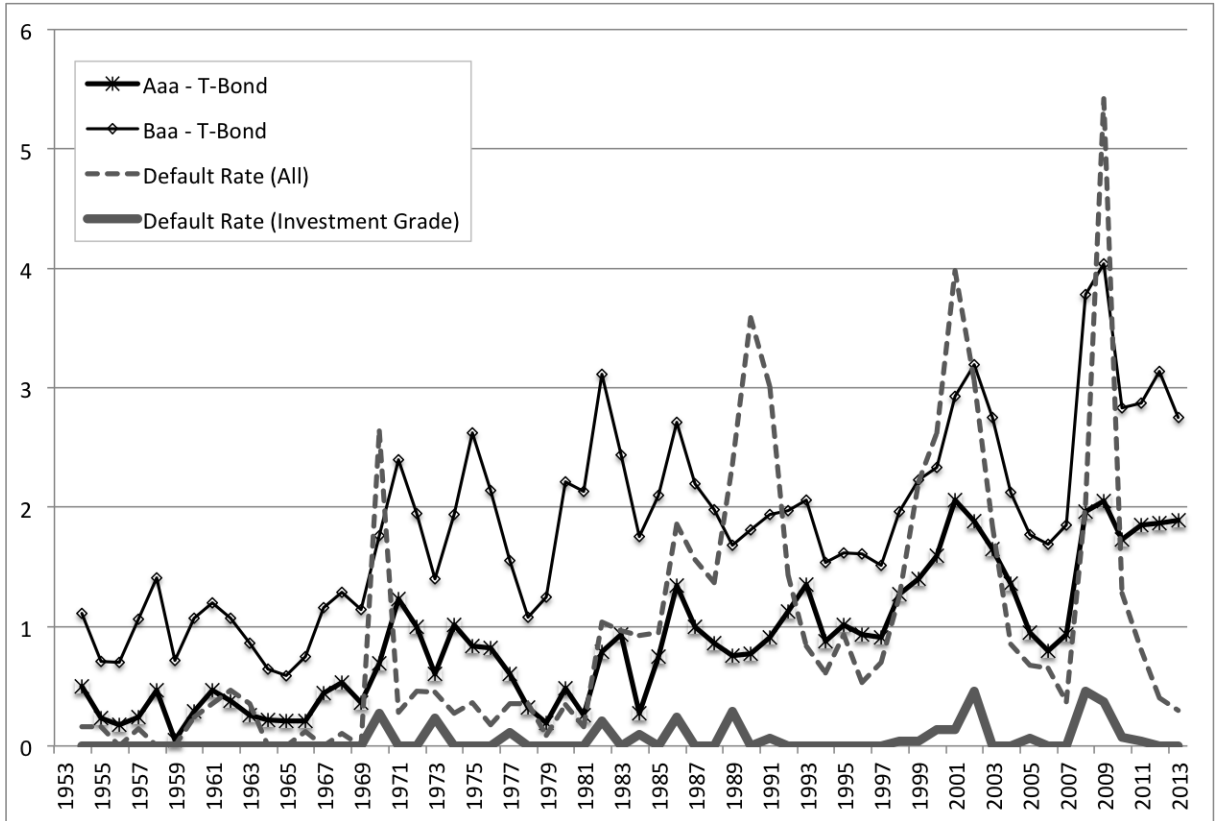


Figure 3.4: Credit Spreads and Default Rates for Corporate Bonds, 1953-2013

Source: FRED, Moody's, author's analysis.

The solid and dashed gray lines show annual dollar-weighted default rates for all corporate bonds and investment-grade corporate bonds, respectively, from Moody's "Annual Default Study: Corporate Default and Recovery Rates." Investment grade includes ratings Baa and above. The marked black lines show the interest rate premium on Aaa and Baa-rated corporate bonds, respectively, over the current 10-year Treasury bond rate.

risk. More generally, there is no reason for rational investors to demand higher interest rates on newly issued debt at a time when *current* default rates are high. Rather, they should demand higher interest rates when there is reason to expect defaults to be higher in the future. So if periods of high interest rates reflect a rational judgement that default risk has increased, they should precede periods of elevated defaults, rather than coinciding with or following them. The anomalous relationship between defaults and credit spreads is especially noticeable in the most recent cycle. By the standards of the post-1980 period, credit spreads were relatively low in the years prior to the financial crisis, giving no indication that bond market participants anticipated the elevated default rates of 2008-2009. Since the crisis, however, spreads have remained close to the highest level on record. Yet perhaps surprisingly, recent default experience is not exceptional by the standards of recent business cycles. At over 5 percent of bonds outstanding, defaults were very high in 2009. But perhaps due to the exceptional interventions of the Federal Reserve and other central banks, corporate defaults dropped back to normal levels more quickly than in other recent recessions. Over the five years 2008-2012, a cumulative total of 9.8 percent of outstanding corporate bonds went into default. This is somewhat more than double the postwar annual average of 0.9 percent per year. But it is lower than for the five-year periods of elevated defaults around the previous two business cycle peaks: 13.7 percent in 1999-2003, and 11.2 percent in 1989-1993.⁹ Thus, it is hard to interpret the pattern shown in Figure 3.4 as reflecting a premium for varying levels of default risk. The credit spread varies too much over the cycle, fails to anticipate periods of elevated defaults, and is not proportionate to the *ex post* riskiness of high-rated corporate bonds. As I will discuss below, these impressions are borne out by the

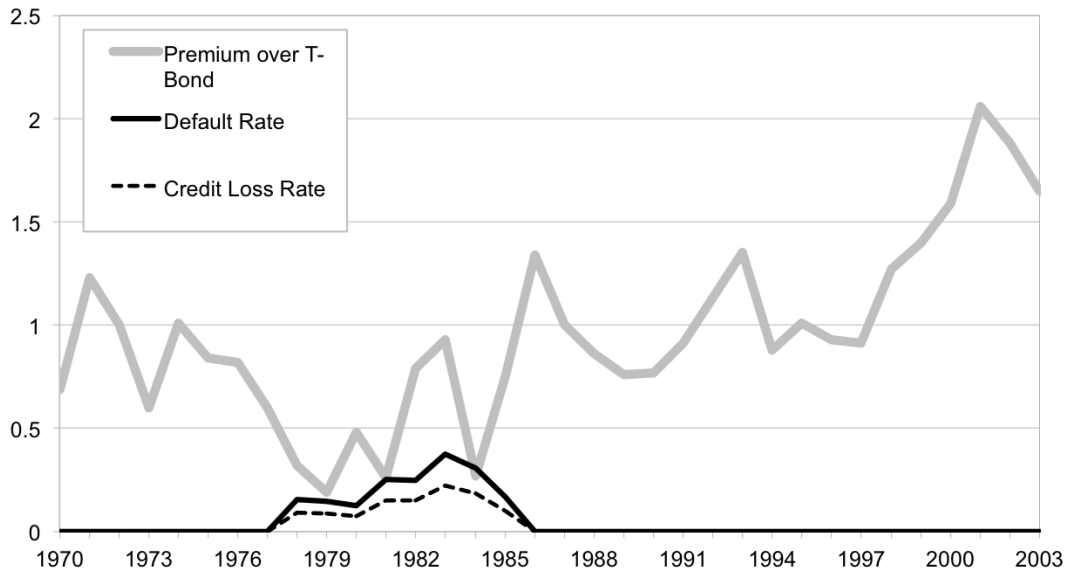
⁹These numbers are derived from Moody's Investor Service, "Annual Default Study: Corporate Default and Recovery Rates," various years.

empirical literature, which does not in general find that credit spreads are informative about future default rates.

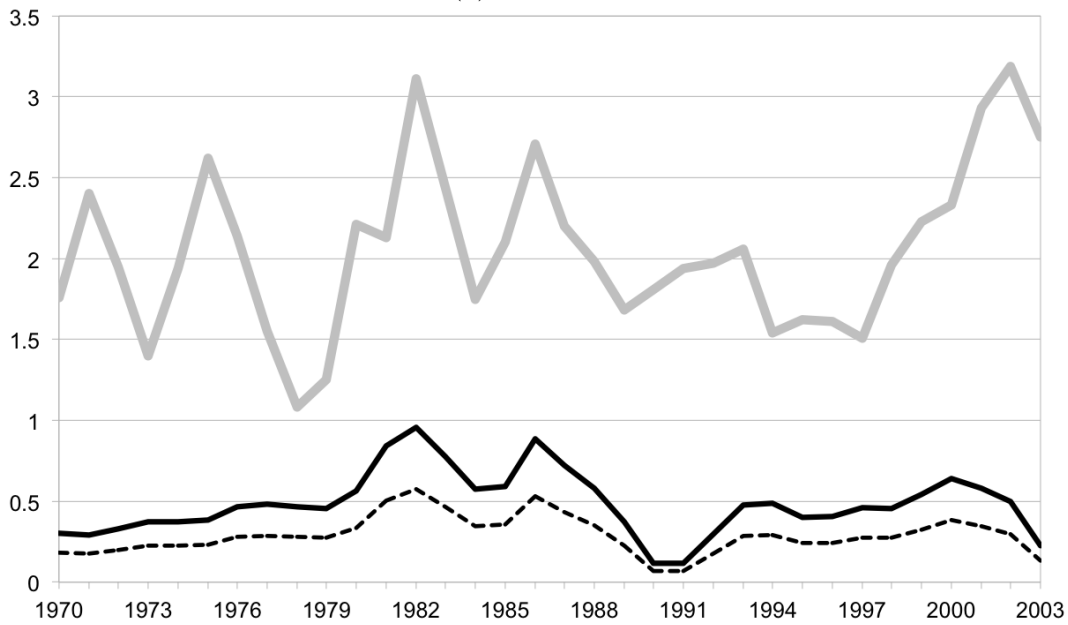
It is important to realize that defaults are heavily concentrated among corporations with “speculative-grade” ratings well below Baa, and that a large part of the long-term rise in the overall default rate represents an increase in the proportion of bonds issued by such risky borrowers, as opposed to an increase in default risk for borrowers with a given rating. In Moody’s rating system, Baa is the lowest “investment-grade” rating, and defaults of investment-grade bonds are very rare, averaging less than 0.05 percent for the postwar period as a whole. For higher ratings, defaults are even rarer. The postwar average dollar-weighted default rate for corporate bonds rated A and above is 0.01 percent, and no Aaa-rated corporate bond has defaulted since 1920. These numbers do not give the full picture of the riskiness of such bonds, however, since defaults are normally preceded by a downgrade. What is relevant is not the rating at the time of default, but the rating at the time the bond was issued.

Because defaults of Aaa-rated corporate bonds are exceptionally rare, it is hard to explain either the size or the trend in these spreads in terms of default risk. In fact, in the entire period since World War II, the only years in which the bonds of *any* corporations rated Aaa at issuance have defaulted, were 1988 and 1991. It is striking that the financial crisis of 2007-2008 did not produce any such defaults, though it did of course involve many defaults of Aaa-rated asset-backed securities. (Ou, 2012) Even more strikingly, for corporate bonds *issued* with investment-grade ratings, the default rate was lower over the 2008-2012 period than for the postwar period as a whole – a fact that has been the source of some surprise to financial market participants.¹⁰

¹⁰For instance: Deutsche Bank’s 2012 report, “Five Years of Financial Crisis: The Default Bark Is Far Worse than the Bite.” See also Moody’s Analytics June 2011 report, “If the Default Rate is So Low, Why Are Credit Spreads So Wide?” The report notes that “credit spreads are too wide from the perspective of a comparatively low ... default rate,” and attributes the excessive spreads



(a) Aaa-rate at Issue



(b) Baa-rate at Issue

Figure 3.5: Corporate Bond Interest Premium and *Ex Post* Default Rate, 1970-2003

Source: FRED, Moody's, author's analysis.

The heavy gray lines show the difference between the market interest rate for Aaa- and Baa-rated corporate bonds, respectively, and the 10-year Treasury bond rate at the time of issue. The solid black line shows the cumulative default rate for corporate bonds issued in that year with that rating over the 10 subsequent years. The dotted line shows the estimated credit loss over the same 10 years, using the average recovery rate for corporate bonds of 40 percent.

Figure 3.5 shows the premium on Aaa- and Baa-rated corporate bonds over 10-year treasury bonds in the year they were issued, and the cumulative default rates on those bonds over the following decade. (The average corporate bond has a maturity of just under 10 years.) The figure also shows estimated credit losses, using the historical average recovery rate in corporate defaults of 40 percent. As can be seen, the premium on both Aaa- and Baa-rated bonds is much higher than realized default losses. There have been no defaults for corporate bonds issued after 1985 (or before 1978), yet these bonds continue to carry interest rates one to two points higher than Treasury bonds of similar maturity.

In principle, the existence of some default risk even for the highest-rated corporate bonds can help explain the spread between their yields and Treasuries. But on the face of it, it does not appear that the bond market priced this risk into Aaa yields in a meaningful way. As can be seen, the 1988/1991 default episodes involved bonds issued from 1978 through 1985. But bond interest rates in those years were not especially high, as one might expect if the market price incorporated information about future default probabilities not incorporated into bond ratings. In fact, the bonds that would default in 1988 and 1991 were mostly issued at times when the spread between the Aaa and 10-year Treasury rate was unusually low. Of course, it is possible that market participants did know the true *ex ante* distribution of default risk, and that the late 1980s simply saw an unusually poor draw from that distribution, while the low spreads in the late 1970s and early 1980s were due to an unusually high level of risk appetite among bond buyers in that period. It is striking, however, that the Aaa-10-year Treasury spread reached its highest levels in the later 1990s and 2000s. This is consistent with the psychologically plausible story that bond market participants revised upward their beliefs about Aaa default probabilities following 1988-1991. This

to a “perceived reduction in the ability of sovereign governments and central banks to prevent or remedy economic downturns” and to “much greater financial systemic risk.”

is not, however, compatible with the view that bond market participants know the true *ex ante* distribution of default risk.

Furthermore, the absolute level of the Aaa premium is hard to reconcile with the realized default rate. Since 1980, the annual default rate on bonds of corporations with Aaa ratings at issuance, has been approximately 0.05 percent – one twentieth of one percentage point. And given an average recovery rate of around 40 percent, the default losses have been even lower. But the premium of Aaa bonds over 10-year treasuries has been 1.2 percent – around 40 times the expected annual default loss. The case of Baa bonds is only a little less extreme, with credit spreads averaging about ten times expected default losses. Even if default risk were largely undiversifiable, as argued by Amato and Remolona (2003), there is no plausible level of risk aversion that could produce such a premium. And in fact, a large number of financial instruments exist precisely to allow the hedging of credit risk. One can logically tell a story in which the market is pricing in the possibility of very low-frequency events with much larger default rates than observed since World War II – as in the 1870s. (Barro and Ursa, 2012) It is debatable how much of the higher spreads over the whole 1980 period represented expectations of some chance of 2008-like crisis; there is strong evidence that the expected *ex ante* probability of such a crisis was much lower than even one realization of a 2008-type crisis in two or three decades. (Crotty, 2009) For the increase in spreads to be a rational response to higher expected default rates, however, the expected probability of a crisis would have to be much *higher* than what has been actually realized. This seems implausible.

3.4.2 The Credit Spread Puzzle

These observations are borne out by much of the empirical work on the “Credit Spread Puzzle” – the lesser known cousin of the equity premium puzzle. While there has been little attention paid to the *increase* in credit spreads since 1980, the larger

question of whether expected default risk can explain the existence of large credit spreads has attracted significant empirical work. As with the term spread, there is a consensus that the observed pattern of yields across debt classes is inconsistent with any straightforward model of rational expectations. A survey of the literature concludes that “credit risk cannot possibly explain the observed corporate yield spreads.” (Huang and Huang, 2002)

The credit spread puzzle refers to the fact that the interest premium on risky bonds is much higher than expected default losses, and not strongly correlated with them either over time or across borrowers: “measures of a company’s probability of default do not seem to be as variable as the credit spread over time.” (Federal Reserve Bank of San Francisco, 2004) Goldstein (2009) examines the ability of the standard bond-pricing models to explain observed credit spreads, and finds that “it is difficult for a basic structural model to explain why credit spreads are as high as they historically have been, given relatively low historical default rates.” The Baa-treasury spread, for example, is five times larger than the average annual default losses from Baa bonds. Chen, Collin-Dufresne and Goldstein (2009) similarly find that conventional models of bond pricing by risk-averse investors generate spreads between Aaa- and B-rated bonds of approximately 0.57%, less than half [the] historical value. Amato and Remolona (2003) find that “across all rating categories and maturities, expected loss accounts for only a small fraction of spreads.” Over 19997-2003, for example, B-rated 3-5 year bonds had yields 170 basis points above the riskfree rate, yet annual default losses averaged only 20 basis points. Similarly, Huang and Huang (2002) find that “calibrating models with actual default data shows none can explain more than 20-30% of observed yield spreads.” They note that almost all models that predict credit spreads similar to those observed, do so by predicting default rates much higher than observed. When default rates are constrained to historical levels, these models predict much lower spreads. “Under empirically reasonable parameter choices, for

investment grade bonds of all maturities, credit risk accounts for only a small fraction – typically 20% – of the observed corporate-Treasury yield spreads.”

While the empirical literature is consistent in finding that credit spreads are, in general, too large to be explained straightforwardly by default risk, little of the work in this area is concerned with the variation in spreads over time. One of the few exceptions is Giesecke et al. (2011), which looks at the relationship between bond yields and default rates over the whole history of the American corporate bond market, going back to the mid-19th century. While the default rates of investment-grade bonds have varied sharply over time – with default rates reaching 35 percent in the 1870s – bond yields seem completely insensitive to subsequent default rates: “Changes in credit spreads have no forecast power for realized default rates.” This is all the more striking since various macro variables do predict future default rates. The logical conclusion is that expected future default losses is not a useful framework for thinking about credit spreads, which seem to be driven mainly by “financial market factors such as illiquidity and risk premia, rather than by fundamentals.”

3.4.3 The Credit Spread as Liquidity Premium

A number of various ad hoc, more or less implausible explanations have been offered for credit spread puzzle within the standard framework of risk priced by rational, optimizing agents. There is also a strand of evidence that the premium of risky bonds should be thought of as compensation of illiquidity rather than risk-bearing. Analyzing credit spreads in these terms requires the specific Keynesian idea of liquidity.

In the standard framework decisionmakers are households intertemporally maximizing utility from consumption. In this framework liquidity typically means simply the transaction costs associated with taking a position in the asset; in some cases, it may also imply that the value of the asset will be low in states of the world in

which the marginal value of consumption is high. (Goldstein, 2009) But the analysis is always conducted in terms of households maximizing their expected utility from consumption. The alternative is to see the economy as essentially monetary, and the question of taking an asset position (particularly for the kinds of units that hold credit market debt) is not to improve the expected distribution of consumption over the lifetime, but to achieve positive returns while keeping the probability of being able to meet all current obligations above some threshold. This is a fundamentally different view of liquidity, which is not simply about transaction costs, but more broadly about the ease and reliability of turning ownership of an asset into command over money. In this story, economic units are matching cash receipts and cash flows, and the risk is not facing a suboptimal consumption path, but bankruptcy if contracted cash payments cannot be made. Critically, here, there is no assumption that the sale price of an asset is normally equal to its present value if held to maturity; if that were the case, liquidity would have no meaning, since it refers specifically to the degree to which an asset can be converted to cash. One important implication of this view is that demand for liquidity will depend strongly on how likely lenders believe they are to face the risk of insolvency – which, for banks and other institutions that depend mainly on short-term funding, largely depends on the perceived chance they will be subject to self-fulfilling panics or runs. The larger implication is that the credit spread may depend less on the financial condition of borrowers, than of lenders; the higher the probability assigned by banks and other financial institutions to the possibility of having current cashflows fall short of cash obligations (in the event of a run, for example), the greater the premium they will pay for assets that can be reliably converted to cash in those circumstances.

The idea that liquidity refers specifically to the extent to which holding a given asset contributes to a unit's ability to meet its cash obligations is not an unfamiliar idea in mainstream economics. Tirole (2011) But it has not been systematically

applied to questions like the credit spread puzzle, since it is not easily compatible with a methodology that frames all problems in terms of maximizing the expected value of lifetime consumption. Nonetheless, there is considerable empirical evidence that liquidity premia can explain a large part of observed credit spreads. (Perraudin and Taylor, 2004; Ziegler and Duffie, 2001) One particularly striking recent study compares yields on various securities guaranteed by the German government, and so presumably facing identical (very low) default risk, but of differing liquidity as measured by the depth of the market, etc. (Schwarz, 2010) Extrapolating from this to a variety of European bonds suggests that over two-thirds of observed credit spreads can be explained by liquidity premia. Bongaerts, De Jong and Driessen (2012) similarly find that for US corporate bonds, liquidity (as proxied by trading volume, bond age, and amount issued) can explain a substantial part of excess credit spreads. Federal Reserve Bank of San Francisco (2004) notes that that the large increase in US bond spreads after the 1998 Russian crisis shows the importance of liquidity effects, since US defaults did not move (or is there reason to think that the Russian crisis changed expectations about default rates for US companies.) In a loanable-funds model of interest rate determination, the Russian crisis should have *reduced* interest rates for US borrowers, since they would no longer have to compete with Russian borrowers for the supply of savings. There is little empirical work looking specifically at the rise in credit spreads after 1980. But to the extent that the “anomaly” of credit spreads greatly in excess of expected default loss can in general be explained by liquidity premia, it is natural to suppose that this also contributed to the rise in credit spreads after 1980.

In other words, I suggest that increased credit spreads can be understood as an increase in the liquidity premium. The institutions that are the direct holders of most debt securities have placed a greater premium on assets that are “more certainly realisable at short notice without loss.” That is, the concern is less with the expected

return on the security, nor with its variance or other moments of the distribution of returns. Rather, it is with the extent to which the security can be *reliably* used to make cash payments as needed. This requires not only a stable market value, low transactions costs, and thick markets, but that the security be regarded by other market participants as liquid – and that these conditions can be relied on to hold at the time that some unplanned-for payment must be made. A security is liquid only if it is possible to sell it or use it as collateral in any state of the world in which the holder needs to generate additional cashflow.

In a crisis, a financial institution may need to convert assets into immediate cash in order to meet its survival constraint. If there is any question about a security's saleability, it will be of less value in the face of the possibility of such a crisis. And to the extent that potential counterparties may also be facing a survival constraint, this fact in turn makes the asset less reliably saleable. Here we see the essentially conventional aspect of liquidity. Because demand for a liquid asset is in large part motivated by the need for certainty that it will always be demanded by others, even a modest difference in risk can produce a drastic difference in liquidity premiums, and doubts about the liquidity of an asset can be self-confirming. It has been argued that this sort of “expectations cascade” was responsible for the collapse of interbank lending in 2008. (Gorton and Metrick, 2009)

The liquidity-premium story helps explain why high credit spreads coincide with high default rates, rather than anticipating them. The same conditions that produce high default rates among borrowers increase the probability that holders of financial assets will need to generate cash at short notice. During these periods, an asset's ability to be immediately sold or borrowed against will be more important than its returns, since future income from the asset is of no use if the asset's holder does not survive to receive it. So it is natural that in these periods, the most readily saleable assets – Treasury bonds – enjoy the highest relative price, and accordingly the lowest

interest rate. It also helps explain the persistence of high credit spreads after a crisis. Liquidity is, in part, a convention, and conventions take time to reestablish themselves once disrupted.

In this sense, credit spreads do represent compensation for risk, but not risk associated with borrowers or (directly) with the real economy. Rather, they compensate for risk associated with the financial system itself. Credit spreads will be larger in proportion to the concern that asset holders – financial institutions in particular – have that they may need to make unplanned payments at short notice. Both the descriptive evidence presented in Section 3.4.1 and the empirical literature reviewed in Section 3.4.2 are consistent with the idea that variation in credit spreads over time is driven mainly by demand for liquidity.

The question of why demand for liquidity might have increased over time is largely beyond the scope of this essay. But one possible contributor is the decline in the supply of the most liquid debt securities, Treasury bonds. Compared with the 1950s and 1960s, holdings of government debt has been a much smaller fraction of financial system assets in recent decades. Treasury securities made up a full 70 percent of credit-market assets held by the financial system at the end of World War II, and remained over 15 percent through the 1960s. By 2007, Treasuries had fallen to just 5 percent of credit market assets held by financial institutions. Treasuries are a uniquely liquid asset, offering nearly the same security as holding cash itself. So it seems natural that a fall in the relative supply of this most liquid asset would lead to a rise in the liquidity premium on other assets. Rising liquidity premia on private debt as a result of a fall in the supply of public debt is consistent with more formal models of liquidity and asset prices. (Holmström and Tirole, 1996)

3.4.4 Financial Repression

The rise in interest rates faced by ultimate borrowers after 1980 is not so surprising when one recalls that holding down borrowing costs to maintain high levels of fixed investment was one of the main goals of New Deal banking legislation. This has been largely forgotten, with banking reforms usually thought of as being aimed at crisis prevention, but holding down the interest rates faced by nonfinancial borrowers was a major concern at the time. (Russell, 2008) In order to achieve this without unduly depressing lender profits (which could threaten the stability of the banking system) regulation also aimed at holding down banks' funding costs. In other words, banks' market power was to be restrained vis-a-vis borrowers, but enhanced vis-a-vis savers, so that holders of assets in the form of claims on banks (middle and upper-income households, essentially, but not the very rich) were forced to subsidize loans for productive investment. Thus for instance Senator Glass argued that interest rate controls on deposits would "put a stop to the competition between banks in payment of interest, which frequently induces banks to pay excessive interest on time deposits." (Quoted in Russell (2008).) These measures included restrictions on entry to new banks, or existing banks to new markets; bans on interest on checking deposits; ceilings on interest on time deposits; regulations to limit the ability of interest-bearing accounts to substitute for checking accounts for transaction purposes; as well as deposit insurance, to help induce savers to accept lower returns on bank deposits. While these regulations were perceived as restrictions by individual banks (and opposed accordingly), their effect, as policymakers like Glass understood, was to limit competition between banks for deposits and thereby hold down their funding costs. As Russell (2008) puts it:

This regulatory framework ... inhibited financial capitalist firms ... from competing with each other ... for access to funds... Meanwhile, in the market to provide investment capital to productive capitalist firms, competition could be vigorous... [which] helped to exert downward pressure on the cost of accessing investment capital. ... So long as competition

was vigorous in the second phase of financial intermediation, New Deal banking reforms might enhance the profitability of commercial banks in the first phase of financial intermediation without necessarily subverting the agenda for the accessibility of investment capital on favorable terms... Thus New Deal banking reforms simultaneously encouraged competition among financial intermediaries in one respect [interest rates paid to savers] while restraining it in another [interest rates charged to borrowers, especially for fixed investment.] (Russell, 2008)

During the 1980s, however, these regulations were effectively eliminated, and the funding advantage of commercial banks largely disappeared (though transaction accounts with no or very low interest rates did continue to exist, on a diminishing scale.) The effect of increased competition among banks for deposits, as well as the shift away from deposits as a funding source, is shown clearly in Figure 3.6. This figure shows the average funding cost of commercial banks – computed as total interest payments divided by total liabilities, and by interest-bearing liabilities, respectively – relative to the Federal Funds rate. As the figure shows, for most of the 1950s, 1960s and 1970s, commercial banks faced an effective cost of funds two to four points below the Federal Funds rate. With the disappearance of their privileged access to cheap transactions balance funding after deregulation in the 1980s (and later with the fall in nominal rates), this funding advantage diminished, and after 2000 essentially disappeared. In Russell’s terms, we can say that deregulation raised the cost of borrowing for nonfinancial businesses (and households) through both, first, increased competition among banks for savings, and, second, reduced competition (because of consolidation, the combination of commercial and investment banking functions, etc.) among banks as lenders. But for the commercial bank sector, at least, the evidence of Figure 3.6 suggests that the former effect was quantitatively more important.

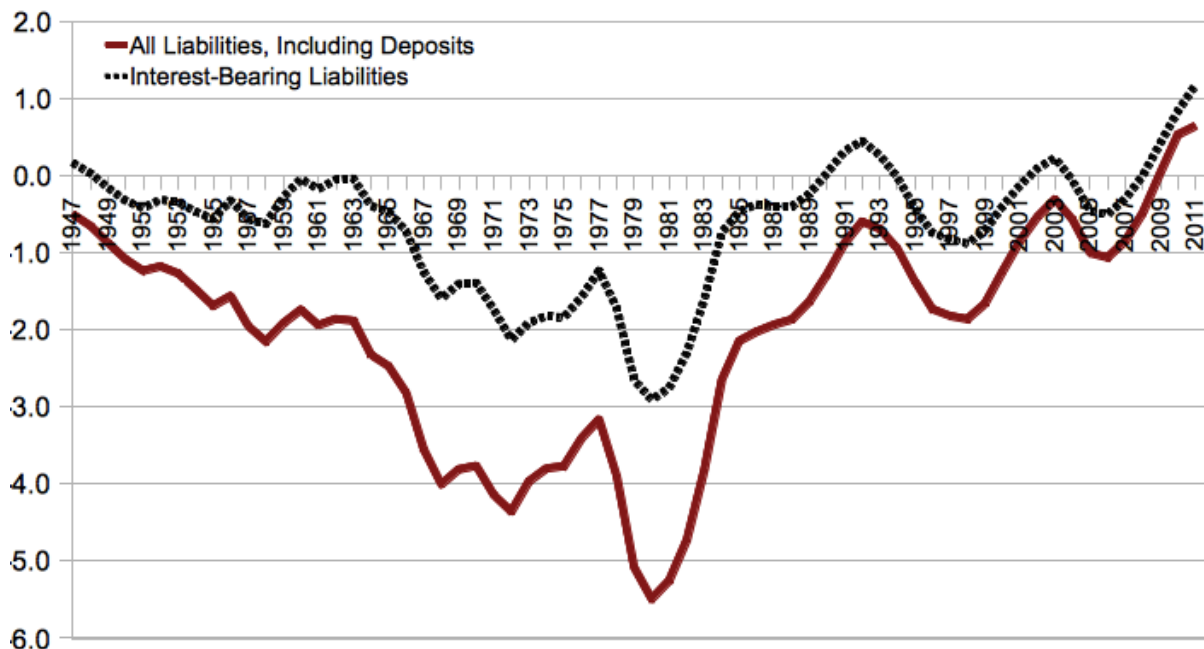


Figure 3.6: Commercial Bank Funding Costs Relative to Federal Funds Rate, 5-Year Moving Averages

Source: FDIC

3.5 Conclusion

Over the past 50 years interest rate spreads have widened substantially, both between longer and shorter maturity loans and between loans to riskier and less risky borrowers. This increase in spreads is hard to explain in conventional models in which the interest rate is the price of deferred consumption, and spreads between rates for different borrowers represent rational expectations of risk. The empirical literature on interest rate spreads consistently finds that long rates do not predict future short rates, contradicting the expectations hypothesis; and it consistently finds that spreads between riskier and less risky bonds are too large to explain in terms of default risk, and carry no information about future defaults. For the orthodox theory, these results are anomalous. But for a Keynesian approach, they point toward an alternative framework for thinking about interest rates – one in which the overall level of rates and the spreads between different rates are the same fundamental phenomenon.

The Keynesian approach to interest rate determination differs from the orthodox approach in two essential respects. First, it regards interest as compensation for illiquidity, rather than for deferring expenditure. And second, it treats expectations as an independent variable rather than restricting models to those that predict the same value for x_t and for agents' expectations of x_t in all periods prior to t . In principle, these are two distinct issues. But there is a deep connection between them, because it is the lack of knowledge of the future that makes liquidity desirable.

This Keynesian perspective provides a useful paradigm to make sense of the patterns of rising term and credit spreads in the post 1980s period. First, from such a perspective it is not useful to think of expectations, or prices incorporating them, as representing the true probability distribution of future events; expectations are essentially conventional and backward looking. Thus, they are likely to overweight recent changes in short rates – a result consistent with both the empirical literature and the assumptions of more policy oriented macro models. At the same time, the importance of capital gains in the returns on longer bonds means that a conventional level or floor on such rates, once established, will be stabilized by the behavior of profit-seeking investors. Thus long rates may be quite stable even in the face of large changes in short rates or other economic data. In an environment where monetary policy is relied on to maintain full employment and where unemployment is more common than inflation, this stability of long rates will lead to large term spreads.

Finally, from a Keynesian perspective, liquidity is central to the structure of interest rates. The interest rate is the price of liquidity (not the price of saving) and depends primarily on developments within the financial system. From a Minskyian viewpoint, liquidity refers to the capacity to meet cash commitments. This implies a world where the goal is to manage cashflows so as to make contracted cash payments where the payment that can be received by sale or hypothecation of an asset is in general lower (often much lower, or zero) than the present value of the income expected

from holding the asset. As Minsky puts it “The fundamental speculative decision of a capitalist economy centers around how much, of the anticipated cash flow from normal operations, a firm, household, or financial institution pledges for the payment of interest and principal on liabilities.” (Minsky, 1975). The extent to which the post 1980s financial system is less liquid than the postwar system, in the sense of having less reliable cashflows relative to its cash commitments, can help explain the increase in the credit spread.

BIBLIOGRAPHY

- Abbas, S. M. Ali, Nazim Belhocine, Asmaa ElGanainy, and Mark Horton.** 2011. "Historical Patterns of Public Debt ? Evidence From a New Database."
- Adrian, Tobias, Paolo Colla, and Hyun Song Shin.** 2012. "Which Financial Frictions? Parsing the Evidence from the Financial Crisis of 2007-9." In *NBER Macroeconomics Annual 2012, Volume 27. NBER Chapters*. National Bureau of Economic Research, Inc.
- Aizenman, Joshua, and Nancy Marion.** 2009. "Using Inflation to Erode the U.S. Public Debt." National Bureau of Economic Research, Inc NBER Working Papers 15562.
- Almeida, Heitor, Murillo Campello, Bruno Laranjeira, and Scott Weisbenner.** 2009. "Corporate Debt Maturity and the Real Effects of the 2007 Credit Crisis." National Bureau of Economic Research, Inc NBER Working Papers 14990.
- Amato, Jeffery D, and Eli M Remolona.** 2003. "The credit spread puzzle." *BIS Quarterly Review*.
- Amiti, Mary, and David E. Weinstein.** 2013. "How Much do Bank Shocks Affect Investment? Evidence from Matched Bank-Firm Loan Data." National Bureau of Economic Research Working Paper 18890.
- Archibald, Joanne, and Leni Hunter.** 2001. "What is the neutral real interest rate, and how can we use it?" *Reserve Bank of New Zealand Bulletin*, 64(3): 15–28.
- Arestis, P., and M. Sawyer.** 2009. "The intertemporal budget constraint and the sustainability of budget deficits." In *Current Thinking on Fiscal Policy.* , ed. J. Creel and M. Sawyer. Palgrave MacMillan.
- Arnon, Arie.** 2010. *Monetary theory and policy from Hume and Smith to Wicksell: Money, credit, and the economy*. Cambridge University Press.
- Bagehot, Walter.** 1999. *Lombard Street: A Description of the Money Market*. Wiley.
- Barba, A., and M. Pivetti.** 2009. "Rising household debt: Its causes and macroeconomic implications a long period analysis." *Cambridge Journal of Economics*, 33: 113–137.
- Barens, Ingo, and Volker Caspari.** 1999. "Old views and new perspectives: on reading Hick's Mr. Keynes and the Classics*." *Journal of the History of Economic Thought*, 6(2): 216–241.

- Barnes, Sebastian, and Garry Young.** 2003. "The rise in US household debt: assessing its causes and sustainability." Bank of England Bank of England working papers 206.
- Barro, Robert J., and Jos F. Ursa.** 2012. "Rare Macroeconomic Disasters." *Annual Review of Economics*, 4(1): 83–109.
- Bayoumi, Tamim.** 1997. "Comment on Blecker." In *The Macroeconomics of Saving, Finance, and Investment.*, ed. Robert Pollin. University of Michigan Press.
- Bebchuk, Lucian A.** 2013. "Pre-Disclosure Accumulations by Activist Investors: Evidence and Policy." PhD diss. School of Business, Duke University.
- Becker, Bo, and Victoria Ivashina.** 2011. "Cyclicality of Credit Supply: Firm Level Evidence." National Bureau of Economic Research, Inc NBER Working Papers 17392.
- Beggs, Michael.** 2012. "Liquidity as a Social Relation." Eastern Economic Association Paper presented at the Eastern Economic Association.
- Bekaert, Geert, and Robert J Hodrick.** 2001. "Expectations hypotheses tests." *The journal of finance*, 56(4): 1357–1394.
- Benito, Andrew, Waldron Matt Young Garry, and Fabrizio Zampolli.** 2007. "The Role of Household Debt and Balance Sheets in the Monetary Transmission Mechanism." *Bank of England Quarterly Bulletin*, 47(1): 70–78.
- Berle, A.A., and G.G.C. Means.** 1991. *The Modern Corporation and Private Property.* Macmillan.
- Bernanke, Ben.** 2000. *Essays on the great depression.* Princeton University Press.
- Bhagat, Sanjai, Andrei Shleifer, Robert W Vishny, Gregg Jarrel, and Lawrence Summers.** 1990. "Hostile takeovers in the 1980s: The return to corporate specialization." *Brookings Papers on Economic Activity. Microeconomics*, 1990: 1–84.
- Bibow, Jörg.** 2000*a.* "On exogenous money and bank behaviour: the Pandora's box kept shut in Keynes' theory of liquidity preference?" *European Journal of the History of Economic Thought*, 7(4): 532–568.
- Bibow, Jörg.** 2000*b.* "On exogenous money and bank behaviour: the Pandora's box kept shut in Keynes' theory of liquidity preference?" *European Journal of the History of Economic Thought*, 7(4): 532–568.
- Bibow, Jörg.** 2005. "Liquidity preference theory revisited: to ditch or to build on it?" The Levy Economics Institute Working Paper.
- Black, Fischer.** 1976. "The dividend puzzle." *The Journal of Portfolio Management*, 2(2): 5–8.

- Blair, Margaret.** 1993. "Financial restructuring and the debate about corporate governance." In *The Deal Decade.*, ed. Margaret Blair. Brookings Institution Press.
- Blanchard, Olivier J., Chouraqui Jean-Claude Hagemann Robert, and Nicola Sartor.** 1991. "The Sustainability of Fiscal Policy: New Answers to an Old Question." NBER Working Paper R1547.
- Bongaerts, D., F. De Jong, and J. Driessen.** 2012. "An asset pricing approach to liquidity effects in corporate bond markets."
- Brayton, Flint, and Peter Tinsley.** 1996. "A guide to FRB/US: a macroeconomic model of the United States." Board of Governors of the Federal Reserve System (US).
- Brown, James R., and Bruce C. Petersen.** 2009. "Why has the investment-cash flow sensitivity declined so sharply? Rising R&D and equity market developments." *Journal of Banking & Finance*, 33(5): 971–984.
- Buiter, Willem.** 1985. "A Guide to Public Sector Debt and Deficits." *Economic Policy*, 1(1): 13–79.
- Campbell, J.Y., and J.H. Cochrane.** 1995. "By force of habit: A consumption-based explanation of aggregate stock market behavior." National Bureau of Economic Research.
- Campello, Murillo, Erasmo Giambona, John R. Graham, and Campbell R. Harvey.** 2011. "Liquidity Management and Corporate Investment During a Financial Crisis." *Review of Financial Studies*, 24(6): 1944–1979.
- Cecchetti, Stephen G., Mohanty Madhusudan S., and Fabrizio Zampolli.** 2010. "The Future of Public Debt: Prospects and Implications." BIS 300.
- Chandler, Alfred D.** 1977. *The visible hand: The managerial revolution in American business.* Harvard University Press.
- Chen, Long, Pierre Collin-Dufresne, and Robert S. Goldstein.** 2009. "On the Relation Between the Credit Spread Puzzle and the Equity Premium Puzzle." *Review of Financial Studies*, 22(9): 3367–3409.
- Chick, Victoria.** 1987. "Speculation, the Rate of Interest, and the Rate of Profit." *Journal of Post Keynesian Economics*, 124–132.
- Chodorow-Reich, Gabriel.** 2012. "The Employment Effects of Credit Market Disruptions: Firm-Level Evidence from the 2008-2009 Financial Crisis." Unpublished working paper.
- Cooray, Arusha.** 2002. "The Fisher Effect: A Review of the Literature." Macquarie University, Department of Economics Research Papers 0206.

- Crotty, James R.** 1990. "Owner-manager conflict and financial theories of investment instability: A critical assessment of Keynes, Tobin, and Minsky." *Journal of Post Keynesian Economics*, 12(4): 519–542.
- Crotty, James R.** 1992. "Neoclassical and Keynesian approaches to the theory of investment." *Journal of Post Keynesian Economics*, 14(4): 483–496.
- Crotty, James R.** 2009. "Structural causes of the global financial crisis: a critical assessment of the 'new financial architecture'." *Cambridge Journal of Economics*, 33(4): 563–580.
- Crotty, James R.** 2013. "The Main Contributions of Chapters 13-15 of the General Theory."
- Cuaresma, Jesús Crespo, and Ernest Gnan.** 2007. "The natural rate of interest: which concept? which estimation method? which policy conclusions?" *Journal of Post Keynesian Economics*, 29(4): 667–688.
- Cynamon, Barry Z., and Steven M. Fazzari.** 2008. "Household Debt in the Consumer Age: Source of Growth,?Risk of Collapse." *Capitalism and Society*, 3(2): 3.
- Das, Piyali.** 2011. "Decomposition of Debt-GDP Ratio for United Kingdom: 1984-2009."
- Davidson, Paul.** 1993. *Can the Free Market Pick Winners?: What Determines Investment.* ME Sharpe.
- Davis, G.F.** 2009. *Managed by the Markets: How Finance Re-Shaped America.* OUP Oxford.
- Debelle, Guy.** 2004. "Household debt and the macroeconomy." *BIS Quarterly Review.*
- Deily, Mary E.** 1998. "Wages in the Steel Industry: Take the Money and Run?" *Industrial Relations: A Journal of Economy and Society*, 37(2): 153–177.
- Diebold, Francis X, Glenn D Rudebusch, and S Boragan Aruoba.** 2003. "The macroeconomy and the yield curve: A nonstructural analysis." CFS Working Paper.
- Dittmar, Amy, and Robert Dittmar.** 2002. "Stock repurchase waves: An explanation of the trends in aggregate corporate payout policy." *Available at SSRN 346548.*
- Dobb, Maurice.** 1975. *Theories of value and distribution since Adam Smith: ideology and economic theory.* Cambridge University Press.
- Duchin, Ran, Oguzhan Ozbas, and Berk A. Sensoy.** 2010. "Costly external finance, corporate investment, and the subprime mortgage credit crisis." *Journal of Financial Economics*, 97(3): 418–435.

- Duménil, Gérard, and Dominique Lévy.** 2011. *The crisis of neoliberalism*. Harvard University Press.
- Duygan-Bump, Burcu, Alexey Levkov, and Judit Montoriol-Garriga.** 2010. “Financing constraints and unemployment: evidence from the Great Recession.” Federal Reserve Bank of Boston Risk and Policy Analysis Unit Working Paper QAU10-6.
- Dynan, Karen E., and Donald L. Kohn.** 2009. “The rise in U.S. household indebtedness: causes and consequences.” Board of Governors of the Federal Reserve System (U.S.) Finance and Economics Discussion Series 2007-37.
- Edgerton, Jesse.** 2012. “Credit Supply and Business Investment During the Great Recession: Evidence from Public Records of Equipment Financing.”
- Eggertson, Gauti B, and Paul Krugman.** 2010. “Debt, Deleveraging, and the Liquidity Trap: A Fisher-Minsky-Koo approach.”
- Epstein, Gerald.** 2007. “Central banks as agents of employment creation.” In *Towards Full and Decent Employment*, ed. Ocampo JA and Jomo KS, 92–122. ew York, London, Penang and Hyderabad:Orient Longman Private Ltd, Zed Books, Third World Network and United Nations.
- Epstein, Gerald, and Thomas Ferguson.** 1984. “Monetary policy, loan liquidation, and industrial conflict: the Federal Reserve and the open market operations of 1932.” *The Journal of Economic History*, 44(04): 957–983.
- Erel, Isil, Brandon Julio, Woojin Kim, and Michael S. Weisbach.** 2011. “Macroeconomic Conditions and Capital Raising.” National Bureau of Economic Research, Inc NBER Working Papers 16941.
- Escolano, J.** 2010. “A Practical Guide to Public Debt Dynamics, Fiscal Sustainability, and Cyclical Adjustment of Budgetary Aggregates.” International Monetary Fund, International Monetary Fund.
- Evans, Lawrence Lee.** 2001. “What drives equity values: Fundamentals or net flows? An empirical analysis of the 1982–1999 US stock market boom.” PhD diss. University of Massachusetts.
- Fama, Eugene F., and Kenneth R. French.** 2001. “Disappearing dividends: changing firm characteristics or lower propensity to pay?” *Journal of Financial Economics*, 60(1): 3–43.
- Fama, Eugene F, and Kenneth R French.** 2005. “Financing decisions: who issues stock?” *Journal of financial economics*, 76(3): 549–582.
- Farhi, Emmanuel, and Jean Tirole.** 2012. “Bubbly liquidity.” *The Review of Economic Studies*, 79(2): 678–706.

- Fazzari, Steven M, Pietro E Ferri, Edward G Greenberg, and Anna Maria Variato.** 2013. "Aggregate demand, instability, and growth." *Review of Keynesian Economics*, 1(1): 1–21.
- Fazzari, Steven M, R Glenn Hubbard, and Bruce C Petersen.** 2000. "Investment-cash flow sensitivities are useful: A comment on Kaplan and Zingales." *The Quarterly Journal of Economics*, 115(2): 695–705.
- Fazzari, Steven, R. Glenn Hubbard, and Bruce C. Petersen.** 1988. "Financing Constraints and Corporate Investment." National Bureau of Economic Research, Inc NBER Working Papers 2387.
- Federal Reserve Bank of San Francisco.** 2004. "What Determines the Credit Spread?" Federal Reserve Bank of San Francisco Economic Letter 2004-36.
- Fisher, Irving.** 1933. "The Debt-Deflation Theory of Great Depressions." *Econometrica*, 1(4): pp. 337–357.
- Friedman, Benjamin M.** 2014. "Has the financial crisis permanently changed the practice of monetary policy? Has it changed the theory of monetary policy?" National Bureau of Economic Research.
- Froot, K.A.** 1990. "New hope for the expectations hypothesis of the term structure of interest rates."
- Gagnon, J.** 2011. "Interview with Joe Gagnon on Quantitative Easing, its Criticisms and the Argument for QE3."
- Garcia-Appendini, Emilia, and Judit Montoriol-Garriga.** 2013. "Firms as liquidity providers: Evidence from the 2007–2008 financial crisis." *Journal of Financial Economics*, 109(1): 272–291.
- Garriga, Carlos, Matthew Chambers, and Don Schlagenhauf.** 2012. "Did housing policies cause the postwar boom in homeownership?" Federal Reserve Bank of St. Louis Working Papers 2012-021.
- Giannitsarou, Chryssi, and Andrew Scott.** 2008. "Inflation Implications of Rising Government Debt." In *NBER International Seminar on Macroeconomics 2006. NBER Chapters*, 393–442. National Bureau of Economic Research, Inc.
- Giesecke, K., F.A. Longstaff, S. Schaefer, and I. Strebulaev.** 2011. "Corporate bond default risk: A 150-year perspective." *Journal of Financial Economics*, 102(2): 233–250.
- Gilson, Ronald J.** 1993. "Comment on Roe." In *The Deal Decade.*, ed. Margaret Blair. Brookings Institution Press.
- Glyn, Andrew.** 1997. "Does aggregate profitability really matter?" *Cambridge Journal of Economics*, 21(5): 593–619.

- Goldsmith, R.W.** 1955. *A Study of Saving in the United States: Nature and deprivation of annual estimates of saving, 1897 to 1949. A Study of Saving in the United States*, Princeton University Press.
- Goldstein, Robert.** 2009. “Can Structural Models of Default Explain the Credit Spread Puzzle?” Federal Reserve bank of San Francisco Economic Letter 2010-06.
- Gordon, Myron J.** 1992. “The neoclassical and a post keynesian theory of investment.” *Journal of Post Keynesian Economics*, 14(4): 425–443.
- Gordon, R A.** 1979. *A Skeptical Look at the "Natural Rate" Hypothesis*. University of California.
- Gorton, Gary, and Andrew Metrick.** 2009. “The Run on Repo and the Panic of 2007-2008.” *Unpublished paper, Yale University*.
- Gottschalk, J., L. Forni, C. Cottarelli, and P. Mauro.** 2010. “Default in Today’s Advanced Economies: Unnecessary, Undesirable, and Unlikely.” IMF SPN 10/12, INTERNATIONAL MONETARY FUND.
- Greenspan, Alan.** 2010. “The Crisis.” *Brookings Papers on Economic Activity*, 41(1 (Spring): 201–261.
- Greenstone, Michael, and Alexandre Mas.** 2012. “Do Credit Market Shocks affect the Real Economy? Quasi-Experimental Evidence from the Great Recession and Normal Economic Times.” Massachusetts Institute of Technology Working Paper 12-27.
- Greenwald, Bruce, Joseph E Stiglitz, and Andrew Weiss.** 1984. “Informational imperfections in the capital market and macroeconomic fluctuations.” *The American Economic Review*, 194–199.
- Greenwood, Daniel J.H.** 2004. “Enronitis: Why Good Corporations Go Bad.” *Columbia Business Law Review*, , (3): 773–848.
- Grullon, Gustavo, and Roni Michaely.** 2002. “Dividends, share repurchases, and the substitution hypothesis.” *The Journal of Finance*, 57(4): 1649–1684.
- Guererri, Veronica, and Guido Lorenzoni.** 2011. “Credit Crises, Precautionary Savings and th Liquidity Trap.” University of Chicago Booth School Working Paper.
- Guidolin, M., and D.L. Thornton.** 2008. “Predictions of short-term rates and the expectations hypothesis of the term structure of interest rates.” *ECB Working Paper*.
- Gurley, John G, and Edward S Shaw.** 1956. “Financial Intermediaries and the Saving-Investment Process.” *The Journal of Finance*, 11(2): 257–276.

- Hall, George J., and Thomas J. Sargent.** 2011. "Interest Rate Risk and Other Determinants of Post-WWII US Government Debt/GDP Dynamics." *American Economic Journal: Macroeconomics*, 3(3): 192–214.
- Hall, R. E.** 2010. "Why Does the Economy Fall to Pieces after a Financial Crisis?" *Journal of Economic Perspectives*, 24(4): 320.
- Hall, Robert E.** 2011*a*. "The High Sensitivity of Economic Activity to Financial Frictions*." *The Economic Journal*, 121(552): 351–378.
- Hall, Robert E.** 2011*b*. "The Long Slump." *American Economic Review*, 101(2): 431–69.
- Hall, Robert E, and Dale W Jorgenson.** 1967. "Tax policy and investment behavior." *The American Economic Review*, 391–414.
- Hannsgen, Greg.** 2004. "The Transmission Mechanism of Monetary Policy: A Critical Review." Levy Economics Institute, The Economics Working Paper Archive 412.
- Harrod, Roy F.** 1939. "An essay in dynamic theory." *The Economic Journal*, 49(193): 14–33.
- Henwood, D.** 1998. *Wall Street: How It Works And for Whom*. Diane Pub Co.
- Hicks, John R.** 1962. "Liquidity." *The Economic Journal*, 787–802.
- Holmström, B., and S. N. Kaplan.** 2001. "Corporate Governance and Merger Activity in the U.S.: Making Sense of the 1980s and 1990s." NBER Working Paper 8220.
- Holmström, Bengt, and Jean Tirole.** 1996. "Private and Public Supply of Liquidity." National Bureau of Economic Research, Inc NBER Working Papers.
- Holmström, Bengt, and Jean Tirole.** 2011. *Inside and outside liquidity*. MIT press.
- Holmström, Bengt, and Steven N Kaplan.** 2003. "The state of US corporate governance: what's right and what's wrong?" *Journal of Applied Corporate Finance*, 15(3): 8–20.
- Homer, Sidney.** 1996. *A History of Interest Rates*. Rutgers University Press.
- Huang, J., and M. Huang.** 2002. "How Much of the Corporate-Treasury Yield Spread is Due to Credit Risk?"
- Ivashina, Victoria, and David Scharfstein.** 2010. "Bank lending during the financial crisis of 2008." *Journal of Financial Economics*, 97(3): 319–338.

- Jensen, Michael C.** 1986. "Agency costs of free cash flow, corporate finance, and takeovers." *The American Economic Review*, 76(2): 323–329.
- Jensen, Michael C.** 1993. "The modern industrial revolution, exit, and the failure of internal control systems." *the Journal of Finance*, 48(3): 831–880.
- Jensen, Michael C.** 2000. *A theory of the firm: governance, residual claims, and organizational forms*. Harvard University Press.
- Jensen, Michael C, and William H Meckling.** 1976. "Theory of the firm: Managerial behavior, agency costs and ownership structure." *Journal of financial economics*, 3(4): 305–360.
- Kahle, Kathleen M, and René M Stulz.** 2013. "Access to capital, investment, and the financial crisis." *Journal of Financial Economics*, 110(2): 280–299.
- Kahle, K. M, and R. M Stulz.** 2010. "Financial Policies and the Financial Crisis: How Important Was the Systemic Credit Contraction for Industrial Corporations?" *NBER Working Paper*.
- Kaldor, Nicholas.** 1940. "A model of the trade cycle." *The Economic Journal*, 78–92.
- Kaplan, Steven N, and Bernadette A Minton.** 2012. "How has CEO turnover changed?" *International Review of Finance*, 12(1): 57–87.
- Keynes, John Maynard.** 1936. *The General Theory of Employment, Interest, and Money*. Macmillan.
- Keynes, John Maynard.** 1937a. "The Ex Ante Theory of the Rate of Interest." *The Economic Journal*, 47(188): 663–669.
- Keynes, John Maynard.** 1937b. "The General Theory of Employment." *Quarterly Journal of Economics*.
- Koo, Richard C.** 2008. *The Holy Grail of Macroeconomics: Lessons from Japans Great Recession*. Wiley.
- Kotz, David M.** 2011. "Over-Investment and the Economic Crisis of 2008."
- Kremp, Elizabeth, and Patrick Sevestre.** 2013. "Did the crisis induce credit rationing for French SMEs?" *Journal of Banking & Finance*, 37(10): 3757–3772.
- Krippner, Greta R.** 2011. *Capitalizing on crisis: The political origins of the rise of finance*. Harvard University Press.
- Large, Andrew.** 2004. "Puzzles in Today's Economy-The Build-up of Household Debt." *Bank of England Quarterly Bulletin, Summer*.

- Lawlor, Michael Syron, and Bobbie L Horn.** 1992. "Notes on the Sraffa-Hayek exchange." *Review of Political Economy*, 4(3): 317–340.
- Lazonick, William.** 1992. "Controlling the market for corporate control: the historical significance of managerial capitalism." *Industrial and Corporate Change*, 1(3): 445–488.
- Lazonick, William.** 2008. "The Quest for Shareholder Value: Stock Repurchases in the US Economy." *Recherches Economiques de Louvain/Louvain Economic Review*, 74(4): 479–540.
- Leary, Mark T, and Michael R Roberts.** 2010. "The pecking order, debt capacity, and information asymmetry." *Journal of Financial Economics*, 95(3): 332–355.
- Leijonhufvud, Axel.** 1997. "The Wicksellian Heritage." University of Trento Working Paper 9705.
- Leijonhufvud, Axel.** 2008. "Between Keynes and Sraffa: Pasinetti on the Cambridge School." *The European Journal of the History of Economic Thought*, 15(3): 529–538.
- Manne, Henry G.** 1965. "Mergers and the market for corporate control." *The Journal of Political Economy*, 73(2): 110–120.
- Mason, J.W., and Arjun Jayadev.** 2014. "Fisher Dynamics in US Household Debt, 1929–2011." *American Economic Journal: Macroeconomics*, 6(2).
- Mehrling, Perry.** 1999. "The vision of Hyman P. Minsky." *Journal of Economic Behavior & Organization*, 39(2): 129–158.
- Mehrling, Perry.** 2006. "Mr. Woodford and the challenge of finance." *Journal of the History of Economic Thought*, 28(2): 161–170.
- Mehrling, Perry.** 2010. *The New Lombard Street: How the Fed Became the Dealer of Last Resort*. Princeton University Press.
- Mehrling, Perry.** 2013. "MIT and Money." Groupe de REcherche en Droit, Économie, Gestion (GREDEG CNRS), University of Nice Sophia Antipolis.
- Mehrling, Perry, and Daniel Neilson.** 2009. "A New Measure of the Liquidity Premium." In *The Political Economy of Monetary Policy and Financial Regulation: A Conference in Honor of Jane D'Arista*.
- Meyer, John R, and Edwin Kuh.** 1966. *The investment decision: An empirical study*. Harvard University Press.
- Mian, Atif, and Amir Sufi.** 2014. *House of Debt: How They (and You) Caused the Great Recession, and How We Can Prevent It from Happening Again*. University of Chicago Press.

- Mian, Atif, Kamalesh Rao, and Amir Sufi.** 2011. “What Explains High Unemployment? The Aggregate Demand Channel.” University of Chicago Booth School Working Paper.
- Minsky, H. P.** 1967. “Financial Intermediation in the Money and Credit Markets.” In *Issues in Banking and Monetary Analysis*, ed. Robert P. Shaw Giulio Pontecorvo and Albert G. Hart, 35–56. Holt, Rinehart & Winston.
- Minsky, Hyman.** 1975. *John Maynard Keynes*. Columbia University Press.
- Minsky, Hyman P.** 1980. “Capitalist financial processes and the instability of capitalism.” *Journal of Economic Issues*, 505–523.
- Minsky, Hyman P.** 1993. “On the non-neutrality of money.” *Federal Reserve Bank of New York Quarterly Review*, 18(1): 77–82.
- Mishkin, Frederic.** 1978. “The Household Balance Sheet and the Great Depression.” *Journal of Economic History*, 38(4): 918–937.
- Modigliani, Franco, and Merton H Miller.** 1958. “The cost of capital, corporation finance and the theory of investment.” *The American economic review*, 261–297.
- Montoriol-Garriga, Judit, and J. Christina Wang.** 2011. “The Great Recession and bank lending to small businesses.” Federal Reserve Bank of Boston Working Papers 11-16.
- Myers, Stewart C, and Nicholas S Majluf.** 1984. “Corporate financing and investment decisions when firms have information that investors do not have.” *Journal of financial economics*, 13(2): 187–221.
- Nilsson, Eric A.** 1999. “Trends in Compensation for Production Workers: 1948–1995.” *Review of Radical Political Economy*, 31(4): 133–163.
- Olney, Martha L.** 1999. “Avoiding Default: The Role Of Credit In The Consumption Collapse Of 1930.” *The Quarterly Journal of Economics*, 114(1): 319–335.
- Ou, Sharon.** 2012. “Annual Default Study: Corporate Default and Recovery Rates, 1920–2011.” Moody’s Investor Service.
- Parker, J. A.** 1999. “Spendthrift in America? On Two Decades of Decline in the U.S. Saving Rate.” *NBER Macroeconomics Annual*, 317–370.
- Perraudin, William, and Alex P. Taylor.** 2004. “On the consistency of ratings and bond market yields.” *Journal of Banking & Finance*, 28(11): 2769–2788.
- Philippon, Thomas, and Virgiliu Midrigan.** 2011. “Household Leverage and the Recession.” National Bureau of Economic Research Working Paper 16965.

- Phillipon, Thomas.** 2012. “Has the U.S. Finance Industry Become Less Efficient? On the Theory and Measurement of Financial Intermediation.” NYU.
- Piazzesi, M., and M. Schneider.** 2009. “Trend and cycle in bond premia.”
- Pollin, Robert.** 1988. “The growth of U.S. household debt: Demand-side influences.” *Journal of Macroeconomics*, 10(2): 231–248.
- Pollin, Robert.** 1990. “Deeper In Debt: The Changing Financial Conditions of U.S. Households.” Economic Policy Institute, Washington, DC.
- Pollin, Robert.** 1997*a*. “Financial Intermediation and the Variability of the Saving Constraint.” In *The Macroeconomics of Saving, Finance, and Investment.* , ed. Robert Pollin. University of Michigan Press.
- Pollin, Robert.** 1997*b*. *The macroeconomics of saving, finance, and investment.* University of Michigan Press.
- Pollin, Robert.** 2008. “Considerations on Interest Rate Exogeneity.” Political Economy Research Institute, University of Massachusetts at Amherst Working Papers wp177.
- Pollin, Robert, and Gary Dymksi.** 1992. “Minsky as Hedgehog: The Power of the Wall Street Paradigm.” In *Financial conditions and macroeconomic performance: essays in honor of Hyman P. Minsky.* , ed. H.P. Minsky, S.M. Fazzari and D.B. Papadimitriou. M.E. Sharpe.
- Pollin, Robert, James Heintz, Heidi Garrett-Peltier, and Jeannette Wicks-Lim.** 2011. “19 Million Jobs for U.S. Workers: The Impact of Channeling 1.4 trillion in Excess Liquid Asset Holdings into Productive Investment.” Political Economy Research Institute.
- Rahaman, Mohammad M., Aivazian Varouj A., and Ling Sun.** 2012. “The Real Effects of Credit Contractions.” Unpublished working paper.
- Rangarajan, C., and D. K. Srivastava.** 2003. “Dynamics of Debt Accumulation in India: Impact of Primary Deficit, Growth and Interest Rate.” *Economic and Political Weekly*, 38(46): 4851–4858.
- Reinhart, Carmen M., and Kenneth S. Rogoff.** 2010. “Growth in a Time of Debt.” *American Economic Review*, 100(2): 573–78.
- Robinson, Joan.** 1951. “The rate of interest.” *Econometrica, Journal of the Econometric Society*, 92–111.
- Roe, Mark J.** 1996. “From antitrust to corporation governance? The corporation and the law: 1959–1994.” *The American Corporation Today (Oxford University Press, New York)* pp, 102–127.

- Russell, E.D.** 2008. *New Deal Banking Reforms and Keynesian Welfare State Capitalism*. *New Political Economy*, Routledge.
- Sarno, L., D.L. Thornton, and G. Valente.** 2007. "The empirical failure of the expectations hypothesis of the term structure of bond yields." *Journal of Financial and Quantitative Analysis*, 42(01): 81–100.
- Scharfstein, David.** 1988. "The disciplinary role of takeovers." *The Review of Economic Studies*, 55(2): 185–199.
- Schwarz, K.** 2010. "Mind the gap: Disentangling credit and liquidity in risk spreads." Available at SSRN 1486240.
- Sherman, Howard.** 1979. "A Marxist theory of the business cycle." *Review of Radical Political Economics*, 11(1): 1–23.
- Smithin, John.** 1996. *Macroeconomic policy and the future of capitalism: the revenge of the rentiers and the threat to prosperity*. E. Elgar.
- Smithin, John.** 2006. "The Theory of Interest Rates." In *A Handbook of Alternative Monetary Economics*. , ed. Malcolm Sawyer and Philip Arestis. Edward Elgar.
- Smithin, John.** 2008. *Money, Enterprise and Income Distribution: Towards a Macroeconomic Theory of Capitalism*. Routledge.
- Sraffa, Piero.** 1932a. "Dr. Hayek on money and capital." *The Economic Journal*, 42–53.
- Sraffa, Piero.** 1932b. "[Money and Capital]: A Rejoinder." *The Economic Journal*, 249–251.
- Stiglitz, Joseph E.** 1993. "Post Walrasian and post Marxian economics." *Journal of Economic Perspectives*, 7(1): 109–114.
- Stothard, Michael.** 2013. "Executives cash in as cheap debt funds staff buybacks." *Financial Times*, May 21, 2013.
- Sturn, S., and T. van Treek.** forthcoming. "Income inequality as a cause of the Great Recession? A survey of current debates." In *New Perspectives on Wages and Economic Growth*. ILO.
- Taylor, Lance.** 2009. *Reconstructing macroeconomics: Structuralist proposals and critiques of the mainstream*. Harvard University Press.
- Taylor, Lance.** 2011. *Maynard's Revenge: The Collapse of Free Market Macroeconomics*. Harvard University Press.
- Tirole, Jean.** 2011. "Illiquidity and All Its Friends." *Journal of Economic Literature*, 49(2): 287–325.

- Tobin, James, and William C Brainard.** 1977. "Asset markets and the cost of capital." *Economic Progress, Private Values, and Public Economic Journal*, 96: 120–138.
- Veblen, Thorstein.** 1923. *Absentee ownership: Business enterprise in recent times: The case of America*. Transaction Publishers.
- Weisskopf, Thomas E.** 1979. "Marxian Crisis Theory and the Rate of Profit in the Postwar U.S. Economy." *Cambridge Journal of Economics*, 3(4): 341–78.
- Whited, T. M.** 1992. "Debt, liquidity constraints, and corporate investment: Evidence from panel data." *Journal of Finance*, 47(4): 1425–1460.
- Wicksell, Knut.** 2007. *Interest and prices*. Read Books.
- Woodford, Michael.** 2005. *Interest and prices: Foundations of a theory of monetary policy*. Cambridge Univ Press.
- Woodford, Michael.** 2010a. "Financial Intermediation and Macroeconomic Analysis." *Journal of Economic Perspectives*, 24(4): 21–44.
- Woodford, Michael.** 2010b. "Financial intermediation and macroeconomic analysis." *The Journal of Economic Perspectives*, 21–44.
- Zhao, Frank, and Kirk Wang.** 2013. "Follow the Smart Money: Riding the Coattails of Activist Investors." S & P Capital IQ.
- Ziegler, Alexandre, and Darrell Duffie.** 2001. "Liquidation Risk." International Center for Financial Asset Management and Engineering FAME Research Paper Series rp29.