

# Commercial paper, corporate finance, and the business cycle: a microeconomic perspective\*

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## Abstract

Little is known about the characteristics or behavior of commercial paper issuers at the firm level, or about the reasons for the countercyclical issuance of commercial paper in the aggregate. In order to examine these issues we construct a new panel data-set linking Moody's data on commercial paper outstanding with Standard and Poor's Compustat.

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We find that high credit quality is a requirement for entry into the commercial paper market, but that long-term credit quality (bond rating) is not a sufficient statistic for measuring short-term credit quality. Holding constant long-term credit quality, access to the commercial paper market depends on large size, high collateral levels, high earnings levels, low earnings variance, and large stocks of liquid assets. These characteristics allow firms to issue near riskless short-term debt and supply a near-money asset to the market, thereby reducing their interest costs by the amount of the commercial paper liquidity premium.

In measuring the attributes of high credit quality, we find that firms of insufficiently high quality to access commercial paper markets maintain higher stocks of inventories and financial assets. They also display greater cash flow sensitivity of inventories and financial assets. This suggests that lower quality firms without access to commercial paper markets also face financing constraints that lead them to accumulate “buffer stocks” of liquid assets.

Finally, in contrast to the known fact that aggregate commercial paper is countercyclical, we find that firm-level paper issuance and sales are positively correlated. Our data support three explanations for this apparent paradox, all of which recognize that commercial paper issuers are atypical by virtue of their unusually high short-term credit quality. First, such high quality firms use commercial paper to finance the accumulation of inventories during downturns. Second, they also use commercial paper to finance accounts receivable. This suggests that commercial paper issuers serve as intermediaries during downturns. Third, it may be that portfolio demand for commercial paper — a highly liquid, safe asset — increases during downturns. This view is consistent with our characterization of commercial paper issuers.

## 1 Introduction

Commercial paper accounts for a large and growing fraction of short-term corporate finance in the United States. Despite its growing importance for corporate finance and despite the attention paid by macroeconomists to commercial paper as a leading economic indicator (Stock and Watson, 1989; Bernanke, 1990; Friedman and Kuttner, 1993a and 1993b; Kashyap, Stein and Wilcox, 1993), there has been virtually no econometric analysis of the characteristics of commercial paper issuers or the circumstances under which commercial paper issuance rises or falls. This is a surprising omission, given that commercial paper is the only form of publicly traded short-term debt placed by corporations.

Interest in the role of commercial paper increased during the “credit crunch” of 1989–92 (see Federal Reserve Bank of New York, 1994). At that time, bank lending fell largely because of the weakened condition of banks, while commercial paper issuance increased. Many observers suggested that the commercial paper market was providing a substitute for bank lending. The tale of the firm that was squeezed out of the bank loan market and turned

to the commercial paper market was often told (see Gertler's discussion following Friedman and Kuttner [1993a]). It was an appealing story because it fit the macroeconomic facts — a decline in bank loans and an increase in commercial paper outstanding.<sup>1</sup> However, by looking for the first time at the characteristics of commercial paper issuers, we show that this simple substitution story does not fit the *microeconomic* facts. That is, there is no indication of commercial paper issuance in a downturn by firms that might have been squeezed out of bank lending.

We show that commercial paper issuance is restricted to firms with strong balance sheets and high cash flows. This alone suggests that it is wrong to hypothesize that increased commercial paper issuance during a credit crunch comes from firms that have been squeezed out of bank lending. Moreover, the balance sheets of commercial paper issuers do not appear to change much in quality over the course of a business cycle. This fact provides additional evidence against the “squeeze” hypothesis for the representative firm. Thus, there must be other reasons why some firms increase commercial paper issuance during downturns.

We argue that the evidence is more consistent with three other hypotheses: (i) that there may be countercyclical shifts in the aggregate demand for monetary assets (namely commercial paper supplied by the high quality firms); (ii) that commercial paper may be issued by high quality firms to finance the extension of trade credit to lesser-quality firms, i.e., inter-firm financial intermediation may be counter-cyclical; (iii) that increased commercial paper issuance may occur to finance the accumulation of inventories by the issuer around a business-cycle peak.

The first hypothesis is that the portfolio demand for monetary assets is countercyclical, i.e., there is a flight to quality during a downturn. Firms with strong balance sheets exploit this demand to reduce their cost of short-term borrowing. We find this plausible, and while our data are unsuited for directly testing such demand shifts, the results below are consistent with this view.

Our second explanation is that firms in strong financial condition issue commercial paper during downturns in order to extend credit to other firms; commercial paper issuers act as financial intermediaries to other firms.<sup>2</sup>

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<sup>1</sup>More generally, business-cycle analysts have been aware of the countercyclical behavior of commercial paper issuance since Selden (1963).

<sup>2</sup>Earlier studies that predate the growth of the commercial paper market have noted cyclical patterns in trade credit and the role of inter-firm intermediation (Davis, 1960; Meltzer, 1960; and Seiden, 1964). Meltzer (1960) shows that in periods of monetary tightening, large, liquid firms increase the amount of trade credit extended. They act as financial intermediaries to smaller firms that might have been rationed out of other sources of financing. By providing financing, the liquid firm can maintain demand and customer relationships in the face of a slowdown. More recently, Smith and Schnucker (1994) explore

While we once again face data limitations, we do find that commercial paper is strongly correlated with increases in accounts receivable, suggesting the possibility of a casual link.<sup>3</sup> Such a link would favor a more nuanced view of the “squeeze” hypothesis that dispenses with the representative firm: reductions in the supply of bank credit increase the demand for inter-firm financing, thus leading *indirectly* to an increase in aggregate commercial paper via those firms in the economy with the strongest balance sheets.

The third explanation is that increased commercial paper issuance is used to finance inventories. Since business-cycle peaks are often characterized by unplanned inventory accumulation, the inventory cycle may help explain the countercyclical behavior of commercial paper.

In this paper we present a wide ranging examination of issues concerning commercial paper issuance, and provide new evidence on the characteristics and behavior of issuers compared to nonissuers from a panel of firm-level data. Our chief goal is to identify the characteristics of firms that have access to the paper market, and to describe the determinants of changes in an individual firm’s paper outstanding. We address a number of previously unanswered questions, including:

- How do the characteristics of short-term public debt issuers differ from those of non-issuers (i.e., issuers of long-term public and private debt)?
- Are there special circumstances that lead firms to increase short-term public debt?
- Are changes in commercial paper issuance driven by the same factors that affect other forms of financing?

Our data set is based on quarterly data on commercial paper outstanding and ratings for issuers rated by Moody’s for the period 1985II through 1992I.<sup>4</sup> These data are merged with financial data from Standard and Poor’s Compustat. There are slightly more than 3300 domestic, nonsubsidiary manufacturing firms in our universe, and about ten percent of them have commercial paper programs. These unique panel data allow us to relate the micro behavior of firms to the macro facts about commercial paper.

The corporate finance literature does not provide adequate explanations for the behavior and existence of commercial paper finance. Typically, models of short-term debt emphasize its advantages (over long-term debt) when

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the empirical determinants of trade credit and its financing.

<sup>3</sup>Mian and Smith (1992) make a similar argument. They indicate that firms form finance subsidiaries to finance accounts receivable and provide financial flexibility, often through commercial paper issuance.

<sup>4</sup>The data on commercial paper ratings and amounts outstanding were graciously made available by Jerome Fons.

the issuing firm has information that debt holders do not have. Short-term financing emerges so that lenders can impose discipline on the borrowing firm. Such models tend to neglect the portfolio attributes of debt instruments. This is important because an outstanding feature of commercial paper — a feature that usefully distinguishes it from bank debt — is that it provides money-like services. Since commercial paper is a money-market instrument (a near-money asset), a ‘liquidity premium’ accrues to issuers in the form of lower interest costs. In order to reduce short-term borrowing costs, all firms would like to issue such liabilities. But only the highest-quality firms qualify for the commercial paper market because purchasers of near-money assets demand little or no risk of default.

Our empirical findings show that conditional on aggregate demand shifts, exit from the commercial paper market is strongly associated with reductions in balance-sheet strength. Furthermore, the characteristics of issuers vs. nonissuers indicate that high credit quality (a strong balance sheet and high cash flow) is the *sine qua non* for issuers. Moreover, improvements in the financial condition of the firm are associated with increases in commercial paper outstanding. Finally, we find that firms with high credit quality maintain much lower levels of working capital. In contrast to commercial paper issuers, nonissuers display much higher sensitivity of inventory and working capital investment to fluctuations in cash flow, suggesting that the shadow cost of funds for nonissuers is high.<sup>5</sup> Thus, high credit quality apparently reduces the unobserved costs of external finance, as well as reducing the interest rate on commercial paper.

In addition to the above, we link our work to previous studies that have used access to long-term debt (bond markets) as an indicator of access to capital markets. We show that long-term creditworthiness, as measured by bond ratings, does not fully capture short-term creditworthiness, as measured by access to the commercial paper market. Despite the close association between long-term and short-term credit quality, there are interesting differences between the determinants of high bond ratings and the determinants of access to the commercial paper market.

The evidence in this paper supports a new interpretation of the countercyclical movement of aggregate commercial paper issuance. While commercial paper issuance is countercyclical at the aggregate level, it is procyclical at the firm level (positively correlated with sales and earnings). The macroeconomic fact that commercial paper issuance rises in recessions (when balance

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<sup>5</sup>These findings are consistent with recent research that suggests that the high costs of external finance are related to asymmetric information (rather than to risk, per se). This leads firms to self-finance, and to “self-insure” against declines in earnings by maintaining large stocks of liquid assets (Carpenter, Fazzari, and Petersen, 1994; Calomiris and Hubbard, 1994).

sheets usually weaken) seems to contradict our microeconomic evidence that commercial paper is always associated with high credit quality. Obviously it is essential to recognize firm heterogeneity in order to resolve the paradox. We build on this basic insight to argue that commercial paper issuance moves countercyclically due to shocks originating outside of issuing firms. As suggested at the outset, three likely sources of such shocks are shifts in the portfolio demand for monetary assets, shifts in the demand for firm-intermediated credit, and shifts in the need to finance inventories. All of these would explain the countercyclical expansion of aggregate commercial paper and all are consistent with the evidence on firm-level behavior that we present below.

The next section of the paper provides a brief historical overview of the development of the commercial paper market and its growth during the post-war period. It is followed by a discussion of theoretical perspectives from the corporate finance literature on the potential advantages of short-term debt. The empirical results are reported in the next three sections. First, we provide a firm-level analysis of the characteristics of firms that issue commercial paper, and consider factors that are associated with increases and decreases in commercial paper outstanding (excluding exit). Second, we examine the behavioral differences between issuers and nonissuers by considering the response of inventory and financial working capital investment to cash-flow disturbances. Finally, we report evidence on the procyclicality of commercial paper at the firm level. We conclude with a summary and our interpretation of the facts.

## **2 The development and growth of the commercial paper market**

### **2.1 *History of commercial paper in the United States***

Commercial paper, broadly defined as unsecured, short-term negotiable promissory notes sold on the open market, is a financial instrument with a long history in the United States. There are three distinct stages in the history of the American commercial paper market following its emergence during the postbellum period. From the late nineteenth century until the 1920s, commercial paper grew rapidly as a source of corporate financing and then all but disappeared during the Depression (see James 1978, 1993; Selden, 1963). The second stage began after World War II and is characterized by very rapid growth in commercial paper outstanding in the 1960s. This stage ended with the Penn-Central failure which severely shook the market and temporarily halted its growth (see Schadrack and Breimyer, 1970; Calomiris, 1994). The third stage began after the Penn-Central failure and continues to the present (see Rowe, 1986; Hahn, 1993; Post, 1992).

Although the institutional characteristics of the commercial paper mar-

ket and the characteristics of issuers and buyers have changed over the last century, there is one aspect of the history of the instrument that reappears in each stage of its growth. The defining issue for understanding the growth of commercial paper is the relationship between the paper market and commercial bank portfolios. At various times the growth of the commercial paper market could be attributed to (i) banks with weak loan demand that were searching for an alternative asset, (ii) regulatory constraints that made bank deposits unattractive, or (iii) market conditions that made bank loans relatively expensive.

According to James (1978, 1993) and Calomiris (1992), the rapid growth of commercial paper in the late 19th century was due to limitations on bank lending resulting from restrictions on branch banking. In the early part of the century, commercial paper was a well-established supplementary borrowing source for the best-rated companies. Commercial banks were the principal holders of commercial paper in this era. Commercial paper played an important role in a highly segmented banking market. Banks with relatively low local credit demand could participate in the national loan market by holding commercial paper. The United States was unique in this respect. In other countries, banking systems operated nationwide branching networks and relied on bankers acceptances as the main form of commercial finance. Direct long-distance lending for commercial purposes through bankers acceptances within the United States was hampered by the unit banking system, which limited the potential for inter-regional flows of interbank credit. Commercial paper provided an alternative means for the most creditworthy borrowers in peripheral regions to raise funds at peak lending times from money-center banks directly.<sup>6</sup>

The commercial paper market all but disappeared by the end of the 1920s, even before the onset of the Depression. James (1993) traces this decline to the bank consolidation wave of the 1920s. Large city banks with growing deposit bases were better able to accommodate growing inter-regional flows of credit in the 1920s which made bank loans (including bankers acceptances) a cheaper source of credit than commercial paper. Another contributing factor was the Federal Reserve's policy of favoring bankers acceptances as collateral for discount lending, which was a conscious effort to increase the relative importance of acceptances and reduce the importance of commercial paper (Hackley, 1973, 55–58).

In the postwar period, commercial paper and bank loans became competing sources of corporate financing rather than complementary bank assets.<sup>7</sup>

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<sup>6</sup>Of course, local banks still helped finance commercial paper by providing bridge loans to local commercial paper houses.

<sup>7</sup>Recall that commercial paper is held almost exclusively by banks during the early period, but in the later period is held outside of banks. This distinction is important, and

The postwar reemergence of the commercial paper market was driven by the growth of finance companies and the demand for a liquid and safe asset. Until the advent of large negotiable CDs in 1961, there were few other liquid assets with attractive rates. Nevertheless, the commercial paper market did not explode until the late 1960s, when regulatory restrictions gave it a tremendous boost.

During the credit crunch in late 1966, open market rates exceeded the Regulation Q ceilings that banks could pay on CDs. As a result, banks could not raise money to satisfy the robust loan demand during the Viet-Nam War expansion. Banks funded loans in part by raising funds through their subsidiaries in the paper market and nonfinancial firms went directly to the commercial paper market. Schadrack and Breimyer (1970) maintained that the Regulation Q ceilings created a classical credit crunch. Restrictions on deposit interest rates reduced the supply of bank loans and encouraged the growth of the commercial paper market.

The rapid growth in commercial paper crashed to a temporary halt with the Penn Central failure in June 1970. Calomiris (1994) argues that the failure produced a reexamination of the pricing of risk in the commercial paper market, and led to the introduction of formal rating of commercial paper programs. The crisis also ushered in a new institutional feature: “backup lines” for commercial paper programs, issued by banks and required by rating agencies. Generally, these backup lines do not provide an absolute bank guarantee of repayment to commercial paper holders. Nevertheless, the existence of the backup lines is a “liquidity enhancement” which makes it easier for firms to obtain alternative financing in the event that firms have difficulty rolling over their paper (Calomiris, 1989).

The slowdown in the growth of commercial paper in the early 1970s reflected the influence of voluntary restraints on administered interest rates, such as the prime rate (Hurley, 1977). The volume of outstanding paper shrank and the commercial paper rate rose substantially above the prime rate in 1973. The commercial paper market bounced back in the mid-1970s. The next growth phase began because commercial paper became (i) a cheap source of funds after the Carter era controls on interest rates were dropped and (ii) increasingly attractive to investors as the Regulation Q ceilings were binding once again.

The institutional reforms introduced in the wake of the Penn Central crisis had set the stage for orderly growth without any fear of “runs” on paper like that produced by the Penn Central crisis. Finally and most importantly, the growth of money-market mutual funds increased the demand for commercial paper dramatically. The money-market funds influenced the development

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can create problems for macroeconomists who use the ratio of commercial paper to bank loans *historically* as an indicator of the relative size of “bank” credit.



of the market by restricting their (rapidly growing) portfolios to top-rated paper with ratings from both major rating agencies.

Commercial paper outstanding continued to grow rapidly in the 1980s (Post, 1992). This growth occurred despite the fact that regulation no longer afforded any advantage to commercial paper — both Regulation Q and reserve requirements on CDs disappeared. Nevertheless, commercial paper financing remained attractive because many industrial borrowers were more creditworthy than the banks themselves, which made it difficult for banks to compete for their business. Moreover, there was a general preference for short-term financing in an era of high interest rates. Finally, commercial paper participated in the general run-up in debt during the 1980s.

Recently, the slow start of the current expansion, a general increase in the riskiness of corporate borrowers, and a tightening by the SEC of the rules governing money-market fund holdings of commercial paper combined to shrink the commercial paper market in 1991–92 (Post, 1992). It is also possible that — in keeping with its general tendency to grow countercyclically — the decline of 1991–92 reflected, in part, a normal cyclical response (see the discussion below).

The number of commercial paper issuers (both financial and nonfinancial) has approximately quadrupled in the last twenty years. Moody's rated programs for key years are as follows (as of January 1st):

	<u>Total</u>	<u>Domestic</u>
1973	534	N/A
1977	537	N/A
1981	786	768
1985	1185	1025
1989	1477	1177
1992	1763	1299
1994	1905	N/A

The number of domestic programs was 97 percent of the total in 1981 but only 68 percent in 1992 (Post, 1992). The rapid increase in the number of issuers in the last decade was mainly due to the growth of foreign programs.

The holders of commercial paper have changed over the years primarily because of the advent of money-market mutual funds. Post (1992) reports that at the end of 1991 the holders with more than a five-percent share of all commercial paper were:

Money-market mutual funds	33.9%
Households, trusts, and nonprofits	29.3
All retirement plans	10.2
Nonfinancial corporate business	9.4

Commercial paper is a highly liquid, low-risk, short-term asset. Most commercial paper is top rated by one or more of the four credit-rating agencies (Moody's and Standard and Poor's are the most prominent; Duff and Phelps and Fitch rate only a few hundred CP programs) and, as noted earlier, virtually all paper is backed by bank credit lines (see Hahn, 1993).<sup>8</sup> In many cases where the paper issuer may be as creditworthy as any bank, the paper is still backed by a bank line of credit, although it is often only a partial backing. Often the holders of CP demand this extra insurance, and since 1991 SEC regulations have restricted the holdings of below-top-rated CP by money-market mutual funds.

## 2.2 *Commercial paper and corporate finance*

Secular growth in commercial paper has made it an important source of corporate finance although it does not threaten the place of more traditional forms of finance. From 1973 to 1993, real commercial and industrial loans of the commercial banks grew by 0.8 percent per year while real nonfinancial commercial paper outstanding grew by 8.8 percent per year.<sup>9</sup> Nevertheless, C&I loans at the end of 1993 were still more than three and one-half times as large as nonfinancial commercial paper outstanding. Data at the end of selected years in billions of 1987 dollars are as follows:

	<u>Real nonfinancial commercial paper</u>	<u>Real C&amp;I loans</u>
1978	31.9	400.3
1983	52.5	471.2
1988	97.5	571.3
1993	122.1	457.2

Chart 1 shows that the ratio of nonfinancial commercial paper to GDP has grown from 0.5 percent of GDP in 1969 to about 2.5 percent and that the cyclical fluctuations in commercial paper outstanding are quite large.

Most commercial paper is issued by financial companies. Nonfinancial issuers accounted for 25 percent of all commercial paper in 1991 and this

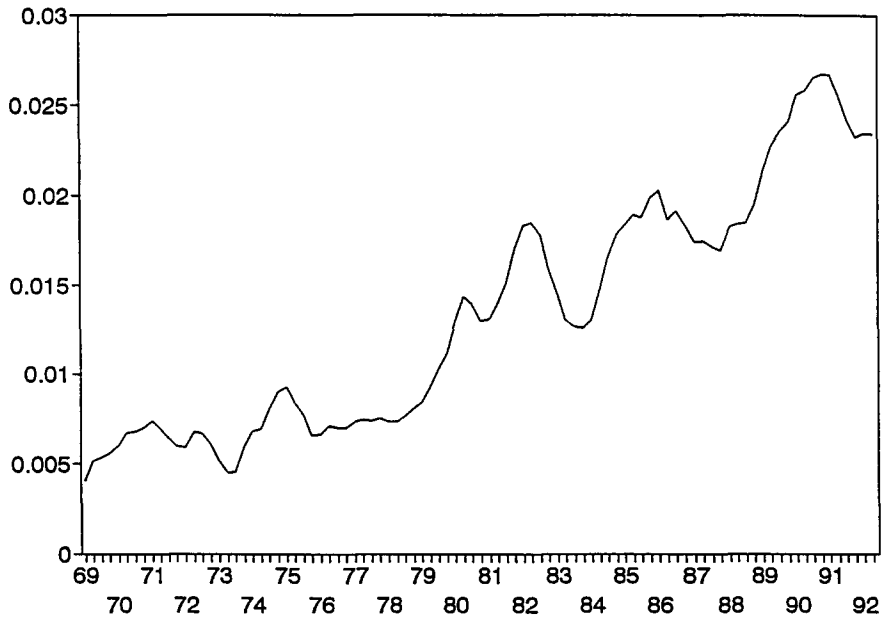
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<sup>8</sup>At the end of 1989, 86 percent of the Moody's rated programs had the top (Prime-1) rating. The relationship between CP and bond ratings in our data set is described below in Section 4.

<sup>9</sup>Data for nonfinancial commercial paper (Citibase series FCPNF) are from the Federal Reserve Bank of New York, and C&I loans (series FCLCI) are from The Board of Governors. The series are deflated by the monthly implicit price deflator for personal consumption expenditures.

# Chart 1

Ratio of Nonfinancial Commercial Paper to GDP



proportion has not changed dramatically in the last 20 years. Nevertheless, commercial paper has become an increasingly important source of funds for nonfinancial firms. The emphasis on the growth of nonfinancial commercial paper in recent years tends to make observers forget that although the market is quite large, commercial paper is just one of many sources of financing for the nonfinancial sector. At the end of 1991, the credit market debt of the nonfinancial nonfarm corporate sector (\$2.3 trillion in total) was distributed among the following instruments:

Bonds and mortgages	60.8%
Bank loans	23.3
Commercial paper	4.3
Other loans	11.5

Commercial paper was 6.1 percent of all short-term liabilities (nonmortgage loans, short-term paper, taxes payable, and trade debt). Thus, other balance-sheet items can be used, even in the short-run, to accommodate financing needs. For example, net trade credit of the sector is almost twice as large as commercial paper borrowing.

Because commercial paper has a short-term maturity, it is usually viewed as a short-term liability of the issuer, but this does not mean that issuers use paper only to finance short-term needs. Financial firms roll over their paper continuously. Similarly, nonfinancial firms often use commercial paper as financing for capital expenditures and roll it over continuously or until alternative financing is found. Thus, it is often correct to view commercial paper as long-term financing with variable terms tied to short-term rates. FASB accounting rules allow firms that use commercial paper to finance capital expenditures to carry the commercial paper on their balance sheets as long-term debt (Stigum, 1983, p. 634).

### **2.3** *Cyclical movements in commercial paper*

The unusual countercyclical behavior of commercial paper outstanding was first observed by Selden (1963) who showed that in each of three recessions — 1953–54, 1957–58, and 1960–61 — the growth in commercial paper outstanding accelerated in the recession, then declined in the early part of the expansion and grew moderately for the remainder of the expansion. The cyclical behavior of commercial paper outstanding in the last five recessions is quite similar. Chart 2 shows the behavior of nonfinancial commercial paper outstanding around the five business-cycle peaks from December 1969 to July 1990, with each series normalized at the value in the peak month. In each instance, the value outstanding increased in the recession and, with

the exception of the last recession, outstanding paper rose by more than 20 percent within 6 months of the peak.

Recent research on commercial paper (notably Kashyap, Stein, and Wilcox 1993) has emphasized the cyclical behavior of the capital structures of firms. Specifically, commercial paper and bank loans tend to move in opposite directions over the business cycle. Charts 3 and 4 show the ratios of bank loans and commercial paper, respectively, to the total credit market debt of the nonfarm, nonfinancial corporate business sector from the Flow of Funds. There is some indication that the fall in bank lending in the late 1970s was offset by commercial paper, but the same observation cannot be made for the large decline in bank lending since the mid-1980s.

Of course, simple flow of funds accounting is not ideal for testing this proposition, since shocks to bank loan supply may affect the general state of the economy, which then affect the movements in loans and commercial paper for other reasons. VAR analysis of impulse responses offers more support for the proposition that tight monetary policy leads to a rise in commercial paper. Most notably, Friedman and Kuttner (1993a) find that any impulse that produces a decline in economic activity tends to be associated with an increase in outstanding nonfinancial commercial paper.

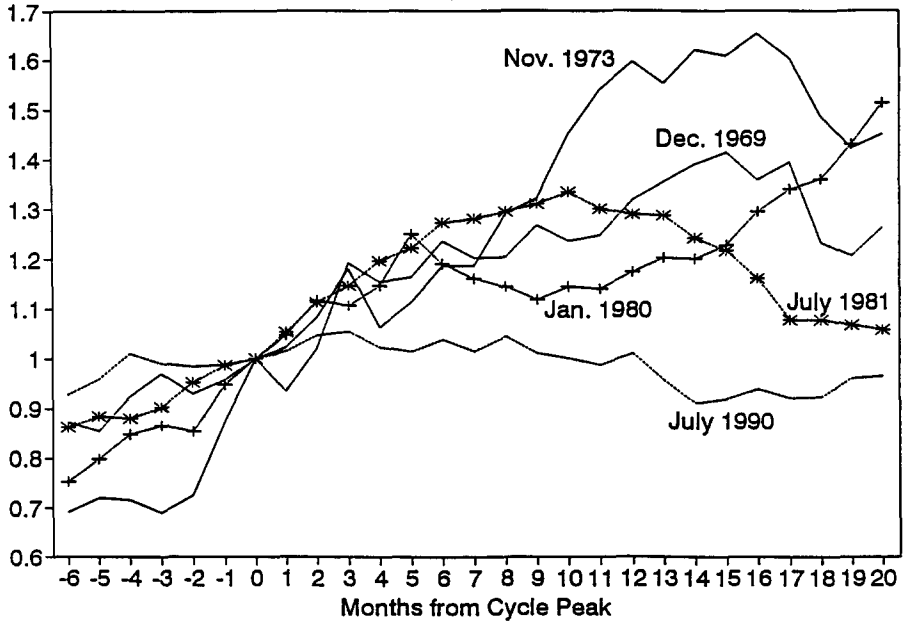
### **3 Theoretical perspectives**

The last decade has witnessed important changes in corporate finance theory and in the way macroeconomists conceive of the links between credit markets and economic activity. Prior to the 1980s, macroeconomic models (for example, the textbook IS-LM model) were built around a single market for credit, and featured an equilibrium interest rate equal to the marginal product of capital. Corporate finance theory was based on the Miller-Modigliani equivalence between bond and equity financing, and implied that corporate financing choices were largely governed by the tradeoff between the costs of bankruptcy (which favor equity) and the rules for taxing corporate income (which favor debt).

These modern approaches to corporate finance were dramatic departures from long-standing traditions that emphasized differences in access to particular credit markets (prominent examples include Butters and Lintner, 1945; Meyer and Kuh, 1957; Gurley and Shaw, 1960; and Minsky, 1975). Since the mid-1970s, new developments in the economics of information have paved the way for a renewed emphasis on the importance of credit-market constraints on investment and consumption (e.g., Leland and Pyle, 1977; Jaffee and Russell, 1976; Stiglitz and Weiss, 1981). We selectively review this literature and identify models that help us to understand the use of nonintermediated, short-term debt — that is, commercial paper — by nonfinancial firms.

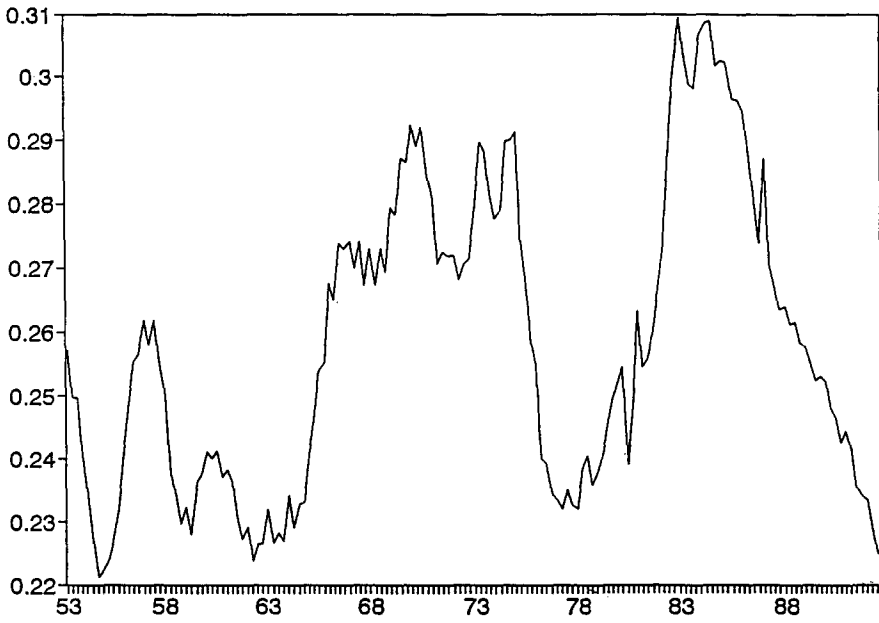
# Chart 2

## Nonfinancial Commercial Paper At Business Cycle Peaks



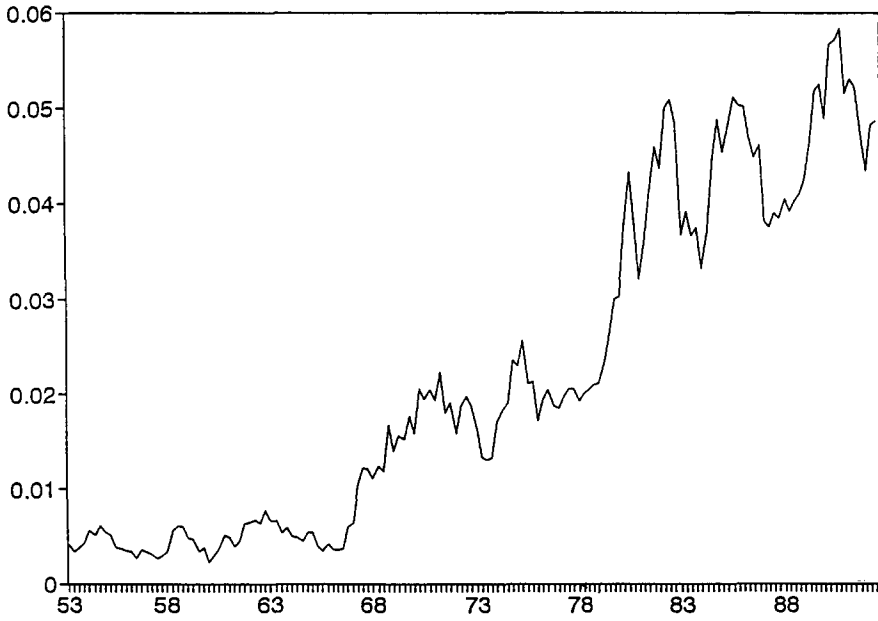
# Chart 3

Ratio of Bank Loans to Credit Market Debt



# Chart 4

Ratio of Commercial Paper to Credit Market Debt





There is a large literature that seeks to understand the role of intermediated debt (Diamond, 1984, 1991b; Rajan, 1992). The common theme emphasized by these researchers is that intermediaries specialize in information production, and banks further specialize in monitoring firms and enforcing contracts. This costly technology will be chosen by relatively unseasoned firms for whom the benefit of paying for these services exceeds the costs (Fama, 1985). Other firms, namely those that can cheaply and credibly communicate information without the assistance of intermediaries, can reduce these costs by placing their debt directly. This explains the existence of long-term bonds and commercial paper.

A large and growing set of empirical findings supports this view of intermediaries (banks in particular) as specialists in information and control who mainly serve unseasoned firms and charge significant premia for their services (James and Wier, 1989; Mackie-Mason, 1990; Booth, 1992; Slovin et al., 1993; Billett, Flannery, and Garfinkel, 1993; Petersen and Rajan, 1994). The adverse macroeconomic consequences of the absence of an effective banking system have also been analyzed in the empirical literature on economic fluctuations (Bernanke, 1983; Calomiris, Hubbard, and Stock, 1986) and on long-run growth (King and Levine, 1993; Wachtel and Rousseau, 1994).

The second important characteristic of commercial paper is its short-term maturity. Short-term debt is usually understood in terms of its incentive advantages over long-term debt (Harris and Raviv, 1990; Calomiris and Kahn, 1991; Calomiris, Kahn, and Krasa, 1992; Gertler and Hubbard, 1993). Short-term contracting limits the tendency of borrowers to increase asset risk after taking on debt. Required debt rollover implies a penalty to such a strategy that long-term contracting would not imply. This is especially true for outside debt contracts (bonds), since bondholders face costly coordination and free-rider problems in enforcing risk-limiting covenants.

Two alternatives to the incentive view of short-term debt that are relevant to understanding commercial paper are Diamond (1991a) and Gorton and Pennacchi (1990). Diamond (1991a) provides a model that explicitly addresses firms' choices among publicly traded long-term debt, commercial paper, and short-term bank debt. For reasons similar to those described above, he too argues that unseasoned credit risks will be forced to rely on intermediated, short-term debt. For firms that do not need to rely on intermediation, he uses an adverse selection model to argue that nonintermediated, short-term debt (commercial paper) will be chosen by high-quality firms.

In Diamond's (1991a) model, the maturity structure of the firm's public debt recognizes the potential costs of financial distress from short-term debt — the possibility that the market will downgrade a firm when it comes to the market to roll over its debt (what he calls "liquidity risk") — and the potential benefits of being able to renegotiate debt when favorable inside

information is revealed. Firms that know their ratings will improve will prefer short-term debt because the benefits outweigh the costs. Under these circumstances choosing short-term debt provides a signal of high firm quality. This model is capable of explaining why high-quality firms that expect their ratings to improve because of future revelation of private information will choose to issue commercial paper to finance long-term projects.

Despite some attractive features of this model, it does not provide a fully general explanation for the use of commercial paper. The model explains why some firms enter the commercial paper market briefly, but it does not explain the protracted use of the market by the very highest rated firms. Given that many commercial-paper issuers maintain AA or AAA credit ratings continuously for long periods of time, it is hard to imagine that they are entering the market in anticipation of an upcoming increase in their creditworthiness.

Moreover, adverse selection models do not seem plausible when applied to enormous, publicly traded firms. Like those that issue commercial paper. For example, utilities are highly regulated enterprises subject to little fundamental uncertainty or inside information, but they are regular issuers of commercial paper.

Finally, given the small potential gains from upgrades for many firms, the transaction costs of placing short-term debt are likely to outweigh possible benefits from ratings upgrades. Dealers' commissions on commercial paper average roughly 1/8 of one percent (Stigum, 1983, p. 639), and backup lines from banks can cost as much as 1/4 of one percent (Stigum, 1983, p. 634). In contrast, the imputed annual cost of the underwriting spread for placing highly rated long-term debt is essentially zero.<sup>10</sup>

Gorton and Pennacchi (1990) provide an interesting alternative perspective on financial intermediation which is useful for understanding the existence of commercial paper. Their view is that intermediaries create liquid assets — assets that “can serve as the basis of a safe security that may be used by uninformed agents for transactions purposes” (p. 51). However, Gorton and Pennacchi argue that bank intermediation is not the only means of creating liquid assets. There are some firms with asset characteristics that are sufficiently similar to financial intermediaries that they can also directly issue liquid securities.

Limits to entry in the production of liquid securities and the extent of demand for such securities imply that only the highest quality credit risks issue money-market instruments like commercial paper.<sup>11</sup> These money-market in-

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<sup>10</sup>Fees for all industrial bond issues of greater than \$100 million average less than one percent, but are much lower for the typical issues of highly-rated firms (Cohan, 1961; Hansen and Torregrossa, 1993).

<sup>11</sup>Interest rate spreads provide some indication that commercial paper is a highly liquid, low-risk security. Interest rates on commercial paper and bank CDs have moved together very closely for the past 20 years. For 3-month rates, the spread exceeds 40 basis points

struments will have a “liquidity premium” which reduces the costs of issuance and provides the incentive for firms to do so. This explains why commercial paper exists and is issued almost exclusively by high-quality credit risks. Issuing firms have access to other credit markets but are willing to bear the transactions costs of constantly rolling over short-term debt as long as the “liquidity premium” outweighs the transactions cost.<sup>12</sup>

Our focus in the next section of this paper is on differences across firms that are associated with differential access to debt markets, and particularly to markets for rated short-term public debt (commercial paper) and rated long-term public debt (bonds). We sort firms according to their access to long-term and short-term public-debt markets and examine their characteristics.

Consistent with the Gorton-Pennacchi view, and contrary to the incentive view, we find that commercial paper issuers are of the *highest quality* in the sense that they present the least possible risk to short-term holders of money-market instruments. While it is widely known that commercial paper is used by many high-quality firms, ours is the first systematic study of which we are aware that identifies the characteristics of issuers and nonissuers and the determinants of within-firm variation in commercial paper issuance. Consistent with the incentive view, we find that firms for which information problems are likely to be most severe are less likely to have access to public-debt markets. But the characteristics of firms that use the commercial paper market do not indicate that short-term public debt is used as a disciplinary device. Rather, it seems that access to the commercial paper market is restricted to a small number of high-quality firms for whom the liquidity premium exceeds the rollover costs.

#### 4 Panel-data evidence on commercial paper issuers

Our data set combines quarterly data on commercial paper (ratings and amounts outstanding) provided by Moody’s with quarterly and annual accounting data obtained from Standard & Poor’s Compustat. The data from Moody’s include all commercial paper programs rated by Moody’s from the second quarter of 1985 through the first quarter of 1992, so that at most 26 quarters of data are available for each firm. Our universe is the set of all man-

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only during the periods of high interest rates around the first oil price shock and again in the early 1980s. The spread has been less than 20 basis points since the end of 1984. Indeed, given the close correspondence between rates on CDs and commercial paper, it is surprising that the Federal Reserve places the two assets into different monetary aggregates. CDs are included in the definition of M3, while commercial paper is included in L, but not in M3.

<sup>12</sup>Schnure (1994) introduces the idea of a clientele effect in the commercial paper market which can be interpreted as a liquidity premium for near-riskless debt.

ufacturing firms (SIC codes 2000 through 3999) appearing on Compustat's quarterly and annual files over the same time period, excluding subsidiaries and nondomestic firms. We do *not* require a firm to have all 26 quarters of data in order to appear in our panel. Instead, our panel is "unbalanced" to allow for entry and exit. The above criteria generate an initial universe of 3383 firms. Of these, 270 have data on commercial paper programs that are rated by Moody's.<sup>13</sup> Since smaller programs are often rated by only one agency, we use Compustat data (Standard and Poor's ratings) to identify an additional 56 programs.<sup>14</sup> Compustat data were also used to identify firms that issue bonds.

Table 1 summarizes the frequency distribution of firms according to their long-term debt ratings and access to commercial paper markets.<sup>15</sup> Firms are grouped into five categories: AA or AAA bond ratings, A ratings, B ratings, below B ratings, and no bond rating. The columns of Table 1 further subdivide firms according to whether the composition of their public debt (if any) consists of bonds or commercial paper or both.<sup>16</sup> Of the AA or AAA firms, 94 percent have commercial paper programs, while 82 percent of the A-rated firms have commercial paper programs. These numbers indicate that a high rating in long-term credit markets is a pretty good indicator of access to commercial paper markets, but it is still the case that 25 percent of B-rated firms issue commercial paper, illustrating that high long-term credit quality

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<sup>13</sup>There were about 15 firms with more than one program. For these firms we assigned the rating of the largest program to the firm and used the sum of all programs. In most cases, the amounts outstanding of all but one program were zero.

<sup>14</sup>For these firms, commercial paper outstanding is not available since this is not a data item on Compustat. These firms make a relatively small contribution to the sample of paper issuers. In the second quarter of 1985, there were 45 such firms with aggregate sales amounting to 9.6 percent of the total sales of firms with commercial paper programs and 5.2 percent of the total sample.

<sup>15</sup>The bond and commercial paper ratings prepared by Moody's, Standard and Poor's, and others are enormously important in determining access to capital markets and the cost of capital. The ratings are derived from an informal analytic framework that weighs numerous factors including many subjective judgments.

For example, the rating criteria for Standard and Poor's industrial bond ratings includes business risks and financial risks (see Standard and Poor's, 1992). Business risks can further be divided into industry characteristics (prospects, competition) and issuer characteristics (diversification, market share, evaluation of management). The analysis of business risk determines the financial risks appropriate for a given rating. Financial risk is measured quantitatively with a great reliance on financial ratios. These include profitability (return on capital), capital structure (e.g., debt-equity ratio), off-balance-sheet liabilities, cash flow adequacy, and financial flexibility. Commercial paper ratings are largely based on the same information and are therefore (not surprisingly) closely related to bond ratings. Greater emphasis is placed on liquidity considerations in determining the commercial paper ratings.

<sup>16</sup>We do not distinguish among commercial paper ratings since virtually all paper receives the top rating.

is by no means necessary for access to commercial paper. At the lowest end of the quality spectrum, virtually none of the firms with low or no bond rating have access to the commercial paper market. Clearly, there is a close association between long-term credit quality and commercial paper issuance. The final row of Table 1 indicates that neither is particularly common; 20 percent of the firms in our sample have access to long-term bond markets, while just 8 percent have access to commercial paper markets.

Table 1:  
Distribution of Firms over Bond Ratings and Debt Usage

Bond Rating	Firm Classification by Debt Usage		
	No Bonds, No Paper	Bonds, No Paper	Both Bonds and Paper
AAA or AA	0	4	60
A	0	23	103
B, BB or BBB	0	280	87
Other Rating	0	78	1
No Rated Bonds	2684	3	3
Total	2684	388	254
Percent of firms	(80%)	(12%)	(8%)

*Notes:* The sample universe is the set of U.S. manufacturing firms (3326) appearing on Compustat over the period 1985 to 1991. A firm is classified as a bond issuer or commercial paper issuer if it has a rating from either Moody's or Standard and Poor's in any quarter between 1985-II and 1991-I. The rating class for a firm is the average rating over the period where ratings categories are assigned numerical values for the purposes of calculation.

Comparing the financial statements of issuers and nonissuers reveals some interesting differences. Table 2 reports means of firm-level variables divided into the same three categories as Table 1: firms with no bonds, firms with bonds but no commercial paper, and firms with both bonds and commercial paper. The means are significantly different across groups for every firm characteristic except sales growth. There are important differences among the categories, and in many cases firms with bonds but no commercial paper appear as an intermediate category between firms with both and firms with neither. The first obvious point is that commercial paper issuers are much larger than nonissuers (measured here by quarterly sales). Commercial paper issuers also have lower ratios to capital of sales, debt, inventories, and financial working capital. Finally, commercial paper issuers appear to have less volatile fundamentals, as indicated by their lower standard deviations of the ratios of earnings-to-capital and sales-to-capital. (In all of the above

comparisons, the results are robust to using sales instead of capital as the scaling factor.) The components of financial working capital that differ most across classes are cash assets and short-term debt; neither accounts receivable nor accounts payable explains the low average working capital ratios of issuers. The results reported in Table 2 are unaffected when we control for industry effects by examining the firms in each two-digit SIC code separately.

The simple comparisons of means confirm our expectations about the character of firms with access to the commercial paper market. First, the low sales-to-capital ratios of commercial paper issuers (0.95 vs. 1.59 for those issuing neither bonds nor paper) may reflect lower costs of capital, which in equilibrium would imply more capital-intensive production. Or, it could be that the capital-intensity of commercial paper issuers reflects the age and maturity of such firms, where mature firms have reached their long-term desired levels of capital intensity. Second, the lower standard deviations of the sales-to-capital ratios (0.17 vs. 0.42) and earnings-to-capital ratios (0.04 vs. 0.11) of issuers are consistent with lower fundamental risk and thus higher credit ratings. Third, commercial paper issuers hold lower stocks of inventories-to-capital (0.58 vs. 1.26), which like the sales-to-capital ratios may reflect differences in factor costs related to capital market imperfections (more on this below). Fourth, the lower levels of financial working capital (0.05 vs. 0.51) are particularly striking, and are consistent with the view that firms maintain positive net levels of short-term financial assets in order to compensate for inferior access to credit. This implies that firms with access to commercial paper markets need not hold precautionary savings. It also seems that access to bond markets reduces the need to maintain large stocks of liquid assets.

Stocks of inventories and financial working capital relax financing constraints in two ways. First, both are preferred forms of collateral for bank loans. Inventories (particularly in the form of raw materials, which constitute the bulk of inventories) are easily appraised and easily liquidated. Thus firms that depend on banks for credit may find it advantageous to select material-intensive production techniques, or may be required by lending covenants to maintain minimum amounts of working capital. Second, firms with high costs of external finance may use financial working capital as a “self-insurance” device. If a firm knows that it will have trouble raising funds, it may choose to accumulate financial working capital during high-earnings periods so that it can draw down its war chest during low-earnings periods. To the extent that there are costs to interrupting fixed capital investment, R&D, or even such financial activity as dividend payments, this strengthens the firm’s incentive to accumulate buffer stocks of financial working capital.

Recent empirical studies have confirmed the role of financial working capital as a self-insuring device for finance-constrained firms. Kashyap, Lamont,

Table 2:  
Firm Characteristics by Debt Classification, Quarterly Data

Table entries are sample means of firm-year observations on levels and ratios, except for standard deviations, which are firm observations.

Firm Characteristic	Firm Classification by Debt Usage		
	No Bonds, No Paper	Bonds, No Paper	Both Bonds and Paper
Sales	55.86	395.30	1521.50
Sales/K	1.59	1.21	0.95
OPINC/K	0.12	0.11	0.13
Sales Growth	0.01	0.02	0.01
FWC/K	0.51	0.36	0.05
FWC/Sales	0.29	0.29	0.03
ACCPAY/Sales	0.32	0.32	0.36
ACCREC/Sales	0.69	0.70	0.63
Net ACCPAY./Sales	-0.37	-0.37	-0.26
Inventories/K	1.26	0.86	0.58
Inventories/Sales	0.78	0.72	0.58
WCAP/K	1.89	1.32	0.63
WCAP/Sales	1.11	1.04	0.61
Short-Term Debt/K	0.39	0.25	0.20
CP.K	0.00	0.00	0.12
CP/(Short-Term Debt)	0.00	0.00	0.68
Long-Term Debt/K	0.60	1.09	0.61
Total Debt/K	1.09	1.41	0.85
<i>Std</i> (OPINC/K)	0.11	0.07	0.04
<i>Std</i> (Sales/K)	0.42	0.30	0.17
Number of Firms	2684	388	254

*Notes:* See note to Table 1 on sample selection and classification. All the means of the characteristics are significantly different across classifications at the one-percent level except sales growth. *Variable Abbreviations:* K = net stock of property, plant and equipment; OPINC = operating income; WCAP = working capital; ACCPAY=accounts payable; ACCREC=accounts receivable; FWC=financial working capital (working capital minus inventories); *Std*(x)=firm-specific standard deviation of x; CP=commercial paper.

and Stein (1994) find that sensitivity of inventories to financial working capital is only apparent in firms without bond ratings. Carpenter, Fazzari, and Petersen (1994) find that inventory responses to earnings are larger for small firms than for large firms, which they interpret as evidence that finance-constrained firms use inventories to offset fluctuations in earnings, and thus maintain smooth fixed capital investment. Calomiris and Hubbard (1994) find that firms facing high costs of external finance display the greatest earnings sensitivity of working capital to earnings, and that the elasticity of working capital with respect to earnings is much higher than that of fixed capital. In the next section we report similar findings of greater sensitivity of inventory and financial working capital investment to earnings for nonissuers than for issuers. These facts — like the comparison of means in Table 2 — are consistent with the notion that constrained firms accumulate financial working capital to increase their access to bank credit and to insulate capital and inventory investment from earnings disturbances.

We further investigate the connection between credit quality and working capital ratios in Table 3, where we divide firms according to the five bond 2-2 rating categories described above. As in Table 2, the patterns are monotonic in ratings and all the means are significantly different across groups with the exception of sales growth. Inventory ratios and financial working capital ratios increase as credit quality declines. The evidence in Tables 1 through 3 indicates that commercial paper issuance and high long-term credit quality are closely associated. High bond ratings and access to the commercial paper market are determined by very similar combinations of fundamental firm characteristics.

We now turn to the question of whether the firm characteristics that permit access to the commercial paper market are adequately summarized by its long-term credit rating, or whether there are additional firm attributes that distinguish short-term creditworthiness from long-term creditworthiness. The four columns of Table 4 address this question with probit results that predict: (i) access to the bond market, (ii) a high bond rating, (iii) the existence of a commercial paper program, and (iv) a commercial paper program that is active. Because the regressors in these probits are not strictly exogenous ( e.g., access to commercial paper markets — the dependent variable in column 3 — may induce firms to hold lower levels of financial working capital), we view these probit results as a useful summary of the partial correlations in the data. For example, the differences in means shown in Table 2 may be driven by differences in the sizes of firms rather than differential access to capital markets. The probit results control for this because firm size appears as an independent variable in the estimation.

The first column in Table 4 examines firm characteristics (averaging over time using annual Compustat data for the sample period) associated with



Table 3:  
Firm Characteristics by Bond Rating, Quarterly Data

Table entries are sample means of firm-year observations on levels and ratios, except for standard deviations, which are firm observations.

Firm Characteristic	Bond Rating				
	No Rating	Other Rating	B, BB, or BBB	A	AA or AAA
Sales	61.83	113.70	430.84	982.01	3524.55
Sales/K	1.58	1.37	1.11	0.99	0.93
OPINC/K	0.12	0.10	0.11	0.12	0.15
Sales Growth	0.01	0.01	0.02	0.01	0.02
FWC/K	0.50	0.18	0.32	0.07	0.06
FWC/Sales	0.29	0.04	0.25	0.10	0.05
ACCPAY/Sales	0.32	0.37	0.34	0.34	0.33
ACCREC/Sales	0.70	0.71	0.70	0.64	0.68
Net ACCPAY./Sales	-0.37	-0.34	-0.34	-0.28	-0.28
Inventories/K	1.25	1.01	0.77	0.65	0.47
Inventories/Sales	0.78	0.78	0.69	0.63	0.48
WCAP/K	1.88	1.34	1.16	0.72	0.54
WCAP/Sales	1.10	0.84	0.96	0.74	0.54
Short-Term Debt/K	0.39	0.40	0.21	0.19	0.25
CP.K	0.13	0.00	0.07	0.12	0.15
CP/(Short-Term Debt)	0.74	0.00	0.60	0.76	0.64
Long-Term Debt/K	0.60	1.28	1.03	0.59	0.41
Total Debt/K	1.08	1.82	1.31	0.78	0.66
Std(OPINC/K)	0.11	0.09	0.06	0.04	0.03
Std(Sales/K)	0.42	0.38	0.26	0.16	0.11
Number of Firms	2700	79	367	126	64

*Notes:* See notes to Table 1 and 2 for details on sample selection and classification and for variable abbreviations. The means of all characteristics (except sales growth) are significantly different across classifications at the one-percent level.

Table 4:  
Cross-Section Probit Regressions for Debt Indicators

A value of one is assigned to the dependent variables in columns one, three, and four if the firm has a rating in any of the 26 consecutive quarters. The dependent variable in column two is assigned a value of one if the average rating (see notes to Table 1) is in the range of AA to AAA. Regressors are firm-specific means of ratios using annual data, except for the standard deviation of operating income, which is calculated using quarterly data. Standard errors appear in parentheses.

Regressors	Dependent Variable			
	Bond Issuer Any Rating	Bond Issuer AA or AAA	CP Program	CP Program and CP > 0
Intercept	-12.073 (1.007)	-37.811 (7.492)	-34.821 (4.191)	-33.070 (4.567)
<i>Std</i> (OPINC/K)	3.379 (1.694)	-29.267 (10.421)	2.038 (4.390)	-10.405 (5.497)
OPINC/K	-0.219 (0.191)	4.964 (0.899)	1.035 (0.465)	1.268 (0.523)
Sales/K	-0.226 (0.090)	0.768 (0.321)	-0.454 (0.163)	-0.427 (0.171)
(Sales/K) <sup>2</sup>	0.005 (.0006)	-0.076 (0.027)	0.011 (0.012)	0.017 (0.013)
Inventory/K	0.134 (0.133)	-2.754 (0.843)	0.996 (0.353)	0.965 (0.400)
log(Sales)	2.933 (0.294)	6.805 (1.652)	7.761 (1.075)	7.134 (1.149)
log(Sales) <sup>2</sup>	-0.145 (0.023)	-0.329 (0.094)	-0.445 (0.069)	-0.397 (0.072)
% Years with Dividend > 0	-0.718 (0.181)	1.064 (1.008)	0.932 (0.416)	0.512 (0.465)
(Cash-S.T.Debt) /Sales	0.987 (0.334)	0.589 (1.665)	-3.541 (1.459)	-3.939 (1.564)
ACCPAY/Sales	4.932 (2.102)	-3.100 (6.098)	-2.552 (3.798)	-2.025 (4.046)
ACCREC/Sales	1.577 (0.966)	1.264 (2.488)	6.251 (2.029)	5.570 (2.129)
Dummy=1 if bond rating AA,AAA	—	—	3.872 (0.758)	2.784 (0.508)
Dummy=1 if bond rating A	—	—	2.712 (0.376)	2.462 (0.389)
Dummy=1 if bond rating B,BB,BBB	—	—	1.167 (0.299)	1.392 (0.368)
Dummy=1 if bond rated below BBB	—	—	-0.686 (1.090)	-21.532 (25.981)

*Notes:* Sample size is 2298. For brief description of sample selection, see notes to Table 1; for variable abbreviations, see notes to Table 2.

having rated long-term debt. Not surprisingly, larger firms and firms with lower sales-to-capital ratios are more likely to have long-term bonds. Perhaps more surprisingly, firms with bond ratings, *ceteris paribus*, have lower levels of operating income, have higher standard deviations of operating income, are less likely to pay dividends (presumably in part because they rely more on debt), and maintain higher levels of accounts payable and receivable. The results on bond issuers' characteristics give a somewhat mixed picture, with perhaps the biggest puzzle coming from the dividend result, but these results are not central to our focus and so we turn to the determinants of commercial paper issuance and bond quality.<sup>17</sup>

The second column in Table 4 measures factors that contribute to AA or AAA bond ratings. Not surprisingly, the highest-quality bond issuers are large firms with low standard deviations of earnings and high average earnings ratios. They are also more likely to issue dividends (possibly an indicator of low costs of external finance, as discussed in Fazzari, Hubbard, and Petersen, 1988, and Calomiris and Hubbard, 1994), although the dividend variable (which measures the percentage of years of positive dividends) is not statistically significant.

The last two columns in Table 4 consider factors that account for access to the commercial paper market, after controlling for long-term credit quality using bond ratings. We consider two measures of "access": first (in column 3), whether the firm has a commercial paper rating during our sample period; and second (in column 4), whether the firm actually issues any commercial paper during our sample period. Interestingly, the results for the CP-rated firms and the CP-issuing firms are different. The two probit models have many features in common – the coefficients on bond rating indicators, the importance of higher profits, larger size, higher inventories, lower cash-net-of-debt, higher accounts receivable, and a greater likelihood of dividend payments. But the standard deviation of earnings is insignificant for CP-rated firms and highly significant for CP-issuing firms, after controlling for long-term debt quality. In other words, volatile cash flow seems to force firms out of the commercial paper market rather than into it.

The positive effect of inventories and accounts receivable in the commercial paper probits is also interesting, given that on average (without controlling for size, long-term credit risk, and profitability) commercial paper issuers hold smaller amounts of inventories and financial working capital. It could be

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<sup>17</sup>The results on dividend payments are included primarily to allow comparisons with papers in the literature that have used low and infrequent dividend behavior as well as bond ratings to identify firms with restricted access to capital markets. The results in Table 4 do not necessarily favor one over the other, and it is important to remember that these results are conditioned on size and capital intensity. Simple correlations would undoubtedly reveal a much closer correspondence between dividend payments and bond usage.

that firms with large inventories and accounts receivable use the commercial paper market to give them greater flexibility in their short-term financing. It could also be that short-term creditworthiness requires more stringent standards than long-term creditworthiness, possibly because commercial paper serves as a money-market instrument (as in Gorton and Pennacchi, 1990). Thus part of the price of admission to the commercial paper market may be the maintenance of more liquid assets. The probits are not able to distinguish cause from effect in the relationship between paper issuance on the one hand and inventories and accounts receivable on the other. Correlations that we report below, however, suggest that commercial paper is used to finance changes in inventories and net accounts receivable, and support the notion that commercial paper provides flexibility for the financing of volatile short-term assets.

Recent research on the characteristics of firms that withdraw from the commercial paper market has also drawn attention to the high quality standards imposed by holders of commercial paper. Lucas and Noe (1989) and Fons and Kimball (1992) describe a process of “orderly exit” in the commercial paper market. As commercial paper borrowers’ credit deteriorates, and they receive a downgrading on their commercial paper, they exit from the market while still solvent, and this typically occurs before any defaults on long-term debt. This evidence on orderly exit complements our previous findings of high quality standards in the commercial paper market.

In Table 5, we report an “exit probit” as a function of firm financial condition. We relate earnings and sales changes to the probability of exit from the commercial paper market, where exit is defined to occur during a quarter that witnesses a transition from a positive outstanding amount of commercial paper to zero outstanding paper. We find a strong relationship between lagged earnings and sales and exit from the market. Declines in either sales or earnings increase the likelihood of exit with a four-quarter lag. This lag likely reflects delays associated with reporting earnings and sales data and with waiting for outstanding paper to mature.

## **5 Evidence on the costs of external and internal finance**

According to standard finance theory, the benefit of low-risk (high-credit quality) is a lower cost of raising funds. As discussed above, however, low risk may also reduce the problems associated with asymmetric information, and for the very best firms may permit access to the commercial paper market where the firm may be able to pay even lower rates of interest in exchange for supplying assets to the money market. The total return to a holder of commercial paper will be the pecuniary return plus the liquidity benefits from holding an asset that can be easily transformed into cash.

Table 5:  
 Probit Regressions to Predict Exit from the Commercial Paper Market

Sample is selected by using observations for which lagged CP is positive. Standard errors appear in parentheses.

Regressors	Dependent Variable - Exit Value of 1 if $CP_{t-1} > 0$ and $CP_t = 0$ ,
Intercept	-2.316 (0.185)
(OPINC/K) <sub>-1</sub>	1.518 (2.972)
(OPINC/K) <sub>-2</sub>	4.142 (3.260)
(OPINC/K) <sub>-3</sub>	-1.459 (3.407)
(OPIN/K) <sub>-4</sub>	-7.172 (2.825)
(Sales Growth) <sub>-1</sub>	-0.546 (1.068)
(Sales Growth) <sub>-2</sub>	1.066 (1.064)
(Sales Growth) <sub>-3</sub>	-0.282 (1.044)
(Sales Growth) <sub>-4</sub>	-2.826 (0.910)

*Notes:* Sample size is 2676. The number of exit events is 197. For variable definitions, see notes to Table 2.

For firms that cannot gain access to commercial paper markets, the shadow costs of short-term funds may be considerably higher. As we discussed in the last section, the same characteristics that allow firms access to commercial paper markets may also allow firms to reap the gains from not having to carry excessive financial working capital. Firms with high costs of external finance should not only carry higher average stocks of financial working capital, but should also display greater sensitivity to cash flow. Constrained firms will draw working capital down during low cash-flow periods and accumulate it during high cash-flow periods (Fazzari and Petersen, 1993). Similarly, fluctuations in cash flow will affect the inventory investment of constrained firms (Carpenter, Fazzari, and Petersen, 1994).

To test these propositions, we first run regressions of inventories and financial working capital on several lags of sales and earnings, estimating separate regressions for two subsets of firms: those that issue commercial paper and those that do not. By classifying firms according to their access to commercial paper markets, we are able to identify a subset of firms for which barriers to short-term credit are demonstrably low. According to the broad predictions of the theory, such firms should have a lower cost of short-term funds, and therefore should display lower sensitivity of inventory and financial working capital investment to cash flow.

These predictions are confirmed by the simple reduced-form results reported in Table 6. These regressions use annual data to estimate the sensitivity of inventories and financial working capital (scaled by fixed capital) to three lags each of the sales-to-capital and operating-income-to-capital ratios. These regressions control for firm fixed effects by differencing the specification and instrumenting using lagged regressors.<sup>18</sup> A comparison of the first two columns reveals much less cash flow sensitivity of inventory investment among firms with access to commercial paper markets. In particular, the sum of the operating income coefficients for nonissuers (“No CP”) is 0.468 and statistically significant, whereas the sum of coefficients for commercial paper issuers (“CP Issuer”) is 0.013 and statistically insignificant.<sup>19</sup>

We also estimate partial adjustment regressions for inventories using quarterly data. These are reported in Tables 7a and 7b. The underlying specifi-

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<sup>18</sup>Regressions with quarterly data are found in Tables 7a and 7b. Results similar to those in Table 6 also hold for quarterly data, but are more sensitive to the data transformations and instrumental variable methods used to control for fixed effects.

<sup>19</sup>Strictly speaking, unless the impact of investment on the sales and income ratios is zero, summing the coefficients gives the wrong measure of the cash-flow effect because it fails to capture feedback effects. But to the extent that these effects are small and/or similar across samples, it clearly gives a good first-order approximation. It is also possible that the coefficients overstate the financing impact of cash flow since cash flow is also a predictor of future returns to the investment (even with the inclusion of sales as a control). This point receives a formal treatment in Gilchrist and Himmelberg (1995).

Table 6:  
Inventory and Financial Working Capital Regressions, Annual Data

All specifications control for fixed firm and year effects. To control for firm effects, model is transformed to first-differences and estimated with 2SLS using lagged regressors as instruments to control for potential endogeneity induced by differencing if regressors are only weakly exogenous. Standard errors appear in parentheses.

	Inventory Investment		FWC Investment	
	No CP	CP Issuer	No CP	CP Issuer
Intercept	-0.026 (0.006)	-0.007 (0.006)	0.017 (0.015)	0.000 (0.015)
(Sales/K)	0.047 (0.006)	0.126 (0.013)	-0.143 (0.014)	-0.114 (0.032)
(Sales/K) <sub>-1</sub>	-0.045 (0.006)	-0.040 (0.013)	0.052 (0.014)	-0.016 (0.032)
(Sales Growth) <sub>-2</sub>	-0.020 (0.006)	0.005 (0.012)	0.024 (0.014)	-0.001 (0.029)
(OPINC/K)	0.231 (0.027)	0.010 (0.068)	0.762 (0.065)	0.096 (0.161)
(OPINC/K) <sub>-1</sub>	0.141 (0.026)	0.091 (0.066)	-0.314 (0.062)	-0.145 (0.158)
(OPINC/K) <sub>-2</sub>	0.096 (0.026)	-0.088 (0.061)	-0.172 (0.060)	0.123 (0.143)
Adjusted $R^2$	0.13	0.31	0.08	0.04

*Notes:* For brief description of sample selection, see notes to Table 1; for variable abbreviations, see notes to Table 2.

cation (without the addition of cash flow variables) assumes that firms have a long-term desired ratio of inventory to sales. Assuming a Koyck stock-adjustment process, one can express log inventories as a function of lagged log inventories, log sales, and the log of the long-run target ratio.<sup>20</sup> In time series data, the log target stock simply shows up in the constant term and poses no estimation problems. But with firm-level data, it makes sense to allow this term to vary across firms. Rather than apply standard panel data techniques such as differencing to condition on this term (see note 19), we chose instead to exploit the length of our panel — 26 quarters — to estimate this target ratio as the firm-specific mean of this ratio. These specifications are estimated using OLS and reported in Table 7a. The estimates in Table 7b are identical except that they use 2SLS with lagged regressors as instruments. This implies that the specification includes the expectation rather than the realization of log sales.

Under the restrictions implied (but not imposed) by the model, the coefficients on lagged log inventories and log sales should sum to one, and the coefficient on the log of the long-run target ratio should equal the coefficient on log sales. While these predictions of the model are not of direct interest to us, we note that they do not appear to be rejected by any of the specifications reported in Tables 7a and 7b. We also note that the coefficient on log sales is the partial adjustment parameter, and that these parameter estimates appear virtually identical across subsets of firms and alternative specifications.

Adding earnings to these equations is a way to test for excessive responsiveness to earnings in inventory accumulation, consistent with the buffer-stock view. We report three specifications – one with current operating

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<sup>20</sup>Specifically, the partial adjustment framework that we estimate allows the target ratio  $\alpha_i$  of the inventory-to-sales to vary across firms, so that

$$I_{it}^* = \alpha_i S_{it} e_{it}^\epsilon,$$

where  $I_{it}^*$  is the desired stock of inventories and  $S_{it}$  is sales. We assume a partial adjustment specification of the form:

$$(\log I_{it} - \log I_{it-1}) = \lambda(\log I_{it}^* - \log I_{it-1}) + u_{it}$$

so that the final specification is:

$$\log I_{it} = (1 - \lambda)\log I_{it-1} + \lambda\log S_{it} + \lambda\log \alpha_i + \lambda\epsilon_{it} + u_{it}.$$

We estimate the log target ratio,  $\log(\alpha_i)$ , for each firm using:

$$\frac{1}{T} \sum_{t=1}^T (\log I_{it} - \log S_{it}).$$



Table 7a:  
 OLS Estimates of Quarterly Inventory Regressions

Dependent variable is the log of inventories. Up to 26 quarters are used to obtain a consistent estimate (the sample mean) of the firm's long run inventory-to-sales ratio,  $\alpha_i$ . The log of this variable is included to control for fixed firm effects. Dummy variables are also included to control for fixed time effects, but are not reported below. Standard errors appear in parentheses.

Regressors	Firm Classification					
	No CP			CP Issuer		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
$\log(I)_{-1}$	0.522 (0.008)	0.533 (0.009)	0.501 (0.009)	0.225 (0.027)	0.224 (0.027)	0.223 (0.027)
$\log(S)$	0.479 (0.009)	0.469 (0.009)	0.499 (0.009)	0.779 (0.027)	0.780 (0.027)	0.781 (0.027)
$\log(\alpha_i)$	0.453 (0.009)	0.447 (0.009)	0.475 (0.009)	0.777 (0.028)	0.778 (0.028)	0.782 (0.028)
(OPINC/S)	0.257 (0.022)	0.262 (0.022)	0.109 (0.025)	0.006 (0.074)	0.010 (0.075)	-0.468 (0.158)
$(OPINC/S)_{-1}$	—	—	0.164 (0.014)	—	—	0.548 (0.161)
$(FWC/S)_{-1}$	—	0.080 (0.008)	—	-0.010 (0.037)	-0.010 (0.037)	—

*Notes:* For brief description of sample selection, see notes to Table 1. *Variable Abbreviations:*  $\log(I)$  = log of inventories;  $\log(S)$  = log of sales;  $\log(\alpha_i)$  = log of the firm-specific inventory-to-sales ratio; OPINC/S = operating-income-to-sales ratio; FWC/S = ratio of financial working capital to sales; CP = commercial paper.

Table 7b:  
2SLS Estimates of Quarterly Inventory Regressions

Dependent variable is  $\log(I)$ , the log of inventories. Regressions are estimated with 2SLS using lagged regressors as instruments. Up to 26 quarters are used to obtain a consistent estimate (the sample mean) of the firm's long run inventory-to-sales ratio,  $\alpha_i$ . The log of this variable is included to control for fixed firm effects. Dummy variables are also included to control for fixed time effects, but are not reported below. Standard errors appear in parentheses.

Regressors	Firm Classification					
	No CP			CP Issuer		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
$\log(I)_{-1}$	0.729 (0.016)	0.791 (0.022)	0.742 (0.018)	0.722 (0.077)	0.717 (0.078)	0.719 (0.084)
$\log(S)$	0.257 (0.016)	0.206 (0.021)	0.233 (0.019)	0.275 (0.077)	0.279 (0.079)	0.279 (0.085)
$\log(\alpha_i)$	0.235 (0.018)	0.204 (0.021)	0.224 (0.020)	0.264 (0.080)	0.268 (0.081)	0.267 (0.087)
(OPINC/S)	0.751 (0.046)	0.618 (0.058)	1.532 (0.164)	0.321 (0.102)	0.396 (0.132)	0.223 (1.085)
$(OPINC/S)_{-1}$	—	—	-0.230 (0.046)	—	—	0.088 (0.982)
$(FWC/S)_{-1}$	—	0.438 (0.089)	—	—	-0.178 (0.194)	—

*Notes:* For brief description of sample selection, see notes to Table 1. *Variable Abbreviations:*  $\log(I)$  = log of inventories;  $\log(S)$ =log of sales;  $\log(\alpha_i)$  = log of the firm-specific mean of the inventory-to-sales ratio; OPINC/S = operating-income-to-sales ratio; FWC/S = ratio of financial working capital to sales; CP = commercial paper.

income, one with both current and lagged operating income, and one including financial working capital in addition to operating income. In all cases, we find that the sensitivity to operating income is greatest for firms without access to public debt markets. Furthermore, these firms' inventories are relatively sensitive to their lagged stock of financial working capital. In Table 7b, the estimated effects are substantially larger for both classes of firms, but are more pronounced and more precisely estimated for the "No CP" firms. These results extend the results of Carpenter, Fazzari, and Petersen (1994) and Kashyap, Lamont, and Stein (1994) by demonstrating that access to commercial paper markets can be used to identify firms for whom the short-term cost of funds is relatively low.

We view these regressions, and the research of others who have found similar effects, as a suggestive first step, not as conclusive evidence for the existence of excess buffer stocks of working capital for finance-constrained firms. Nevertheless, these preliminary findings suggest that commercial paper issuers enjoy a lower shadow cost of short-term funds than a simple inspection of observed interest rates would reveal.

## 6 Evidence on commercial paper and the business cycle

In light of the microeconomic evidence presented thus far, the countercyclical behavior of commercial paper at the aggregate level is surprising. At the firm level, participation in the commercial paper market — as shown by Tables 2, 4, and 5 — is *positively* associated with sales and earnings. Additional evidence reported in Table 8 shows that the quarterly growth rates of commercial paper and sales are positively correlated (0.141); that is, at the firm level, commercial paper issuance is "procyclical."<sup>21</sup> Thus there is an apparent contradiction between the procyclicality of commercial paper at the firm level and the countercyclicality of commercial paper at the aggregate level. So why is there more commercial paper issuance in bad economic times? This section seeks to resolve the paradox.

We identify five possible explanations for the countercyclical behavior of aggregate commercial paper issuance. First, Friedman and Kuttner (1993a) estimate VARs with aggregate data that show commercial paper issuance responds positively to negative earnings impulses. This suggests that firms may use commercial paper to offset earnings shortfalls. Second, Kashyap, Stein, and Wilcox (1993) find that the ratio of bank loans to bank loans plus

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<sup>21</sup>In computing these correlations, we exclude from the analysis observations of zero outstanding paper. Thus our correlations only apply to changes in commercial paper in which the beginning and end period values of commercial paper are both positive. When we left in the zero-value observations, the correlations were qualitatively identical, but smaller, as many "zero" firms showed no change over long periods.

Table 8:  
Firm-Level Correlations with Commercial Paper, Quarterly Data  
Calculations are based on variables transformed by differencing (indicated by  $\Delta$ ).

Variables	One-Quarter Differences	Four-Quarter Differences
	$\Delta$ (CP/K)	
$\Delta$ (OPINC/K)	0.058**	-0.030
$\Delta$ (Sales/K)	0.124***	-0.007
$\Delta$ (INV/K)	0.072***	0.121***
$\Delta$ (ACCPAY/K)	-0.022	-0.027
$\Delta$ (ACCRC/K)	0.125***	0.104***
$\Delta$ (Net ACCRC/K)	0.130***	0.117***
	$\Delta$ log (CP)	
$\Delta$ log(Sales)	0.141***	0.156***
$\Delta$ log (INV)	0.095***	0.281***
$\Delta$ log (ACCPAY)	0.003	0.113***
$\Delta$ log (ACCRC)	0.166***	0.235***
	$\Delta$ (CP/Total Debt)	
$\Delta$ log (Sales)	0.149***	0.086***
$\Delta$ log (INV)	0.017	0.157***
$\Delta$ log (ACCPAY)	-0.004	-0.000
$\Delta$ log (ACCRC)	0.088***	0.133***

*Notes:* Correlations marked by \* are significantly different from zero at the 5% level, by \*\* at the 1% level, and by \*\*\* at the 0.1% level. Sample size is approximately 3000, depending on the variable pair. The selection of observations into the sample is conditional on commercial paper being positive in both the current and the relevant lagged quarter. Similar results are obtained when only one of either the current or lagged value was required to be positive. *Variable Abbreviations:* K = net stock of property, plant and equipment; OPINC = operating-income-to-sales ratio; ACCRC = accounts receivable; ACCPAY = accounts payable; INV = inventory stock.

commercial paper (the “mix”) is positively associated with various measures of economic activity. They interpret this as evidence that firms substitute away from bank loans into commercial paper during bank credit squeezes. Third, Gertler and Gilchrist (1993) find that large firms show substantial increases in inventories and short-term debt around cyclical peaks, suggesting that commercial paper (which is predominantly issued by large firms) may be financing the countercyclical movement of inventories.

A fourth explanation for the countercyclical movement of commercial paper is the need to finance trade credit. As the economy weakens, customers pay their bills more slowly and firms may extend more trade credit as a means of financing their customers’ short-term credit needs. Because high-quality firms have easy access to short-term debt through the commercial paper market, they in particular may serve as “intermediaries” for other firms experiencing liquidity problems during business-cycle downturns. Such high-quality firms may allow their customers — who are experiencing contractions in earnings or increases in unanticipated inventories — to expand accounts payable, effectively providing a “pass through” of commercial paper financing to the customers of commercial paper issuers.

Finally, it is possible that the increase in commercial paper during the onset of a recession reflects changes in the portfolio demand of investors, rather than increases in the demand for funds by issuers. As a low-risk, liquid asset, commercial paper may be in higher demand during a recession (i.e., there may be a “flight to quality”). For example, if tight monetary policy shrinks the supply of bank time deposits and CDs, this could shift demand to other money-market instruments, namely Treasury bills and commercial paper. Shifts in portfolio demand could also explain the countercyclical movement of the interest-rate spread between commercial paper and Treasury bills (Friedman and Kuttner, 1993a, 1993b; Bernanke, 1990; Stock and Watson, 1989). Because Treasury bills are more liquid and less risky than commercial paper, a flight to quality would cause commercial paper rates to fall by less than Treasury bill rates, thus explaining the movement of the spread.

The existing evidence using aggregate time series data cannot easily distinguish among these five explanations. For example, Kashyap, Stein, and Wilcox (1993) argue that the explanatory power of the “mix” (the ratio of bank loans to bank loans plus commercial paper) in investment and inventory equations is evidence for the bank-credit-substitution hypothesis.<sup>22</sup> However, Friedman and Kuttner’s (1993a) findings imply that any of the other mechanisms mentioned above could explain the same negative association between

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<sup>22</sup>Gertler and Gilchrist (1994) and Oliner and Rudebusch (1993) argue that the “representative firm” metaphor employed by Kashyap, Stein, and Wilcox (1993) oversimplifies the effects of tight bank credit because it does not discern differences in the responses of large vs. small firms.

aggregate economic activity and commercial paper. They show that the predictive power of the mix is driven by the quantity of commercial paper and that *any* negative shock to the economy — not just those associated with bank loan supply — produces an expansion in commercial paper. Thus any explanation of the countercyclical movement of commercial paper can explain the behavior and predictive power of the mix.

Our microeconomic findings are useful for distinguishing among the various explanations for the countercyclicality of aggregate commercial paper. First, contrary to the hypothesis that commercial paper is used to finance earnings shortfalls, there is a positive relationship between operating income and commercial paper issuance. Table 8 shows that quarter-to-quarter changes in the ratio of commercial paper to capital are positively (although somewhat weakly) correlated with changes in operating-income-to-capital (0.058). The correlation between four-quarter changes is not statistically different from zero. We also estimated OLS regressions (not reported here) with the change in commercial paper as the dependent variable, and found strong positive links between commercial paper change and growth in earnings.

Second, contrary to the aggregate evidence reported by Kashyap, Stein, and Wilcox (1993), there are positive relationships between commercial paper and the growth of the firm. Table 9 shows the correlations of the one-quarter and four-quarter changes in the ratio of commercial paper to total debt with sales growth (0.149 and 0.089), inventory growth (0.017 and 0.157), and accounts receivable (0.088 and 0.133).<sup>23</sup> Thus the bank-loan-substitution hypothesis — which views an increased reliance on commercial paper as an indicator of tight credit conditions — is inconsistent with the firm-level evidence.

Third, our data provide support for the view that commercial paper is used to finance inventory accumulation. The firm-level correlation between the growth rate of inventories and commercial paper is 0.095 using one-quarter differences and 0.281 using four-quarter differences. The correlation between the four-quarter growth rate of inventories and the ratio of commercial paper to total debt (0.157) provides additional evidence that for firms that have the option to issue, commercial paper is the marginal source of finance for inventory accumulation.

Fourth, there is also evidence that commercial paper is used to finance trade credit. The one-quarter and four-quarter correlations of commercial paper with accounts receivable are 0.108 and 0.182, respectively. It is also the case that the ratio of commercial paper to total debt is positively correlated with accounts receivable (0.088 and 0.133, respectively), providing

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<sup>23</sup>We cannot examine these relationships with the “mix” variable used by Kashyap et al. (the ratio of bank loans to bank loans plus commercial paper) because we do not have the amount of bank credit outstanding at the firm level. Thus we use total debt instead.

Table 9:  
Aggregate Quarterly Time Series (nominal) for Commercial Paper Issuers,  
Selected Variables

Aggregates constructed by summing over “commercial paper issuers” without missing data for the period shown.

Year	Qtr	CP	Sales	INV	ACCPAY	ACCREC	LT Debt
1988	1	23814	244976	124898	101420	141822	162356
	2	27511	258816	126305	105248	144052	169016
	3	25982	258021	129654	103657	146300	177503
	4	31940	273731	131518	110162	163224	193612
1989	1	35890	264295	134552	108976	164001	198493
	2	43528	283410	134248	109530	168744	204282
	3	48030	277437	137271	112251	174728	215962
	4	47460	297661	137698	126702	180328	222801
1990	1	50415	290140	143128	121331	183642	229749
	2	57629	300034	143791	121057	186143	232340
	3	53939	313551	149623	134435	200260	238253
	4	49192	350399	146960	143319	199710	238816
1991	1	45188	303682	149318	127481	188329	241889
	2	42032	305368	145787	127484	187334	242116
	3	41581	306393	147523	128843	190237	241747
	4	36595	328480	145514	140467	195945	239525
1992	1	30368	300979	147700	129409	189299	235535

evidence that commercial paper is the marginal debt instrument for financing accounts receivable. It is interesting to note that the correlation between inventory changes and accounts payable is relatively high for firms without access to public-debt markets (0.13), but is essentially zero (-0.004) for commercial paper issuers (not reported in Table 8). This is consistent with a story in which firms without access to commercial paper, when hit with an unanticipated increase in inventories at the onset of a recession, partly finance this by increasing their accounts payable to firms with better access to short-term credit.

Finally, there is limited support for the view that commercial paper issuance rises during recessions in response to increases in the portfolio demand for liquid assets. Our characterization of issuers showed that commercial paper is restricted to firms with strong balance sheets and high cash flows; that is, firms that are in a position to supply low risk, highly liquid assets. With our data, we obviously cannot identify the extent to which demand shifts contribute to the increase in commercial paper, but our characterization of the supply side of the market is certainly consistent with such a story.

Our assessment of the above theories in light of our firm-level evidence leads us to the following conclusions. First, it is essential to recognize differences across firms in order to understand the aggregate movement of nonfinancial commercial paper. The commercial paper aggregate is dominated by a very small number of firms whose large size, strong balance sheets, and high cash flows put them in a position to issue low-risk, highly liquid securities. There is no evidence to suggest that such firms need to issue commercial paper in order to finance cash shortfalls or reductions in alternative sources of short-term funds. But there is evidence that this select group of firms uses commercial paper to finance increases in inventories and accounts receivable. Among other things, this evidence calls for a more nuanced view of the apparent substitution among assets in the aggregate. In particular, the movements of commercial paper and bank debt may in fact reflect: (i) an increase in commercial paper to finance accounts receivable among large, high-credit quality firms acting as intermediaries for other firms, and in turn (ii) the substitution of accounts payable for bank loans among smaller “credit-constrained” firms.

In conclusion, we identified five possible explanations for the countercyclical movement of aggregate commercial paper issuance. Our evidence on the behavior of firms that issue commercial paper provides support for three of these explanations – the need to finance inventories, intermediation to credit-constrained firms, and the influence of demand for safe assets.

The recent relationships among aggregate commercial paper, inventories, and accounts receivable of issuers (shown in Table 9) confirm our interpretation. As industrial production slowed prior to its peak in the first quarter of 1989, inventories, net accounts receivable, and commercial paper of the firms



in our panel rose sharply as sales growth came to a halt. During the recovery of 1991–1992, commercial paper fell as issuers' inventories remained flat and their net accounts receivable declined. Thus our data set provides support for these hypotheses and helps to explain the paradox between the behavior of commercial paper issuers and the macroeconomic data.

## 7 Conclusion

Countercyclical movements in aggregate commercial paper outstanding have been observed for quite some time without being well understood. In this paper, we have used a unique panel data set to explore the characteristics of issuers, the role of commercial paper as a financing tool, and the relationship between the business cycle and commercial paper issuance by firms.

We began with an examination of the characteristics of firms that issue paper and found that access to the commercial paper market is restricted to firms of high credit quality. Indicators of short-term credit quality (access to the commercial paper market) are closely related to but not identical to the determinants of long-term credit quality. Holding constant long-term credit quality, commercial paper issuers are larger, have higher levels of collateral, have higher earnings, lower earnings variance, and higher stocks of liquid assets. These characteristics allow them to issue near riskless short-term public debt and enjoy a liquidity premium by virtue of their ability to issue a money-market instrument.

Firms of high credit quality also behave differently than other firms. In particular, they display excess sensitivity of inventory investment to fluctuations in cash flow, suggesting that lack of access to commercial paper markets is an indicator of costly external finance due to capital market imperfections. Consistent with this interpretation, we also found that firms of high credit quality maintain much lower stocks of financial working capital, and exhibit much less responsiveness of financial working capital to earnings. High credit quality permits these firms to avoid excessive holdings of “buffer stocks” of financial working capital. The combined evidence on the behavior of inventory and financial working capital investment indicates that the shadow costs of funds attributable to capital market imperfections appear to be much lower for high-quality firms. This implies that the cost of short-term funds for commercial paper issuers is more favorable than the low interest rates on paper would indicate.

Finally, our analysis of commercial paper issuers exposed a paradox that we sought to resolve in the second part of the paper. The paradox arises because the countercyclical movements of aggregate commercial paper are not the result of “countercyclical” issuance at the firm level. In the aggregate, commercial paper outstanding tends to increase during an economic

slowdown. However, our data indicate that for individual firms there is a positive relationship between commercial paper issuance and their own sales or earnings. That is at the firm level commercial paper issuance is procyclical.

We concluded that there are three possible explanations of this apparent contradiction between aggregate and firm-level behavior that are supported by our results. First, commercial paper increases as a downturn begins because firms need to finance unplanned increases in inventories. Second, firms that can issue commercial paper act as intermediaries for other firms that may be credit constrained. Our evidence indicates that high-quality firms increase their accounts receivable during a downturn and finance these with commercial paper. Finally, it may be that commercial paper issuance increases during a downturn due to an increase in aggregate portfolio demand toward safe, liquid assets. This explanation is consistent with our characterization of commercial paper issuers.

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