NBER WORKING PAPER SERIES

LEVERAGE AS A STATE VARIABLE FOR EMPLOYMENT, INVENTORY ACCUMULATION, AND FIXED INVESTMENT

Charles W. Calomiris
Athanasios Orphanides
Steven A. Sharpe

Working Paper No. 4800

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
July 1994

The authors thank participants at the Conference on Debt Deflation at the City University of London for helpful comments. This paper is part of NBER's research program in Corporate Finance. Any opinions expressed are those of the authors and not those of the Federal Reserve Board, the Federal Reserve System, or the National Bureau of Economic Research.

NBER Working Paper #4800
July 1994

LEVERAGE AS A STATE VARIABLE FOR EMPLOYMENT, INVENTORY ACCUMULATION, AND FIXED INVESTMENT

ABSTRACT

The importance of a firm's balance sheet for determining its investment and employment decisions is the central assumption of macroeconomic models of "debt deflation" or "debt overhang." According to these models, firm investment decisions are influenced not only by the fundamental opportunity set of the firm, but also by the firm's existing financial condition, especially its leverage. This paper tests that assumption by examining whether the responsiveness of employment, investment, and inventory accumulation to exogenous changes in sales depend on the leverage of the firm. We find that leverage acts as an important state variable for conditioning the response of all three variables to changes in sales. We also find that this effect varies depending on the state of the economy. During recessions, higher leverage magnifies the contractionary effect of declines in sales on investment; during times of positive sales growth, higher leverage tends to dampen the expansionary effect of growth in demand. The size and significance of leverage conditioning effects are larger during recessions. These results support theoretical models of the potential importance of "debt overhang" effects. Firms that use debt to finance expansion during times of increasing demand suffer reduced ability to maintain growth during recessions as a consequence of their higher leverage.

Charles W. Calomiris
Department of Finance
University of Illinois at Urbana-Champaign
340 Commerce West
1206 South Sixth Street
Champaign, IL 81820-6271
and NBER

Athanasios Orphanides
Division of Monetary Affairs
Federal Reserve Board
Constitution Avenue and C Street, NW
Washington, D.C. 20551

Steven A. Sharpe
Division of Research and Statistics
Federal Reserve Board
Constitution Avenue and C Street, NW
Washington, D.C. 20551

I. Introduction

"Debt deflation" refers to one of the ways in which the cumulative past of the economy matters for its future evolution. In a debt deflation, existing debt contracts become a burden on producers, consumers, or intermediaries, and prevent them from achieving levels of activity that they otherwise would have achieved had their earlier contracting decisions been different. Adverse shocks to real income or a lower than anticipated price level effectively raise the burden or value of debt relative to equity, and the amount of debt payments relative to cash flow, which, in turn reduces agents' creditworthiness and forces them to limit their activities. As Keynes (1931) and Fisher (1933) argued, debt deflations that constrain expenditures of firms and individuals, as well as lending by intermediaries, can produce debt-deflation spirals of ever-worsening economic conditions. Much recent research on the Great Depression and other historical depressions has focused on debt deflation as one of the ways in which shocks to demand produced persistent decline in aggregate economic activity by undermining the creditworthiness of borrowers and banks (Mishkin, 1978; Hunter, 1982; Bernanke, 1983; Eichengreen and Sachs, 1985, 1986; Calomiris and Hubbard, 1989; Temin, 1989; Bernanke and James, 1991; Calomiris, 1993).

Banks that choose to increase their loan-to-asset or debt-to-capital ratios prior to the onset of a recession, for example, will incur the greatest proportional losses of capital and will experience more extreme increases in their debt-to-capital ratios relative to banks that had been less aggressive prior to the recession. As the riskiness of uninsured liabilities of such banks rises during debt deflations, they will have to limit new lending, accumulate capital by retaining more earnings or issuing stock, or pay higher interest rates on uninsured liabilities than their rivals. They also may be subject to runs on uninsured liabilities. If such runs occur on an economy-wide basis, they can create large externalities for banks and their borrowers (Calomiris and Gorton, 1991).[1] In today's environment of deposit insurance and government capital regulation, banks are most likely to be forced to contract lending or pay the costs of issuing new stock under conditions of high uncertainty about the value of their portfolios (high lemons premia). Some researchers refer to this as a "capital crunch," and argue it has been an important impediment to expansion in bank lending in recent years (Syron, 1991; Bernanke and Lown, 1992; Peek and Rosengren, 1992; Baer and McElravey, 1992).

Consumers who expand their debt during a boom run the risk of being burdened by high debt-service to income ratios and illiquidity of assets. If conditions worsen, they will have to tighten their discretionary expenditures relative to other consumers during subsequent lean years. Consumers that expanded debt to purchase illiquid consumer durables will be especially constrained, since many of their assets are not saleable (Mishkin, 1976).

Farm owner/operators are also vulnerable to adverse income and wealth shocks because of their reliance on debt to finance their farm operations, and because agency considerations require that their net worth be invested in a highly undiversified portfolio of farm land, which is subject to substantial price change (Calomiris, Hubbard, and Stock, 1986; Hubbard and Kashyap, 1992; Calomiris and Himmelberg, 1994). During the U.S. farm bust of the early 1980s, the runup in farm leverage during the 1970s forced many farmers and their bankers into insolvency, and limited aggregate farming activity by more than the initial shock to demand.

In general, firms that use debt to expand operations aggressively during booms are likely to be among the least creditworthy if a recession strikes, and may be forced to contract activity more than their rivals. Many economists expressed concern during the boom of the 1980s about the potentially destabilizing consequences of the growing debt burdens of industrial borrowers (Friedman, 1986, 1989; Bernanke and Campbell, 1988).

Industrial firms' susceptibility to problems of debt deflation is exacerbated by four factors. First, firms with the greatest potential for long-term expansion may be the ones most dependent on debt. Recent models of contracting suggest that debt may be desirable because it limits adverse selection, moral hazard, and monitoring costs under asymmetric information (Jensen and Meckling, 1976; Townsend, 1979; Myers and Majluf, 1984; DeMeza and Webb, 1987; Jensen, 1986). Thus the firms most likely to rely on debt may be relatively unseasoned credit risks for which problems of asymmetric information are most pronounced. High-growth firms in new industries -- those on which the future growth of the economy may be most dependent -- are particularly subject to problems of financial instability.[2]

Second, theoretical models of optimal investment strategies suggest that there are advantages to rapid expansion which encourage firms to invest quickly, rather than slowly as would be required if firms wished to eschew a reliance on outside funds (and hence debt). This literature emphasizes advantages of investing during periods of high aggregate economic activity (Murphy, Shleifer, and Vishny, 1989).

Third, corporations may not properly anticipate how aggregate economic circumstances affect the liquidity of their assets, and thus may be excessively optimistic regarding their ability to avoid costly financial distress. This, in turn, may lead to excessive leveraging. Shleifer and Vishny (1992) argue that during the boom of the 1980s, the liquidity of industrial assets was high, and hence the potential cost of financial distress was presumed to be low. Firms may have been surprised to find the liquidity of their assets decline (and hence their exposure to financial distress increase) with the recession of 1989-1990.

Fourth, tax considerations (particularly in the United States) have motivated excessive reliance by firms on debt. Gertler and Hubbard (1990) argue that the contracting benefits of debt cannot plausibly explain the debt buildup in the U.S. of the 1970s and 1980s.[3] Interest relative to corporate earnings rose from under 10 percent in 1946 to roughly 20 percent during the early 1960s. From 1966 to 1986, the debt service ratio rose to 60 percent. The double taxation of dividends and the increasing burden of corporate taxation in recent decades, can explain the rising use of debt. The cost of this tax policy is the reduced economic activity produced by high leverage ratios during times of declining demand, and the physical costs of debt renegotiation and bankruptcy.

Recent commentators, both within academia and the popular press, have argued that the worst fears about the excesses of leverage in the 1980s have come true in the aftermath of the recession of 1989-1990. The proportion of debt in default in 1991 was double its previous peak (Remolona et al., 1992). Some researchers have argued that renegotiation and bankruptcy costs on defaulted debt also have risen in the 1980s, due to the increasing proportion of debt in the form of "arms length" bonds, rather than loans from intermediaries. Renegotiations of bond issues entail larger costs due to problems of coordination among bondholders, and greater asymmetry of information between firms and their lenders (Gilson, John, and Lang, 1990; Brown, James, and Mooradian, 1991; Asquith, Gertner, and Scharfstein, 1992).

The slow recovery from the recession in 1991 and 1992 has been attributed by some to a "debt overhang" problem in the major industrialized nations. For example, in an article entitled "Recovery Hits the Wall," the Economist (January 16, 1993, p. 77) argues that declines in the value of commercial property in the U.S., Britain, and Japan weakened the creditworthiness of corporations, and limited their potential to expand during the recovery. In Britain, commercial property has declined by 45 percent from its peak. A study by McWilliams (1992), cited by the Economist, argues that low commercial property values, through their effect on debt-to-equity ratios, have constrained the availability of commercial loans to corporations.

In a similar vein, Bernanke and Lown (1992) found that loan growth in the U.S. during 1991 and 1992 was slower than during other postwar recoveries. Bernanke and Lown (1992) and Bernanke (1993) claim that neither the recession, nor the protracted recovery of lending in 1991-1992, can be attributed to tight monetary policy. Bernanke (1993) argues that "1990-1991 might be the only recession since the 1950s in which tight money was not a significant factor in the slowdown of lending." Rather, they attribute slow loan growth to the deterioration in the credit quality of borrowers, due to high debt service burdens and the collapse of real estate values (see also Perry and Schultze, 1993). Other evidence supports a link between declining creditworthiness and slow growth in recent years. Gertler and Gilchrist (1992) -- who attach greater weight to tight monetary policy in explaining the recent recession -- point to the relative decline of small manufacturing firms (relatively unseasoned credit risks) during the recent recession as further evidence that creditworthiness has been an important constraint on investment. Apparently, financial planners at American corporations agree that debt overhang presented a burden during the recent recession, as evidenced by the significant "deleveraging" of corporate balance sheets in recent years (Frydl, 1991, 1992; Remolona et al., 1992).

Leverage effects on corporate activity can be hard to identify convincingly using aggregate time series analysis, for three reasons. First, aggregate debt relative to aggregate assets may not be a good indicator of the representative debt-to-asset ratio of firms. Second, leverage may be a more important constraining influence on cyclically sensitive firms, and thus important leverage effects may not be visible in aggregate data. Third, postwar aggregate data provide too few observations of variation in economic activity (six major recessions for the U.S.). Using panel data expands observations by examining links between leverage and behavior cross-sectionally as well as across time.

Microeconomic analysis of the effects of leverage has produced mixed findings. Studies of financial distress find important effects on investment, employment, and sales from leverage. In a panel study of Compustat firms, Whited (1991) found that during recession phases of the business cycle, firms reduced investment in order to accumulate working capital (to strenghen their balance sheets). Brown, James, and Ryngaert (1992) find that, among firms experiencing financial distress, those with higher leverage suffered the largest declines in investment and employment. Opler and Titman (1992) examine industries in which financial distress is occurring, and find that higher-leveraged firms experience greater declines in sales. On the other hand, skeptics stress that leverage is an endogenous variable that may serve as a proxy for other effects. One recent study of fixed capital investment (Kopcke and Howrey, 1994) argues that if one properly controls for lags of sales, investment, capital, and cash flow, balance sheet effects are not important for fixed capital investment.

The approach Kopcke and Howrey (1994) take to measuring leverage effects on investment, however, may be flawed in an important respect. They consider the role of balance sheet variables as separate regressors in the investment equation. But they do not consider whether balance sheet measures are important as "state variables" that condition the effects of other variables on investment. For example, a firm that expands capital during a sales boom and finances that expansion with debt may increase its vulnerability to a subsequent decline in sales. The average effect of leverage *per se* on investment may be small, but it may increase the responsiveness of investment to a contraction in sales. Indeed, Cantor (1990) finds that employment and capital expenditures at more highly leveraged firms are more responsive to earnings, and Sharpe (1994) finds that employment of more highly leveraged firms is more sensitive to sales.

Once one begins to focus on leverage as a state variable, it becomes important to consider asymmetries in the effects from leverage. As Calomiris and Hubbard (1990) show theoretically, and as Hubbard and Kashyap (1992) demonstrate empirically in their study of aggregate U.S. farm investment, leverage constraints on growth are asymmetric. The role of leverage as a conditioning variable for the effect of sales growth on investment should depend on whether sales are growing or shrinking. A firm that builds up leverage, but experiences continuing growth in sales, may show a relatively stable continuing relationship between sales and capital expenditures because capacity constraints do not bind. If anything, one might expect high leverage to dampen the effect of positive changes in sales on future investment. On the other hand, a highly leveraged firm that experiences a contraction in sales may contract investment more in response to declining sales, as debt capacity becomes a problem. Sharpe (1994) finds some evidence of such an asymmetry in the role of leverage as a conditioning variable for employment. He finds that leverage increases the sales sensitivity of employment more during business cycle contractions than during business cycle expansions.

In this paper, we examine the effect of leverage as an asymmetric conditioning variable for fixed capital investment, inventory investment, and employment. We analyze panel data on U.S. durable-goods manufacturers from the "R&D Master File" constructed by Hall et al. (1988) for 1959-1985. We chose durable goods manufacturers because of the cyclicality of their sales, which makes the identification of leverage effects more likely.

Our results are similar for investment, inventories, and employment. In all three cases, leverage acts as an important conditioning variable for changes in sales, and in all three cases, leverage matters much more as a conditioning variable during episodes in which sales are declining. These results provide evidence in favor of the importance of "debt overhang" problems for manufacturing firms, and lend credence to macroeconomic models of debt deflation. Section II describes our data and methodology and presents our results. In Section III, we consider limitations of our findings for measuring the magnitude of debt-deflation effects.

II. Methodology and Findings

We construct a panel data set of durable goods manufacturers for the period 1959 to 1985 (see the Data Appendix for a detailed description of the data). Our endogenous variables are the log difference of employment, the log difference of inventories, and the difference of the ratio of gross fixed capital investment to the initial stock of fixed capital. Examining differences removes firm-specific effects that might otherwise bias our results. The specification of inventories as a log difference, regressed on the log difference of sales, is consistent with assuming a long-run target inventories-to-sales ratio and lagged adjustment. The specification of fixed capital investment as the difference of the ratio of investment to capital, regressed on the ratio of sales to capital, is consistent with the standard neoclassical model of constant returns to scale and quadratic adjustment costs (for example, Hayashi, 1982; Fazzari, Hubbard and Petersen, 1988; Calomiris and Hubbard, 1994). After screening for outliers (observations and lags in which a firm tripled in size by assets, sales, or employment, or made an acquisition whose value exceeded 20% of its own value), our sample retains 10,890 observations.

Our interest is in examining the potential importance of leverage as a conditioning variable in models that gauge the effects of changes in sales (demand) on employment, inventories, and fixed investment. Because the role of leverage as a conditioning variable may be different depending on whether the economy is expanding or contracting, we construct the indicator variables P and N. P takes a value of one during NBER recoveries and expansions, and zero during recessions; N takes a value of one during recessions and zero otherwise. Each of our regressions allows the dependent variable to depend on current and lagged sales, the lagged dependent variable, firm size (fixed capital), leverage, the interaction between sales and firm size, and the interaction between le\ -rage and sales. Some specifications also allow regressors, including the interaction of leverage and sales growth, to enter asymmetrically -- that is, interacted with either P or N. To avoid problems of simultaneity, leverage is defined with a lag of two years (the year before the date of the earliest observation on any other regressor. We report results for simple ordinary-least-squares regressions, as well as for instrumental-variables regressions, which use macroeconomic indicators and lagged variables as instruments for sales. To the extent that sales changes are themselves responding within the year to changes in employment, inventory investment, and fixed capital investment, endogeneity of sales may weaken the estimated effect of the leverage-sales interaction if leverage measures the ability of firms to respond to changes in demand. Our instrumental variables estimates provide a way around that problem.

Table 1 provides data on the means and standard deviations of each of the variables included in our analysis.

Tables 2a and 2b report the results for the employment specifications, with and without the *P* and *N* interactions. Here and elsewhere OLS regressions are reported in panel *a*, while instrumented results are reported in panel *b*. In all regressions, standard errors are corrected for heteroskedasticity. In many cases, this had the effect of doubling or tripling the size of estimated standard errors. Equations are estimated after removing the means from the conditioning variables in all results reported below, to facilitate interpretation of the interaction effects. We report versions of the regressions with contemporaneous and lagged sales change, as well as versions that combine the current and lagged data on sales growth into a single two-year window.

To gauge the total effect of sales growth on employment growth for a firm of given size and leverage, and for a given state of the economy, one sums the relevant coefficients from the regressions, each multiplied by the difference between the average value of the regressors and those of the firm. For example, according to equation (2a), the effect of a one percent decline in sales growth during the first year of a recession for a firm of average size with a leverage ratio of 0.5 is employment growth of -0.35 percent (-0.35 = -0.29 + [-0.14] x [0.5 - 0.1]).

Regressions (1a) and (1b) for employment growth confirm Sharpe's (1994) finding of a positive and significant coefficient on the interaction between leverage and lagged sales growth. Regressions (2a) and (2b) decompose that effect according to whether the economy is expanding or contracting. The effect of sales on employment is more affected by leverage during recessions, and such effects are much larger in the instrumented regressions. As shown in regressions (4a) and (4b), which collapse the two years of sales into a single period, the interactive effect is much larger during negative sales growth episodes, and is not statistically significant during positive growth episodes, and again, the difference is larger in the instrumented regression. This provides confirmation for the asymmetric effect of leverage posited by the debt-deflation hypothesis.

Table 3 provides analogous results to those of Table 2, but for the log difference of inventories. As before, the interaction between leverage and sales is larger and more statistically significant for the recession episodes, and the instrumented coefficients are much larger. Moreover, in regression (8b) the coefficient on the leverage-sales interaction is negative and significant for expansion periods. These findings are consistent with the proposition that as firms reach their debt capacity they are more vulnerable to bad news, and (possibly) are less able to expand in response to good news.

Table 4 presents results for fixed capital investment (the simple difference of the ratio of investment to capital). The results on the asymmetry of the role of leverage as a conditioning variable are similar to those of Tables 2 and 3 in the sense that recession episodes show positive and more significant leverage conditioning effects, expansion phases show negative coefficients on the leverage-sales interaction, and both effects are strengthened by instrumenting.

Our findings of significant, asymmetric, conditioning effects for leverage in employment, inventory accumulation, and fixed investment are surprisingly strong when one considers that, cross-sectionally, leverage ratios could be positively associated with greater creditworthiness. That is, our interpretation of leverage has implicitly assumed that debt capacity is the same across firms, and therefore, that leverage ratios of different firms are comparable measures of "distance from debt capacity." If, however, some firms have higher leverage because they have higher debt capacity, one could find that leverage acts as an indicator of greater potential access to funds, not less. In theory, this effect could reduce -- and possibly change the sign of -- the sales-leverage interaction effect. Our inclusion of a size-sales interaction effect removes some of this problem by controlling for differences in debt capacity correlated with size, but that is not likely to control fully for debt-capacity differences.[4] Thus our findings for leverage likely understate the true "within-firm" effect from increasing debt relative to capacity, because we have not controlled for cross-sectional variation in firms' debt capacities. This should be a promising avenue of future research.

Our regressions also include firm size interactions with sales change, and we allow these to vary according to whether sales growth is positive or negative. As with the coefficients on leverage, we find that asymmetries are important in size-sales interactions, as well, although the interpretation of these coefficients is not straightforward. In employment regressions, the sensitivity to sales growth is largest for small firms, and this effect is largely attributable to small firms' employment sensitivity to positive sales shocks, as shown most clearly in regressions (4). In the case of inventories, there is no clear average size-sales interaction (see regressions (7)), but we do find that moments of positive sales growth see a greater sensitivity of inventories to sales growth for small firms, and the opposite size effect for episodes of sales contractions. In fixed investment regressions, larger firms appear to be more sensitive to sales growth, and this effect does not depend on whether sales are expanding or contracting. Thus, there is no consistent size-related asymmetry of sales sensitivity across our three sets of regressions. Future work should address the question of why firm size-sales interaction effects are so different across the three sets of regressions.[5]

In addition to leverage's significance as a conditioning variable for sales, leverage also enters significantly as a regressor by itself, but it enters with a positive sign in the fixed capital regressions and a negative sign in the employment and inventory regressions. This illustrates the difficulty of interpreting the information content of leverage as an intercept variable, as discussed above. Observed differences may reflect firm fixed effects. For example, if leverage is correlated with fixed capital intensivity, then (holding sales effects constant) firms with higher leverage may be more likely to invest in fixed capital and less likely to increased inventories or employment.

Our regression results for leverage suggest that other balance sheet variables may also prove useful as state variables for sales effects on investment. Indeed, recent theoretical and empirical work has suggested that working capital stocks may be important in reducing the responsiveness of fixed investment to changes in income. Whited (1991), Fazzari and Petersen (1993), Carpenter, Fazzari, and Petersen (1993), Calomiris and Hubbard (1994), and Calomiris, Himmelberg, and Wachtel (1994) argue that firms accumulate working capital, in part, as a self-insuring buffer, which can be drawn down during low-earnings episodes to maintain fixed capital investment. This implies that working capital should counteract, in part, the effect of declines in sales on fixed investment. Firms with high working capital will not be as susceptible to declines in sales.

We ran regressions (not reported here) for employment and fixed investment similar to those in Tables 2-4, in which working capital takes the place of leverage as a conditioning variable for sales. As before, the effect is significant and asymmetric. Consistent with the above-mentioned arguments about working capital as a buffer for fixed investment, higher working capital stocks reduce the response of fixed capital investment and employment to sales growth only during episodes of declining sales.

III. Conclusion

The results from our panel data study suggest that leverage may act as an important propagator of shocks during business cycles -- especially during downturns -- and this lends credence to the potential importance of "debt overhang" effects. Despite the advantages of panel data for qualitatively identifying balance sheet effects, they may not be as useful for measuring the importance of those effects for the business cycle. In general, our coefficient estimates will understate the macroeconomic importance of balance sheet effects for two reasons. First, microeconomic analysis of investment takes the macroeconomic environment as given. In particular, if aggregate sales are themselves affected by aggregate investment, then leverage effects will produce declines in sales, as well as contractions in investment in response to declines in sales. Second, as we argued above, our coefficients on the sales-leverage interaction effect probably understate the effect of leverage because they do not control for cross-sectional variation in firms' debt capacities.

Among the remaining challenges for measuring the importance of leverage in the business cycle include the estimation of firm-specific debt capacities and the construction of a general-equilibrium model that allows sales to respond endogenously to other changes in the economy (including leverage). Future work should also explore whether cross-sectional differences in the composition of debt or cross-time changes in the laws governing bankruptcy affect the magnitude of leverage's effect as a conditioning variable. Finally, we have only estimated linear models of leverage interaction effects. If the effects of leverage on the responsiveness of investment, inventories and employment to sales growth are larger for larger leverage ratios, however, then one would expect to find non-linear conditioning effects of leverage.

REFERENCES

Asquith, Paul, Robert Gertner, and David Scharfstein (1992). "Anatomy of Financial Distress: An Examination of Junk Bond Issuers." Working paper, MIT.

Baer, Herbert L., and John N. McElravey (1993). "Capital Shocks and Bank Growth." Federal Reserve Bank of Chicago Economic Perspectives (July/August).

Bernanke, Ben S. (1983). "Non-Monetary Effects of the Financial Crisis in the Propagation of the Great Depression." American Economic Review 73 (June), 257-276.

Bernanke, Ben S. (1993). "Credit in the Macroeconomy." Federal Reserve Bank of New York Quarterly Review (Spring), 50-70.

Bernanke, Ben S., and John Y. Campbell (1988). "Is There a Corporate Debt Crisis?" Brookings Papers on Economic Activity I, 83-125.

Bernanke, Ben, and Harold James (1991). "The Gold Standard, Deflation, and Financial Crisis in the Great Depression: An International Comparison." In Hubbard, R. Glenn, ed., Financial Markets and Financial Crises. Chicago: University of Chicago Press, 33-68.

Bernanke, Ben, and Cara Lown (1992). "The Credit Crunch." Brookings Papers on Economic Activity 2, 205-39.

Brown, David T., Christopher James, and Robert M. Mooradian (1991). "The Information Content of Exchange Offers Made by Distressed Firms." Working paper, University of Florida.

Brown, David T., Christopher James, and Mike Ryngaert (1992). "The Effects of Leverage on Operating Performance: An Analysis of Firms' Responses to Poor Performance." Working paper, University of Florida.

Calomiris, Charles W. (1993). "Financial Factors and the Great Depression." Journal of Economic Perspectives (Spring), 61-85.

Calomiris, Charles W. (1994). "Is the Discount Window Necessary? A Penn-Central Perspective." Federal Reserve Bank of St. Louis Review, forthcoming.

Calomiris, Charles W., and Gary Gorton (1991). "The Origins of Banking Panics: Models, Facts, and Bank Regulation." In Financial Markets and Financial Crises, edited by R. Glenn Hubbard, 33-68. Chicago: University of Chicago Press.

Calomiris, Charles W., and Charles P. Himmelberg (1994). "Directed Credit Programs for Agriculture and Industry: Arguments from Theory and Fact." Proceedings of the World Bank Annual Conference on Development Economics 1993, forthcoming.

Calomiris, Charles W., Charles P. Himmelberg, and Paul Wachtel (1994). "Commercial Paper and Corporate Finance: A Microeconomic Perspective." Carnegie-Rochester Series on Public Policy, forthcoming.

Calomiris, Charles W., and R. Glenn Hubbard (1989). "Price Flexibility, Credit Availability, and Economic Fluctuations." Quarterly Journal of Economics 103 (August), 429-452.

Calomiris, Charles W., and R. Glenn Hubbard (1990). "Firm Heterogeneity, Internal Finance, and Credit Rationing." Economic Journal 100 (March), 90-104.

Calomiris, Charles W., and R. Glenn Hubbard (1994). "Internal Finance and Investment: Evidence from the Undistributed Profits Tax of 1936-1937." NBER Working Paper No. 4288 (March 1993).

Calomiris, Charles W., R. Glenn Hubbard, and James Stock (1986). "The Farm Debt Crisis and Public Policy." Brookings Papers on Economic Activity 2, 441-485.

Cantor, Richard (1990). "Effects of Leverage on Corporate Investment and Hiring Decisions." Federal Reserve Bank of New York Quarterly Review, 31-41.

Carpenter, Robert E., Fazzari, Steven M., and Petersen, Bruce C. (1993). "Inventory (Dis)Investment, Internal Finance Fluctuations, and the Business Cycle." Working Paper, Washington University in St. Louis.

De Meza, David, and Webb, David C. (1987). "Too Much Investment: A Problem of Asymmetric Information." Quarterly Journal of Economics (May), 281-92

Eichengreen, Barry, and Jeffrey Sachs (1985). "Exchange Rates and Economic Recovery in the 1930s," Journal of Economic History 45, 925-46.

Eichengreen, Barry, and Jeffrey Sachs (1986). "Competitive Devaluation in the Great Depression: A Theoretical Reassessment," Economic Letters 22, 67-71.

Fazzari, Steven, R.Glenn Hubbard and Bruce C. Petersen (1989), "Financing Constraints and Corporate Investment," Brookings Papers on Economic Activity, 1141-195.

Fazzari, Stephen M., and Petersen, Bruce C. (1993). "Investment Smoothing with Working Capital: New Evidence on Financing Constraints." Rand Journal of Economics (Autumn), 328-342.

Fisher, Irving (1933). "The Debt-Deflation Theory of Great Depressions," Econometrica 1, 337-57.

Friedman, Benjamin M. (1986). "Increasing Indebtedness and Financial Instability in the United States." In Debt, Financial Stability, and Public Policy. Federal Reserve Bank of Kansas City.

Friedman, Benjamin M. (1989). "Views on the Likelihood of Financial Crisis." In Reducing the Risk of Economic Crisis, Martin Feldstein, ed. Chicago: University of Chicago Press.

Frydl, Edward J.(ed.) (1992). Studies on Corporate Leveraging. Federal Reserve Bank of New York (September).

Frydl, Edward J. (1992). "Overhangs and Hangover: Coping with the Imbalances of the 1980s." Federal Reserve Bank of New York Annual Report.

Gertler, Mark, and Simon Gilchrist (1993). "Monetary Policy, Business Cycles, and the Behavior of Small Manufacturing Firms." Working paper, New York University.

Gertler, Mark, and R. Glenn Hubbard (1990). "Taxation, Corporate Capital Structure, and Financial Distress." Tax Policy and the Economy 4, 43-71.

Gilson, Stuart C., Kose John, and Larry H. P. Lang (1990). "Troubled Debt Restructurings." Journal of Financial Economics 27, 315-53.

Hall, Bronwyn H., Clint Cummins, Elizabeth S. Laderman, and Joy Mundy (1988). "The R&D Master File Documentation." NBER Technical Working Paper No. 72.

Hayashi, Fumio (1982). "Tobin's Marginal q and Average q: A Neoclassical Interpretation." Econometrica 50 (January), 213-224.

Hubbard, R. Glenn, and Kashyap, Anil (1992). "Internal Net Worth and the Investment Process: An Application to U.S. Agriculture." Journal of Political Economy 100, 506-534.

Hunter, Helen M. (1982). "The Role of Business Liquidity During the Great Depression and Afterwards: Differences Between Large and Small Firms," Journal of Economic History 42, 883-902.

Jensen, Michael C. (1986). "Agency Costs of Free Cash Flow, Corporate Finance, and Takeovers." American Economic Review 76 (May), 323-330.

Jensen, Michael C., and William H. Meckling (1976). "Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure." Journal of Financial Economics 3, 305-60.

Keynes, John M. (1931). "The Consequences to the Banks of the Collapse of Money Values." In Essays in Persuasion. New York: W.W. Norton and Company, 1963.

Kopcke, Richard W., and Mark M. Howrey (1994). "A Panel Study of Investment: Sales, Cash Flow, the Cost of Capital, and Leverage." Federal Reserve Bank of Boston New England Economic Review (January/February), 9-30.

McWilliams, Douglas (1992). "Commercial Property and Company Borrowing." Royal Institution of Chartered Surveyors (November).

Mishkin, Frederic S. (1976). "Illiquidity, Consumer Durable Expenditure, and Monetary Policy," American Economic Review 66, 642-654.

Mishkin, Frederic S. (1978). "The Household Balance Sheet and the Great Depression," Journal of Economic History 38, 918-37.

Murphy, Kevin M., Andrei Shleifer, and Robert W. Vishny (1989). "Industrialization and the Big Push." Journal of Political Economy 97 (October), 1003-1026.

Myers, Stewart C., and Nicholas Majluf (1984). "Corporate Financing and Investment Decisions When Firms Have Information That Investors Do Not Have." Journal of Financial Economics 13, 187-221.

Opler, Tim C., and Sheridan Titman (1992). "The Indirect Costs of Financial Distress." Working paper, UCLA.

Peek, Joe, and Eric Rosengren (1992). "The Capital Crunch in New England." Federal Reserve Bank of Boston New England Economic Review (May/June), 21-31.

Perry, George L., and Charles L. Schultze (1993). "Was This Recession Different?" Brookings Papers on Economic Activity 1, 145-212.

Remolona, Eli, Robert N. McCauley, Judith S. Ruud, and Frank Iacono (1993). "Corporate Refinancing in the 1990s." Federal Reserve Bank of New York Quarterly Review(Winter), 1-27.

Sharpe, Steven A. (1994). "Financial Market Imperfections, Firm Leverage, and the Cyclicality of Employment." American Economic Review, forthcoming.

Shleifer, Andrei, and Robert W. Vishny (1992). "Liquidation Values and Debt Capacity: A Market Equilibrium Approach." Journal of Finance (September), 1343-1366.

Syron, Richard (1991). "Are We Experiencing a Credit Crunch?" Federal Reserve Bank of Boston New England Economic Review (July/August), 3-10.

Temin, Peter (1989). Lessons from the Great Depression. Cambridge: MIT Press.

Townsend, R. (1979). "Optimal Contracts and Competitive Markets with Costly State Verification," Journal of Economic Theory (October), 265-293.

Whited, Toni M. (1991). "Investment and Financial Asset Accumulation." Journal of Financial Intermediation 1, 307-334.

DATA APPENDIX

Sample Dataset Characteristics

Firm level data is drawn from the R&D Master File (documented in Hall, et al., 1988), which is constructed from Standard & Poors Compustat files and has annual observations on manufacturing firms dating from 1959-1985. The panel contains firms that enter and exit in various years; our sample retains this characteristic. After discarding observations because of missing data and dropping five observations per firm in order to create lags and a lead, our sample contains 22,298 observations.

The sample is then split into two sets of two-digit industries, one in which the average covariance of sales growth of sample firms in the 2-digit industry with GNP is high, and the other where the average covariance with GNP is low (using the dichotomy of Sharpe, 1993). One might expect that if there is any effect of leverage or size on the responsiveness of endogenous variables to increases in demand, it should be most distinguishable among firms in industries where cyclical fluctuations are a more dominant feature of the dynamics. The more cyclical subsample of industries fairly closely corresponds to the durables industries. These include firms that fall into the following two-digit industries: 24, 25, 30 and 33-37, which includes all durables industries except Stone, Glass and Clay (32) and Instruments (38), and includes a non-durables industry (Rubber and Miscellaneous Plastic Products (30)). In addition, we exclude firms in 4-digit industries where at least 10% of employment observations were footnoted (in the firm annual statements) as containing a "substantial" number of seasonal workers. Substantial is defined by Compustat as "at least 10% of the labor force."

After discarding observations because of missing data and the creation of lags, the data were screened for outliers -- observations and lags in which a firm tripled in size by assets, sales or employment, or made an acquisition whose value exceeded 20% of its own value. The screen eliminates six percent of the observations, leaving 10,883 for our analysis.

Construction of Variables

The three dependent variables are constructed as follows. Employment growth is the log difference of employment, where the number of employees is an annual figure reported at the end of the firm's fiscal year. This is reported by some firms as an average number of employees and by some as the number at year end. If both were given on the annual report, Compustat uses the year-end figure. They make no attempt to distinguish between the two in their data; in the analysis below, we treat this as a year-end figure. Growth in inventories is equal to the log difference in the inflation-adjusted level of inventories, which is converted into real inventory growth by subtracting the growth (year-end over year-end) in the producer price index (PPI). Investment is measured as investment in PPE divided by the lag of the inflation-adjusted net capital stock. (See Hall et al., 1988, for a detailed description of the procedure for adjusting PPE and inventories for inflation.) In our regressions we use the difference of the investment rate as our dependent variable.

For the employment and inventory regressions, sales growth is measured as the log difference in sales less the log difference in the PPI. For the investment regressions, sales growth is measured as the first difference of normalized sales, where sales is normalized by the lag of the inflation-adjusted net capital stock. We use "current" and "lagged" sales growth as independent variables. In the case of the investment specifications, this is straightforward, since both investment and sales are measured as flows over the year. Since employment and inventories are measured at year end, we compute "current sales" growth in these cases as the log of sales in the year just beginning minus the log of sales over the year just ended.

The primary measure of financial leverage is called the "net leverage" ratio. This ratio is computed as the book value of total debt over book value of assets, with net short-term assets subtracted from both numerator and denominator. Net short-term assets includes cash plus short-term investments plus receivables less payables. Netting out short-term liquid assets is meant to produce a comprehensive measure of overall "tightness" of the firm's balance sheet. In order to eliminate outliers/anomalies in our leverage measures that tend to arise when book equity is negative (yielding extremely high leverage), we truncate book value equity at zero. Book equity value is favored because it is more stable than market value and presumably provides a measure of the firm choice of balance sheet leverage that is not highly sensitive to the market's current assessments.

Firm size is measured as the log of total inflation-adjusted tangible capital value, the sum of inflation-adjusted net plant and equipment and inflation-adjusted inventories. We use lagged values of our leverage and size measures to avoid endogeneity problems. In the employment and inventory regressions, we use the second lags, while the third lags are used in the investment regressions. (With respect to current sales growth, leverage and size characteristics are measured with a lag of three periods.)

The indicator variable used to characterize whether the economy is expanding or contracting takes on a value of one during NBER recoveries and expansions, and zero during recessions. This variable is observed at monthly frequency, and thus the timing of its observation can be gauged relative to the last month of the firm's fiscal year. We use the value of this indicator at the midpoint of the period during which lagged sales growth is measured. Thus, relative to when firm employment and inventory are observed, we use the twelve-month lag of the recession indicator; relative to the end of the year during which investment is carried out, we employ the two-year lag of this indicator.

Instruments

Included in the set of instruments are our (lagged) balance sheet measures of firm leverage, working capital, and size, as well as the second lags of endogenous variables -- sales growth, employment growth, inventory growth, and the change in investment. Interactions between the firm balance sheet characteristics and the second lags of the endogenous variables are also included.

Macroeconomic series to be used as instruments are matched up to the micro data firm by firm, taking into account that different firms' fiscal year-ends fall in different months. In our sample, 57% of the observations are on firms with fiscal years ending in December. Another 10% have fiscal years ending in June, with the rest scattered across the remaining ten months. Because of variation in reporting dates, our data contain more variation in the time dimension than does standard annual data. To exploit the fiscal-year-end variation, and to enable a finer analysis on the timing issues, we use a mixed-frequency approach to matching the data. Generally, macroeconomic instruments are computed at a semiannual frequency and matched up to the annual firm-level data in accordance with the following schematic:

E_{t-2} E_{t-1} E_t

z6 z5 z4 z3 z2 z1

where E is firm i's employment at the end of fiscal year t and z(s) is the value of the macro variable z averaged over a six-month period which is centered at (s-1)/2 years prior to the firm's fiscal year-end. Macro growth rates or changes are thus calculated at a semiannual frequency as well: Dz1 = z1 - z2. Four variables are used to proxy for the business cycle: growth in industrial production, the CPI inflation rate, changes in the ratio of wholesale inventories-to-sales, and changes in the real federal funds rate.

We exclude the first two semiannual lags of our macro instruments because they are potentially correlated with the error term. Thus we include the third (Dz3) through the sixth (Dz6) lag of the growth of industrial production, the change in the real fed funds rate, the change in the ratio of wholesale inventories to wholesale sales of durable goods, and the CPI inflation rate. First and second order interactions between firm leverage, working capital, and size with each of the macro instruments are also included. These interactions allow predicted firm sales growth to vary in response to macro variables according to differences across firms associated with size and leverage. Finally, we double the size our instrument set by including interactions between the recession indicator variable and all of the other instruments.

NOTES

1. It is worth noting that runs are not restricted to banks. For example, in 1970, in the wake of the failure of a large commercial paper issuer (Penn Central), the commercial paper market experienced a run for several weeks (Calomiris, 1994). Similar concerns about exposure to systemic financial instability motivate expressions of concerns about the growing markets in financial derivatives.

2. Calomiris and Hubbard (1994) find that, during the mid-1930s, firms with the largest estimated shadow costs of external finance (which often were small firms in new industries) had roughly twice the debt-to-equity ratios of firms with low costs of external finance (large firms in established industries). The cost of external finance can be measured in 1936-1937 because of the existence of the surtax on undistributed profits, which set rising marginal surtax rates on retained earnings. By examining a firm's surtax margin, Calomiris and Hubbard (1994) estimate the shadow cost of external finance, and examine differences in the behavior of high- and low-surtax margin firms.

3. Gertler and Hubbard argue that there are alternative means of contracting (essentially debt contracts indexed to aggregate business cycle conditions in simple ways) which would provide all the incentive advantages of debt without the costs of potential destabilization through debt deflation. But the tax code would not recognize such contracts as debt, and therefore, firms avoid them. The increasing importance of bonds relative to loans from intermediaries also suggests that debt is motivated by tax considerations. Incentive advantages of debt contracting related to asymmetric information suggest that debt would largely take the form of intermediated debt. Bond financing does not involve the concentration of debt holding or the design and enforcement of complicated covenants that characterize borrowing from financial intermediaries. But much of the runup in debt has taken the form of widely held bond issues of large, highly seasoned credit risks.

4. The reason the sales-size interaction controls for debt capacity differences correlated with size is that the coefficient on the triple product of size, leverage, and sales can be approximated linearly by the sales-leverage and sales-size effects.

5. Recent research on the links between fixed capital investment and working capital investment may shed some light on this phenomenon. One possibility is that small firms (which face greater financing constraints and tend to be more dependent on internally generated funds) may use working capital (including inventories) as a self-insuring buffer to keep fixed investment smooth. Evidence for this proposition is presented in Fazzari and Petersen (1993), Calomiris and Hubbard (1994), and Calomiris, Himmelberg, and Wachtel (1994). This may explain why small firms' fixed capital investments are less sensitive to sales (since they build up stocks of working capital as well as fixed capital whenever they see an increase in sales). It also may explain why inventories are more sensitive to sales during an episode of increasing sales. But this story does not explain why small firms should show less sensitivity of inventories to sales during episodes of declining sales. During times of shrinking sales, small firms should sell off inventories to

keep fixed capital investment smooth in the face of declining earnings. One possibility is that unintended increases in inventories during sales declines are more important for small firms, but the rationale for such an effect is unclear.

Table 1

Summary Statistics

Variables	Mean	Std. Dev.	Observ.
Sales Growth	0.027	0.204	10,883
Sales/Capital	3.719	3.175	10,883
Capital	4.729	1.814	10,883
Gross Invst./K	0.196	0.180	10,883
Employment Growth	0.016	0.190	10,883
Inventory Growth	0.035	0.248	10,883
Debt/Assets	0.104	0.207	10,883
Work.Cap./Capital	0.442	0.679	10,883

Table 2A
Employment Regressions
(OLS -- Standard Errors Corrected for Heteroskedasticity)
Log Difference of Employment (DLEMP)
(Standard Errors in Parentheses)

Variables	(1a)	(2a)
Constant	-0.010 (0.002)	-0.010 (0.002)
DLEMP$_{-1}$	-0.108 (0.017)	-0.108 (0.017)
LEV	-0.043 (0.010)	-0.044 (0.011)
SIZE	-0.036 (0.009)	-0.034 (0.010)
DLS	0.224 (0.012)	
PDLS		0.203 (0.014)
NDLS		0.290 (0.020)
DLS$_{-1}$	0.601 (0.014)	
PDLS$_{-1}$		0.604 (0.017)
NDLS$_{-1}$		0.605 (0.023)
DLSxLEV	0.015 (0.078)	
PDLSxLEV		-0.009 (0.088)
NDLSxLEV		0.141 (0.129)
DLS$_{-1}$xLEV	0.071 (0.081)	
PDLS$_{-1}$xLEV		0.098 (0.104)
NDLS$_{-1}$xLEV		-0.010 (0.101)
DLSxSIZE	-0.123 (0.064)	
PDLSxSIZE		-0.125 (0.068)
NDLSxSIZE		-0.133 (0.142)
DLS$_{-1}$xSIZE	-0.060 (0.086)	
PDLS$_{-1}$xSIZE		-0.052 (0.108)
NDLS$_{-1}$xSIZE		-0.045 (0.124)
Adj. R-Square	0.492	0.494

Variables	(3a)	(4a)
Constant	-0.009 (0.002)	-0.007 (0.002)
DLEMP$_{-1}$	-0.035 (0.014)	-0.035 (0.014)
LEV	-0.037 (0.010)	-0.035 (0.011)
SIZE	-0.037 (0.009)	-0.035 (0.010)
DLS(-1,0)	0.400 (0.010)	
PDLS(-1,0)		0.385 (0.011)
NDLS(-1,0)		0.446 (0.017)
DLS(-1,0)xLEV	0.037 (0.061)	
PDLS(-1,0)xLEV		0.020 (0.074)
NDLS(-1,0)xLEV		0.112 (0.079)
DLS(-1,0)xSIZE	-0.072 (0.047)	
PDLS(-1,0)xSIZE		-0.089 (0.053)
NDLS(-1,0)xSIZE		-0.022 (0.094)
Adj. R-Square	0.432	0.433

Table 2B
Employment Regressions
(Instrumental Variables -- Standard Errors Corrected for Heteroskedasticity)
Log Difference of Employment (DLEMP)
(Standard Errors in Parentheses)

Variables	(1b)	(2b)	Variables	(3b)	(4b)
Constant	-0.014 (0.002)	-0.012 (0.002)	Constant	-0.012 (0.002)	-0.011 (0.002)
$DLEMP_{-1}$	0.037 (0.021)	0.048 (0.022)	$DLEMP_{-1}$	0.117 (0.020)	0.111 (0.020)
LEV	-0.022 (0.011)	-0.019 (0.103)	LEV	-0.021 (0.011)	-0.011 (0.012)
SIZE	-0.024 (0.010)	-0.008 (0.012)	SIZE	-0.030 (0.010)	-0.011 (0.011)
DLS	0.265 (0.018)		DLS(-1,0)	0.386 (0.012)	
PDLS		0.266 (0.031)	PDLS(-1,0)		0.398 (0.016)
NDLS		0.312 (0.025)	NDLS(-1,0)		0.417 (0.022)
DLS_{-1}	0.571 (0.020)				
$PDLS_{-1}$		0.534 (0.029)			
$NDLS_{-1}$		0.588 (0.040)			
DLSxLEV	0.292 (0.146)		DLS(-1,0)xLEV	0.057 (0.077)	
PDLSxLEV		0.227 (0.186)	PDLS(-1,0)xLEV		-0.045 (0.092)
NDLSxLEV		0.524 (0.171)	NDLS(-1,0)xLEV		0.443 (0.173)
DLS_{-1}xLEV	-0.125 (0.103)				
$PDLS_{-1}$xLEV		-0.155 (0.155)			
$NDLS_{-1}$xLEV		0.005 (0.248)			
DLSxSIZE	-0.721 (0.107)		DLS(-1,0)xSIZE	-0.049 (0.063)	
PDLSxSIZE		-0.615 (0.164)	PDLS(-1,0)xSIZE		-0.275 (0.078)
NDLSxSIZE		-0.378 (0.198)	NDLS(-1,0)xSIZE		0.601 (0.191)
DLS_{-1}xSIZE	0.267 (0.108)				
$PDLS_{-1}$xSIZE		-0.048 (0.162)			
$NDLS_{-1}$xSIZE		0.884 (0.238)			
Adj. R-Square	0.213	0.212		0.191	0.191

Table 3A
Inventory Regressions
(OLS -- Standard Errors Corrected for Heteroskedasticity)
Log Difference of Inventories (DLNVT)
(Standard Errors in Parentheses)

Variables	(5a)	(6a)	Variables	(7a)	(8a)
Constant	0.009	0.010	Constant	0.011	0.010
	(0.002)	(0.003)		(0.002)	(0.003)
$DLNVT_{-1}$	-0.055	-0.052	$DLNVT_{-1}$	-0.016	-0.014
	(0.015)	(0.015)		(0.015)	(0.015)
LEV	-0.109	-0.116	LEV	-0.103	-0.098
	(0.015)	(0.017)		(0.016)	(0.018)
SIZE	-0.038	-0.040	SIZE	-0.041	-0.039
	(0.014)	(0.015)		(0.014)	(0.015)
DLS	0.086		DLS(-1,0)	0.390	
	(0.014)			(0.015)	
PDLS		0.137	PDLS(-1,0)		0.396
		(0.017)			(0.017)
NDLS		-0.050	NDLS(-1,0)		0.370
		(0.024)			(0.029)
DLS_{-1}	0.709				
	(0.022)				
$PDLS_{-1}$		0.682			
		(0.026)			
$NDLS_{-1}$		0.747			
		(0.042)			
DLSxLEV	0.014		DLS(-1,0)xLEV	0.051	
	(0.078)			(0.107)	
PDLSxLEV		-0.134	PDLS(-1,0)xLEV		-0.009
		(0.087)			(0.134)
NDLSxLEV		0.418	NDLS(-1,0)xLEV		0.252
		(0.149)			(0.124)
DLS_{-1}xLEV	0.107				
	(0.148)				
$PDLS_{-1}$xLEV		0.204			
		(0.184)			
$NDLS_{-1}$xLEV		-0.106			
		(0.189)			
DLSxSIZE	-0.320		DLS(-1,0)xSIZE	0.034	
	(0.116)			(0.085)	
PDLSxSIZE		-0.291	PDLS(-1,0)xSIZE		0.005
		(0.135)			(0.101)
NDLSxSIZE		-0.373	NDLS(-1,0)xSIZE		0.103
		(0.189)			(0.144)
DLS_{-1}xSIZE	0.349				
	(0.108)				
$PDLS_{-1}$xSIZE		0.335			
		(0.134)			
$NDLS_{-1}$xSIZE		0.259			
		(0.185)			
Adj. R-Square	0.347	0.353		0.250	0.251

Table 3B
Inventory Regressions
(Instrumental Variables -- Standard Errors Corrected for Heteroskedasticity)
Log Difference of Inventories (DLNVT)
(Standard Errors in Parentheses)

Variables	(5b)	(6b)	Variables	(7b)	(8b)
Constant	-0.012	-0.004	Constant	0.002	-0.006
	(0.003)	(0.003)		(0.003)	(0.003)
DLNVT$_{-1}$	0.135	0.141	DLNVT$_{-1}$	0.173	0.203
	(0.020)	(0.020)		(0.019)	(0.020)
LEV	-0.036	-0.044	LEV	-0.063	-0.014
	(0.017)	(0.020)		(0.017)	(0.021)
SIZE	0.010	0.027	SIZE	-0.040	0.001
	(0.017)	(0.021)		(0.015)	(0.018)
DLS	-0.086		DLS(-1,0)	0.393	
	(0.025)			(0.016)	
PDLS		-0.036	PDLS(-1,0)		0.512
		(0.039)			(0.023)
NDLS		-0.099	NDLS(-1,0)		0.327
		(0.042)			(0.037)
DLS$_{-1}$	1.111				
	(0.028)				
PDLS$_{-1}$		0.964			
		(0.041)			
NDLS$_{-1}$		1.275			
		(0.058)			
DLSxLEV	0.382		DLS(-1,0)xLEV	0.069	
	(0.166)			(0.126)	
PDLSxLEV		0.013	PDLS(-1,0)xLEV		-0.326
		(0.172)			(0.148)
NDLSxLEV		1.318	NDLS(-1,0)xLEV		1.515
		(0.295)			(0.347)
DLS$_{-1}$xLEV	-0.263				
	(0.160)				
PDLS$_{-1}$xLEV		-0.054			
		(0.222)			
NDLS$_{-1}$xLEV		-0.262			
		(0.465)			
DLSxSIZE	-0.616		DLS(-1,0)xSIZE	0.163	
	(0.203)			(0.115)	
PDLSxSIZE		0.031	PDLS(-1,0)xSIZE		-0.381
		(0.265)			(0.158)
NDLSxSIZE		-1.143	NDLS(-1,0)xSIZE		1.071
		(0.362)			(0.323)
DLS$_{-1}$xSIZE	-0.192				
	(0.208)				
PDLS$_{-1}$xSIZE		-0.838			
		(0.310)			
NDLS$_{-1}$xSIZE		0.203			
		(0.477)			
Adj. R-Square	0.174	0.177		0.110	0.118

Table 4A
Fixed Investment Regressions
(OLS -- Standard Errors Corrected for Heteroskedasticity)
Difference of Investment/Capital (DI_K)
(Standard Errors in Parentheses)

Variables	(9a)	(10a)
Constant	-0.002 (0.002)	-0.002 (0.002)
DI_K$_{-1}$	-0.365 (0.021)	-0.366 (0.021)
LEV	0.018 (0.010)	0.021 (0.010)
SIZE	-0.017 (0.010)	-0.015 (0.010)
DS_K	0.056 (0.003)	
PDS_K		0.057 (0.003)
NDS_K		0.057 (0.006)
DS_K$_{-1}$	0.035 (0.003)	
PDS_K$_{-1}$		0.034 (0.003)
NDS_K$_{-1}$		0.043 (0.007)
DS_KxLEV	0.012 (0.012)	
PDS_KxLEV		0.006 (0.014)
NDS_KxLEV		0.027 (0.020)
DS_K$_{-1}$xLEV	-0.008 (0.012)	
PDS_K$_{-1}$xLEV		-0.022 (0.010)
NDS_K$_{-1}$xLEV		0.002 (0.022)
DS_KxSIZE	0.078 (0.018)	
PDS_KxSIZE		0.075 (0.021)
NDS_KxSIZE		0.080 (0.035)
DS_K$_{-1}$xSIZE	0.052 (0.015)	
PDS_K$_{-1}$xSIZE		0.038 (0.015)
NDS_K$_{-1}$xSIZE		0.105 (0.047)
Adj. R-Square	0.300	0.304

Variables	(11a)	(12a)
Constant	-0.003 (0.002)	-0.002 (0.002)
DI_K$_{-1}$	-0.406 (0.018)	-0.405 (0.018)
LEV	0.019 (0.010)	0.021 (0.010)
SIZE	-0.016 (0.010)	-0.016 (0.010)
DS_K(-1,0)	0.046 (0.002)	
PDS_K(-1,0)		0.046 (0.002)
NDS_K(-1,0)		0.049 (0.005)
DS_K(-1,0)xLEV	0.005 (0.010)	
PDS_K(-1,0)xLEV		-0.005 (0.010)
NDS_K(-1,0)xLEV		0.019 (0.012)
DS_K(-1,0)xSIZE	0.064 (0.012)	
PDS_K(-1,0)xSIZE		0.057 (0.013)
NDS_K(-1,0)xSIZE		0.084 (0.023)
Adj. R-Square	0.293	0.296

Table 4B
Fixed Investment Regressions
(Instrumental Variables -- Standard Errors Corrected for Heteroskedasticity)
Difference of Investment/Capital (DI_K)
(Standard Errors in Parentheses)

Variables	(9b)	(10b)	Variables	(11b)	(12b)
Constant	-0.002	-0.001	Constant	-0.002	-0.001
	(0.002)	(0.002)		(0.002)	(0.002)
DI_K$_{-1}$	0.122	0.123	DI_K$_{-1}$	0.041	0.047
	(0.062)	(0.063)		(0.035)	(0.034)
LEV	0.019	0.015	LEV	0.021	0.024
	(0.012)	(0.012)		(0.012)	(0.012)
SIZE	-0.007	0.002	SIZE	-0.006	-0.005
	(0.012)	(0.012)		(0.012)	(0.011)
DS_K	0.065		DS_K(-1,0)	0.034	
	(0.006)			(0.004)	
PDS_K		0.065	PDS_K(-1,0)		0.031
		(0.009)			(0.004)
NDS_K		0.071	NDS_K(-1,0)		0.044
		(0.010)			(0.009)
DS_K$_{-1}$	0.002				
	(0.010)				
PDS_K$_{-1}$		0.000			
		(0.009)			
NDS_K$_{-1}$		0.011			
		(0.018)			
DS_KxLEV	0.017		DS_K(-1,0)xLEV	0.010	
	(0.016)			(0.012)	
PDS_KxLEV		-0.018	PDS_K(-1,0)xLEV		-0.024
		(0.021)			(0.015)
NDS_KxLEV		0.082	NDS_K(-1,0)xLEV		0.028
		(0.039)			(0.017)
DS_K$_{-1}$xLEV	-0.004				
	(0.019)				
PDS_K$_{-1}$xLEV		-0.035			
		(0.026)			
NDS_K$_{-1}$xLEV		-0.052			
		(0.044)			
DS_KxSIZE	0.124		DS_K(-1,0)xSIZE	0.043	
	(0.031)			(0.020)	
PDS_KxSIZE		0.178	PDS_K(-1,0)xSIZE		0.066
		(0.038)			(0.025)
NDS_KxSIZE		0.078	NDS_K(-1,0)xSIZE		0.062
		(0.085)			(0.040)
DS_K$_{-1}$xSIZE	-0.027				
	(0.030)				
PDS_K$_{-1}$xSIZE		-0.021			
		(0.035)			
NDS_K$_{-1}$xSIZE		0.081			
		(0.069)			
Adj. R-Square	0.048	0.050		0.043	0.045