Financial Market Imperfections and Investment: an Overview

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Abstract

The paper examines the interpretation of the investment sensitivity of some firms to their cash flow as an artifact of financial market imperfections. Two alternative explanations of the financial constraints are compared. One is based on informational problems (asymmetric information). The other focuses on limited commitment between firms and financial intermediates. Empirical evidence of investment-cash flow sensitivity is discussed as well as some of the macroeconomic implications of financial market imperfections.

Key Words: Financial Accelerator, Cash Flow, Financial Constraint, Overinvestment

JEL classification: D92, E22, E44, G33

1 Introduction

"There is no necessity to hold idle cash to bridge over intervals if it can be obtained without difficulty at the moment when it is actually required"
J.M. Keynes (The General Theory of employment interest and money).

Investment decisions of firms with different financial profiles may qualitatively differ. The fact that, for some firms, investment is sensitive to variations in the abundance of internal funds or liquidity (e.g. cash flow) has already been empirically assessed in the litterature (Fazzari, Hubbard, and Petersen 1988). Recent findings suggest that investment spending is sensitive to internal funds for firms identified as financially constrained. But these results seem to partially depend upon the splitting criterion chosen to discriminate firms identified as financially constrained from those which are not (Kaplan and Zingales 1995, 2000). This paper surveys the empirical literature to assess the extent to which financial market imperfections can explain the investment-cash flow sensitivity of some firms.

Typically, asymmetric information models are used to explain the empirical evidence supporting the view that financially constrained firms have a greater investment-cash flow sensitivity. It is often argued that financing constraints due to informational problems or agency costs preclude some firms from reaching their desired (first best) level of investment. Financially constrained firms are thus presumed to underinvest because internal funds are partially depleted and external funds are available only at a prohibitive price (or not at all). These firms cannot take full advantage of their investment opportunities.

As far as it is empirically supported, the fact that investment is sensitive to financial considerations for financially constrained firms might be explained by the asymmetric information assumption. But this theoretical explanation implies that

some firms expecting future financial distress cannot necessarily borrow more in advance if they are already constrained. Yet, being financially constrained, one might think that these firms could still hold cash to cushion any future severe constraint: cash flow would then be held as a precautionary buffer as suggested by Schnure (1998). This feature is not fully taken into account in the asymmetric information framework. One could also imagine that a firm that is not yet financially constrained but expecting to be restricted in the near future would be willing to increase its borrowing in the short run, before being restricted. As far as the precautionary motive is concerned, it could be the case that some firms would like to *increase* their investment/borrowing level before facing a severe borrowing limit, rather than underinvesting as assumed in the asymmetric information framework -when the firm is financially constrained.

There is a body of research that proposes an alternative to the asymmetric information explanation. These models emphasize the limited commitment between the financial intermediary and the firm. Marcet and Marimon (1992) show that the limited commitment framework has more pervasive effects on investment spending than the asymmetric information one. This approach, instead of relying on asymmetric information, assumes that the financial relationship between a borrower and its creditor can be unilaterally terminated at any time (Kehoe and Levine 1993). Consequently, when there is risk sharing, endogenous financing constraints arising from limited commitment can potentially lead to *overinvestment* as well as underinvestment. This property arises in some limited commitment models but not all.

Indeed, this is neither the case in Hart and Moore (1994) nor in Albuquerque and Hopenhayn (1997). In these models, investment takes place only at the first period. Kiyotaki and Moore (1997) and Hart and Moore (1994) are based on

anonymous debt contracts and do not allow for long term relationships. But in Sigouin (1999) it is shown that a limited commitment model where investment decisions occur each period, and where the relationships lasts ad infinitum, a self-enforcing financial contract can arise endogenously. Because the model assumes a stochastic environment (in contrast to Kyiotaki and Moore 1997, Hart and Moore 1994), it is possible to evaluate the impact of "unexpected but rationally anticipated" fluctuations in the availability of internal funds. The major finding is that an entrepreneur can in fact overborrow at the end of economic upturns, in order to take advantage of the still low cost of external funds.

This paper investigates to what extent investment sensitivity of some firms to cash flow can be interpretated as an artifact of financial market imperfections. The two alternative explanations of the financial constraints are compared both empirically and vis-à-vis their macroeconomic implications. Section two and three present, respectively, the theoretical developments and empirical evidence related to the asymmetric information and the limited commitment approaches. Section four discusses some macroeconomic implications of these approaches. Section five concludes.

2 The Two Theoretical frameworks

2.1 The asymmetric information assumption

It is obviously impossible to present all the models based on the asymmetric information assumption. However, in order to understand how this framework is built and its properties, I will rely on the stylized moral hazard model of Gertler and Hubbard (1988).

In this model an entrepreneur is able to improve the probability of receiving a good output realization y whenever she uses enough of a special capital-like factor C along with capital K. Productivity can be either good or bad. Thus $y = f(K)$ with probability Π^g or $y = \alpha f(K),\ \alpha \in (0,1)$ with probability Π^b (and whenever $C = 0$). The entrepreneur decides the level of C and K to use for production in the first period, then sells her output in the second (and last) period. Under some parameter restrictions, and provided that the use of C can indeed improve production, if there is no informational problem K is choosen such that:

$$(\Pi^g + \Pi^b\alpha)f'(K) - (1+\nu)r = 0$$

(where ν is the optimal ratio of C to be used and r is the gross riskless exogenous rate).

When the expenditures on C are unobservable to the lender, the optimal capital level K^* derived from the previous equation cannot obtain since the Modigliani-Miller theorem does not hold in that case. K may fall below the first best. This level of capital maximizes $(\Pi^g + \Pi^b\alpha)f(K) - \Pi^g p^g - \Pi^b p^b$, where p^g and p^b are the payments to the lender depending on realization of the state. Gertler and Hubbard (1988) assume that the firm is endowed with initial wealth W inferior to K^* and has a net worth of $W + V/r$, where V is the actualized collateralizable expected future profit. p^g and p^b are such that the intermediary is indifferent between lending to the firm or investing in the riskless asset:

$$\Pi^g p^g + \Pi^b p^b = r((1+\nu)K - W)$$

The problem is that in order to make sure that the firm really uses enough C, an incentive constraint must also be satisfied which guaranties that the gains from

cheating $\alpha f(K) - p^b + r\nu K$ are inferior to that obtained while using the proper level of C: $(\Pi^g + \Pi^b\alpha)f(K) - (\Pi^g p^g + \Pi^b p^b)$. Because of this constraint and the limited liability constraint (i.e. $\alpha f(K) + V \geq p^b$), investment is an increasing function of the net worth.

A simple informational problem between the lender and the borrower yields an investment decision positively related to the collateral of the firm. In that case, the lower the net worth of a firm, the more likely she is to be financially constrained, and thus underinvests compared to the first best (i.e. the neoclassical case without asymmetric information).

Another important aspect of this framework is that it generates asymmetric responses to shocks. Indeed, while not displayed in Gertler and Hubbard (1988), it is easy to show that the gap between p^g and p^b worsens during downturns. When $p^b = \alpha f(K) + V$, decreases, ceteris paribus, $p^g = (1/\Pi^g)(r((1+\nu)K - W) - \Pi^b p^b)$ increases. Hence the incentive problem deteriorates. The same is true when r increases, as can readily be seen from the incentive constraint. Finally, because investment is positively related to net worth, a good productivity shock increases investment when V increases, and the investment can also be greater with a larger W.

2.2 The case of limited commitment

While there seems to be a conventional way to use the asymmetric information assumption, this is not necessarily the case with limited commitment models. In this class of models, depending on the assumptions made, the predictions differ substancially. For example, Cooley et al. (2000) assume that in the case of repudiation the intermediary loses the whole value of the contract. This, along with

the risk aversion hypothesis and the sufficient saddle point functional equation (SPFE) characterization made herein, as in Marcet and Marimon (1992) (for details see Marcet and Marimon 2000), leads to a situation where constrained firms are more sensitive to shocks.

The above assumptions make the predictions of this limited commitment model similar to the one of an asymmetric information model. The future level of capital is increasing in assets (Cooley et al. 2000, corollary 3.1). Furthermore, the model also leads to the prediction that after a positive shock, constrained firms react strongly and their number increases at the onset of an upturn. This implies a serially correlated output growth rate (i.e an internal propagation mechanism). The SPFE sufficient characterization and the other assumptions, notably regarding the repudiation scheme, impose that the entrepreneur cannot start the contract with the optimal level of capital. At first, since the firm will likely face future incentives to repudiate and take the assets, the creditor does not provide the full commitment level of investment. It leads to temporary financial constraints for young firms with still a substancial incentive to renege. It also implies that whenever the enforceability constraint is not binding anymore, that is when the firm is large enough and no longer financially constrained, it does not grow: the full commitment is permanently reached. Thus, in that model, underinvestment is coming from the financial constraints of growing firms; a feature quite similar to the one found with the asymmetric information assumption.

However, since the SPFE characterization is not necessary, within the limited commitment framework there are other available approaches. If one wants to take into account the fact that some firms might want to protect themselves against anticipated bad shocks, the risk sharing approach of Thomas and Worrall (1988) (1994) can also be followed. Thomas and Worrall (1988) (1994) do not impose

any sufficient characterization to overcome the non convexity structure of the incentive constraints. In that setup, the full commitment Pareto frontier is not necessarily reached, and even when it is the case it may not be permanent since the expected utility promised to the contracting firm is state contingent (i.e. bounded). The (self-enforcing) constraints always remain potentially binding. In that case, overinvestment can arise within the long term relationships.

For example, following Thomas and Worrall approach, Sigouin (1999) assumes that the risk neutral lender can take the firm's assets $(1-\delta)K_{t-1}$ (where δ is the depreciation rate of capital, K_{t-1}, available for production at the beginning of period t) during upturns. The firm might be forced to renege and turn indefinitely to autarky using its "private endowments" à la Kehoe and Levine (1993) during downturns. A special feature of the model is the assumption of intertemporal production. A simplified version of the model considers a limited commitment Pareto frontier additively separable in capital and expected utility with zero adjustment cost of capital and the possibility of disinvestment. In that version, it is analytically proven that the optimal investment is either $i^* = i^{fc}$, the full commitment investment when the constraint is not binding, or $i^* > i^{fc}$ if the constraint is binding for at least one future state j of nature (see Sigouin 1999, proposition 2).

Sometimes a firm anticipates that she might need to rely on self-financing in the next period, receiving then the maximum expected utility level compatible with the continuation of the relationship $U^{max}(K^*, \theta)$, θ being the future (bad) realization of the state associated with K^*, the future limited level of capital. When that happens, it is Pareto efficient to invest more than the full commitment investment level in advance to cushion the future limited availability of external funds. Overinvestment decreases the current utility of the firm, while increasing the firm's future expected utility $U^{max}(K^*, \theta)$. The creditor agrees with this overinvest-

ment because it enables the firm to comply with the relationship thereafter, at the onset of the bad realization of nature, when the firm's incentive to quit is strong. Therefore, present investment is positively related to future internal finance requirements.

In that case, investment is also sensitive to the availability of external funds. But while asymmetric information implies that low net worth firms underinvest, some limited commitment models suggest that firms invest more to circumvent an expected limitation of external fund. From the point of view of the empirical evidence, these predictions are not necessarily paradoxical.

3 Empirical Evidence

3.1 Investment-Cash Flow Sensitivity of Financially Constrained Firms

One of the main contributions of Fazzari, Hubbard and Petersen (1988) is to show that firms's financial structure matters for investment decisions. For some firms, external funds do not provide a perfect substitute for internal capital. They show that the conventional representative firm approach might apply to mature companies, but that, for other firms, financial factors play an important role. Using a panel of Value Line for 421 manufacturing firms they analyze differences in investment among firms, with a spliting criterion based on dividend-income ratio as a proxy for earnings retention practices. This criterion and the data source are the same as in Gertler and Hubbard (1988). The relevance of this criterion comes from the fact that retained earnings are the main source of internal finance and

net funds regardless of the firm size. The retention ratio decreases monotonically with asset size, from 80 percent for small firms to 50 percent for large firms. With the reduced-form investment equations:

$$(I/K)_{i,t} = f(X/K)_{i,t} + g(CF/K)_{i,t} + u_{i,t}$$

(i=firm class, I=investment in plant and equipment, K=beginning-of-period capital stock, X=vector of variables controlling for investment opportunities, CF=cash flow)

they find that investment of firms with a cost disavantage in external financing (low dividend-income ratio firms) is sensitive to fluctuations in cash flow. While firms with a low dividend-income ratio are smaller on average, this does not mean that firm size is always a factor. When the sample is split according to size (average capital stock) Fazzari et al. (1988) find that small firms have a relatively low cash flow coefficient. Furthermore, the cash flow effect holds for every class of dividend-income ratio; however the cash flow effect is strongest for the lowest dividend-income ratio class.

The conclusion reached by Fazzari et al. (1988) that financial factors undoubtedly matter in the investment decision process, especially for financially constrained firms (identified as the low dividend-income firms), is quite robust. It does support both the limited commitment and the asymmetric information approaches in the sense that it is an empirical evidence of investment-cash flow sensitivity. In that sense, it casts serious doubts on the assumption of perfect financial market. This empirical evidence have been repeatedly confirmed in the very large literature addressing this issue. For example, Mills, Morling, and Tease (1994) find similar evidence regarding financial factor effects on investment. Using different splitting criterion, they find that small firms, particularly highly leveraged firms

and firms with high retention ratios have a high investment-cash flow sensitivity. They estimate the following equation:

$$I_{i,t}/k_{i,t-1} = \alpha + \beta_1 q_{i,t-1} + \beta_2(CF_{i,t}/K_{i,t-1}) + \beta_3(L_{i,t-1}/K_{i,t-2}) + \beta_4(D_{i,t-1}/K_{i,t-2}) + \beta_5(S_{i,t}/K_{i,t-1})$$

(with q=Tobin's q, L=stock of liquid financial assets, D=stock of outstanding debt, S=sales, these three variables being stocks measured at the end of previous period).

One could think that these results are attributable to the fact that the proxy variable constructed for the Tobin's q does not completely capture investment opportunities, making cash flow spuriously significant. Yet Fazzari et al (1988) control for that, as do Gilchrist and Himmelberg (1995) (1998). Following Abel and Blanchard (1986), Gilchrist and Himmelberg (1995) estimate a set of vector autoregression forecasting equations to build a proxy for the expected value of marginal Q conditional on observed fundamentals: a "fundamental Q". This allows the isolation of the role of the cash flow as a forecasting variable from its role as an explanatory variable of investment. Even when controlling for this, the empirical evidence of Fazzari et al. (1988) still holds true. Using Compustat data, Gilchrist and Himmelberg (1995) confirm that financial factors matter for all firms and that the investment-cash flow sensitivity is strong for firms identified as financially constrained; although the fundamental Q is strongly significant for unconstrained firms. For constrained firms, the use of the fundamental Q seems superfluous since the investment-cash flow sensitivity is almost the same as when using more conventionnal measures of Q. Actually, the use of conventional measures of Q underestimates the difference in investment-cash flow sensitivity among firm classes.

When using the same criterion as in Fazzari et al. (1988) to identify financially constrained firms (the dividend payout ratio), Gilchrist and Himmelberg (1995) find contradicting results. But they also consider firm size, CP rating and bond rating and the majority of these splitting criterion reveal the investment-cash flow sensitivity of financially constrained firms. They then directly infer that the empirical evidence supports the asymmetric information approach.

3.2 Is there a Case for a Precautionary Motive?

The fact that financially constrained firms display an investment sensitivity to cash flow can be related to the informational problem framework as well as the limited commitment one. Since some limited commitment models result in financially constrained firms overinvesting in advance (a different investment sensitivity explanation), the break down of the neoclassical view does not necessarily warrant the existence of an internal propagation mechanism. Puzzling empirical evidence actually suggests that some investment-cash flow sensitive firms *smooth* their investment.

The first disturbing finding is that cash flow matters, but in a non-linear manner. As repeatedly shown (e.g. Fazzari et al. 1988, Devereux and Schiantarelli 1989), the timing of the cash flow effect is more complex than suggested by the asymmetric information framework. As pointed out by Devereux and Schiantarelli (1989), the asymmetric information models "do not yield an investment equation that explains how financial factors and *expectations* about firm's prospects jointly determine investment". In addition to the fact that the cash flow dynamic effect is not captured, Devereux and Schiantarelli (1989) also report that cash flow effect does not seem to matter only for strictly financially constrained firms. They assert

that cash flow fluctuations might play a role for all firms, and not just those with current depleted internal funds or incapacity to issue new shares. With a splitting criterion based on firm size, they show that the investment-cash flow sensitivity is actually greater for large firms.

Kaplan and Zingalez (1995) (2000) also cast doubt about a monotonic relationship between investment-cash flow sensitivity and firm financial class. They find that the less financially constrained firms can hold more internal funds and exhibit a significantly higher investment-cash flow sensitivity. One possible explanation given by the authors for the low investment sensitivity of financially constrained firms relies on capital adjustment costs. When a financially constrained firm experiences a jump in cash flow she does invest more. But because she was forced to invest prior to the increase in liquidity, the investment reaction is dampened. If the firm had not been constrained during downturn she would have invested more.

While Kaplan and Zingales (1995) rule out the agency cost approach, they do not find a satisfactory explanation for the investment-cash flow sensitivity of unconstrained firms. To classify firms according to their relative degree of financing constraints, they use qualitative information in the annual reports as well as quantitative information about firms' financial statements and notes both retreived from Compustat. They conclude that the observed investment-cash flow sensitivity depends on the splitting criterion used. The relationship is not necessarily monotonic since unconstrained firms can also be cash flow sensitive depending on the criterion used. They insist that their paradoxical results should command criticism when examining the influence of financial factors. If the least constrained firms are in fact somehow intertemporaly constrained, then the splitting criterion must take this into account and be designed accordingly. As a matter of fact, Fazzari et. al. (1999) claim that firms with large amounts of cash balances and unused lines

of credit are likely to be *expecting* future financial constraints. This coincides with the Kaplan and Zingales (2000) view of an excessive conservatism of managers.

This suggests that designing a criterion really able to separate firms depending on their degree of current and expected degree of financial constraint could prove useful to solve both the issue relative to the non linearity of investment-cash flow relationship and the non monotonicity of the sensitivity-firm's class. As far as I know there is no empirical study trying to build a criterion able to capture the intertemporal nature of financial constraints. Despite this lack of knowledge, research suggests that there is a case for investment smoothing.

Indeed, relatedly to the two above described puzzles, Gertler and Gilchrist (1993) mention that bank lending to large firms rises following tight money. They interpret this result as evidence of a smoothing behavior, large firms borrowing more to cushion the expected declining sales in the wake of tight money. There is a slightly positive response of business loans lasting almost one year after a rate hike (Bernanke, Gertler, Gilchrist 1996, Losier 2000). Thurlow (1994), with a VAR analysis, show that the immediate response to a monetary tightening is an increase in lending and inventory stocks, a result consistent with the findings of Gertler and Gilchrist (1994), but not with the asymmetric information approach. Refering to these authors Losier (2000) mentions that this could come from the fact that lenders are willing to prevent premature bankruptcies, an intertemporal interpretation consistent with limited commitment models à la Thomas and Worrall[1].

In a following paper, Gertler and Gilchrist (1994) investigate further this issue.

[1]The trough in output precedes the one in business credit, while the increase in business credit demand coincides with one in inventories. I thank Scott Hendry for mentionning these facts.

Estimating:

$$\Delta I_t = \alpha_1(E_{t-1}S_t - I_{t-1}) + \alpha_2 i_{t-1} + \alpha_3 CR_{t-1} + \Sigma_{s=1}^{2}\alpha_{4,s}\Delta I_{t-s} + \Sigma_{s=1}^{2}\alpha_{5,s}\Delta S_{t-s} + \Sigma_{s=1}^{2}\alpha_{6,s}\Delta i_{t-s} + \Sigma_{s=1}^{2}\alpha_{7,s}\Delta CR_{t-s} + \epsilon_t$$

(with I=inventory, i=short-term interest rate, S=sales, CR=coverage ratio, all detrended logarithms variables)

they mention that the past coverage ratio is a significant explanatory variable for small firms inventory decisions, but not for large firms. For large firms the lagged coverage ratio and its variation enter negatively. These dynamics could be interpreted as follows: when past coverage ratios have started to decrease, borrowing and inventories are increasing. Yet these variables are found insignificant, which is not inconsistent with the view that overborrowing is done in advance.

They assert that overinvestment of large firms seems to be attributable to the fact that they are persistently piling up inventories at the onsets of a monetary policy tightenings (the Romers dates, see Romer and Romer 1988, 1992). The view of a desired inventory building up for precautionary motive vis-à-vis expected credit limitations is also advocated by Thurlow (1994): the undesired inventory building up due to real rigidities is not supported by facts, does not explain the increase in sales prior to the downturn and does not generate asymmetric responses. [2]

If, for some firms, investment is sensitive to expected cash flow, then such firms anticipating lower future inflows should also hold high internal funds in advance. The fact that future inflows might explain current cash flow positions is supported

[2] In order to account for this increasing investment, Thurlow (1994) assume credit line and time-consuming reorganization of credit by commercial banks. The limited commitment approach offers a different explanation by making the creditor actually willing to increase lending.

by the evidence of Opler et. al (1997). Net working capital is a proxy for money expected to be received by the firm within the year. Opler et al (1997) present evidence that net working capital is negatively related to cash flow. Firms have target cash flow levels. Estimating:

$$\Delta(CF/A)_t = \alpha + \beta\Delta(CF/A)_{t-1} + \epsilon_t$$

(with A=assets)

with Compustat data, Opler et al. (1997) find cash flow to be mean reverting: firms keep it within brackets, holdings being greater in volatile industries. They also find that the short run impact of cash flow on investment is small. These findings suggest that cash flow helps the firm in the continuation of her investment projects. They report that firms with excess cash in one year experience a fall in operating cash flow the next year. When a firm expect to be financially constrained she accumulates cash to be able to finance investment despite expected decrease in future cash flow. They argue that this evidence is consistent with a dominant precautionary demand for liquid assets. While the results confirm that investment and cash flow are dynamically related, Opler et al. (1997) cannot support the accelerator theory, finding no evidence that firms facing agency costs would have a relatively high propensity to spend excess cash.

In fact, the most important result is that excess cash seems to be held in advance to cushion decreases in operative cash flows. This might be paralleled to the overborrowing and the increase in investment inventory stocks prior to downturns. The propensity to use excess cash for capital expenditures is far from significant: a dominant cash hoarding due to risk aversion is at play, i.e. a cash in advance motive driven by a form of liquidity preference.

The idea of treating cash flow as an independent variable to disentangle its effect on investment is also followed by Schnure (1998) with the same conclusions. Schnure (1998) develop a model of firm's decision over cash flow given a probability of being credit constrained in the future. Using Compustat data it is established that agency cost does not concern the majority of firms. Schnure (1998) advocates the existence of a precautionary balance regardless of the firms' size[3]. In the United States the high cash holders operate in the riskiest sectors, precisely where precaution matters. While investment is positively correlated to past cash flow (Fazzari et. al. 1988, Devereux Schiantarelli 1989), Schnure (1998) finds current cash flow to be strongly negatively related to future capital expenditures, especially for high cash flow holders. This is consistent with the findings of Opler et al. (1997).

3.3 Average Investment, Inventories, Cash Flow and Sales

Using Research Insight data from 1980 to 1998, I retreived yearly financial data for over 16000 firms. After cleaning the dataset and transforming the variables, I computed the average ratios of investment to total assets, inventories to total assets, cash flow to total assets and sales to total assets for the 2999 remaining firms. For each year, each firm is assigned either a high probability of bankruptcy or a low probability of bankruptcy, depending on its Zscore. When, for a specific year, a firm has a ZScore below 1.81, it is classified as a troubled firm with high probability of bankruptcy. Above this threshold the firm is classified as an healthy firm with a low probability of bankruptcy. When a firm has been deleted in the dataset, with a deletion due to bankruptcy, it is considered a bankrupt firm. With

[3]In the case of the most liquid firms cash comes from stock insuance.

this classification based on the probability of bankruptcy, I split the dataset in three different sets. In one set there are all healthy firms for the year, in the second set there are all troubled firms for each year. The third set includes firms that have went bankrupt between 1980 and 1998.

What this exercice reveals is that firms that are financially healthy in a given year, with a low probability of bankruptcy for this year, have relatively higher average cash flow, sales and inventories ratios than their troubled and bankrupt counterparts. Yet, the inventories ratios gap between bankrupt firms and healthy firms seems smaller than the one between troubled firms and healthy firms. This seems to be also the case for cash flow ratios gaps. More importantly, the simple computation of the average ratio of investment to total assets for the healthy firms, the troubled firms, and the bankrupt firms indicates that firms having a high probability of bankruptcy in a given year do not necessarily invest less than firms in the healthy set. Actually, between 1980 and 1989, and after 1997 the reverse holds true. The case appears even stronger for bankrupt firms. These descriptive statistics, while being rather simplistic, confirm the idea that there might be a case for a precautionary motive when investing. At least, assessing the investment behavior by considering criterions such as the probability of bankruptcy embeded in the ZScore could yield encouraging results.

4 Macroeconomic Implications

On one hand, the asymmetric information-based interpretation of the investment sensitivity to internal funds' variations leads to an internal propagation mechanism. When the economy is experiencing an upturn, external funds can be acquired at a cheaper cost. Indeed, an increase in internal funds, ceteris paribus,

reduces the cost of borrowing. Therefore, financially constrained firms can then reduce the degree of underinvestment. They can increase investment both because of the increase in internal funds, and also because external funds are becoming less expensive. So their investment decisions are sensitive to the variations of internal funds. This phenomenon is believed to generate a financial accelerator (Gertler and Gilchrist 1994). It is argued that business fluctuations are amplified by the counter-cyclicality of external funds costs (Gertler 1992, Carlstrom and Fuerst 1997). During upturns, financially constrained firms have access to external funds at low cost. As their net worth increases they invest more. This in turn triggers a further increase in output.

On the other hand, some form of limited commitment makes investment and borrowing sensitive to expected variations in cash flows. However, this leads to a financial decelerator. When in downturns, a firm can invest more than what an asymmetric framework would predict. This is because the risk sharing plays fully its role here: the precautionary motive strongly prevails. The intuition behind this is relatively straightforward. In asymmetric information models, financially constrained firms can only decrease their degree of underinvestment while in upturns. Whereas in limited commitment models, the financial constraint does not bind all the time. It only arises (endogenously) during downturns. So, depending on the contract design, a firm expecting a decrease in its future internal funds may have the opportunity to overinvest before facing the financial constraint vis-à-vis its creditor.

Overall, the survey suggests at least that the borrowing decision and the inventory decision somehow seem to coincide. This is true whether there is a pure stockout avoidance behavior à la Thomas and Worrall or stockout avoidance coupled with some credit frictions. The interpretation of the asymmetric downturn dynamics

then is that, at the onset of a downturn, output drops sharply thanks to the inventories accumulated, this being possibly exacerbated by the effects of tight money. Firms with low cash flow are directly hit since their inventory investments are small; larger firms can survive more easily because of their cushion. This macroeconomic interpretation based on limited commitment differs from the one infered by the financial accelerator (e.g. Bernanke, Gertler, Gilchrist 1996) but seems more consistent with the documented increasing lending.

The asymmetric information approach explains that investment is sensitive to cash flow for financially constrained firms. It leads to a financial accelerator. Depending on the assumptions, the limited commitment approach suggests that current investment is sensitive to future cash flows as well, when a firm expects to be financially constrained. But this leads to a financial decelerator because the precautionary motive is amplified by the risk sharing. Since the macroeconomic implications of these two approaches are sometimes rather different, it is thus worthwhile examining further the related empirical and theoretical questions to clarify the established results.

5 Conclusion

In light of all the evidence it seems that financial factors matter but that we shall not necessarily consider the investment-cash flow relationship as only an intratemporal one. This also suggests that any splitting criterion used to assess the investment-cash flow sensitivity should take into account the degree of expected financing constraint.

Regarding monetary policy, if the cash flow effect on investment is due to a liquid-

ity preference, then the following shall be investigated. First, an interest rate hike is likely to announce an economic slowdown. Such tightening monetary policy can be implemented whenever there is any fear of inflation pressure. The rise in inflation, wether wage cost induced or not, makes real interest rates lower, which, ceteris paribus, stimulates investment. A tightening monetary policy can also be implemented when there is financial euphoria, a period of overinvestment. In such a situation, especially if inflation is rising (and even more in its wage cost induced form), stock prices might attract more households' savings. Whatever the reason that motivates the tightening monetary policy, it is likely to operate when cash flow hoarding, inventory investment and lending are increasing. It is not clear wether this policy is an optimal response or if it is precipitating/exacerbating an unavoidable output drop.

Second, when the central bank decreases the interest rate, it helps the economy recover. However, recovery is empirically found to be a slow process. Interest rate manipulation has an asymmetric effect in the sense that the liquidity effect throughout which the central bank has a positive short term effect on the economy is weak. This could be related to the precaution argument. Since firms with high cash flow and inventories level need not to invest under unfavourable circumstances, or if so, can rely on internal finance, they are temporarily immune to the easing in credit conditions. Consistently with the interpretation of the investment-cash flow relation given above, Kaplan and Zingales (1995) go further, arguing that "policies designed to make credit more available in recessions will not lead to increased investment by firms with the highest investment-cash flow sensitivity."

Overall, this paper suggests that financial factors matter due to their *intertemporal* linkage with investment.

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