Chapter 3
Cash Holdings, Firm Value and the Role of Market Imperfections. A Cross Country Analysis

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Abstract In this paper we evaluate the empirical importance of the contemporaneous presence of financial and labor market imperfections by studying cross-country differences in market valuations of listed companies and firms' cash holdings. Our results show that, as expected, financial market imperfections are positively correlated with firms' cash holdings and that the latter are larger wherever employment protection laws (EPL) are stricter. Moreover, stock markets value liquid companies less in economies with higher EPL levels.

Introduction

In this paper we empirically analyze the impact of labor and financial market imperfections on firm behavior by using two cross-country datasets of listed and unlisted firms. We focus on two aspects: first, we study firms' cash holdings in the presence of labor market imperfections. Secondly, we analyze how the market value of listed firms depends upon labor market imperfections and the joint impact of liquidity and labor market imperfections.

There are several reasons why the study of firm cash holdings is worth exploring. First, in a world of perfect financial markets and no contracting costs, firms do not demand (hold) cash because they can invest in all positive net present value (NPV) projects available to them and pay out the funds that they cannot invest in such

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projects to shareholders. However, in the presence of imperfect financialmarkets firms demand cash for different reasons. For example, when agency problems exist, i.e., when the interests of controlling shareholders are not aligned with those of outside investors, controlling shareholders prefer to keep funds in liquid assets that have a private benefit option attached to them that other assets do not have (Pinkowitz et al. 2006).

Second, as documented by Bates et al. (2008), the average cash-asset ratio held by companies in the US doubled from 10.48 to 24.03% between 1980 and 2004. This finding appears paradoxical because improvements in financial technology should reduce cash holdings. The authors explain the increase in the average cash ratio by citing a precautionary motive: the average cash ratio increases over the sample period because the cash flow risk for American firms has increased, inventories have fallen, and research and development expenditures have increased. In Bates et al. (2008), therefore, the cash ratio increased because of changes in firm characteristics.

Third, there is cross-country variability in the cash-assets ratio and the observed cross-country variability may reflect significant differences in institutional environments, in the degree of market imperfections and in the quality of domestic institutions, such as bankruptcy laws, the state of development of capital markets, and patterns of corporate governance (Ferreira and Vilela 2004).

Finally, the analysis of the role played by market imperfections and institutions in determining cash holdings provides a valuable background to the design of welfare-improving economic policies. The traditional models of financial management hold the institutional framework constant. We, however, are able to analyze the impact upon management of operating in a variety of environments in an international study. Indeed, strategies which might be optimal in a given institutional or legal environment are not necessarily optimal in another.

We are interested in looking at how the existence of financial and labor market imperfections affects firm value and, therefore, their growth. In our paper labor market imperfections are those created by the legal environment, as represented by employment protection laws (EPL): how much freedom does management have to change its labor force in response to changes in demand? If management is constrained from adjusting its labor expenses when demand changes, the firm essentially has a higher level of operating leverage and, in turn, a greater volatility of cash flows. Greater cash flow volatility, as Bates et al. (2008), have shown, changes the firm's optimal stock of cash. Operating leverage is the incurrence of a fixed operating cost. In the simplest case, with no labor market imperfections, we can regard labor as a variable cost. If, however, legislation makes it difficult or expensive to adjust the quantity of labor purchased, labor becomes, at least in part, a fixed cost. Higher operating leverage transforms a given level of sales volatility into operating income volatility. This will, in turn, modify management's optimal strategies. In particular, management will need to hold a larger quantity of cash holdings as a buffer against the larger fluctuations of cash inflows and outflows. Therefore, we should expect that tighter EPL increases cash holdings.

The purpose of the analysis is twofold. First, we regress cash holdings on a set of explanatory variables that we reasonably assume are proxies for the economic determinants of firms' cash holdings. As theoretical cash demand models are often considered alternative, but not mutually exclusive, we take a general-modeling approach by estimating an equation with several variables the effects of which on cash holdings are consistent with different theoretical interpretations. Among these variables, we focus our attention on the role played by labor market imperfections and study how firms' cash holdings vary with EPL over time and across countries. Second, for the sample of listed companies, we follow the Fama and French (1998) approach to regress firms' market value on their characteristics, such as: earnings and earning variations, net asset variations, research and development expenditure levels and variations, interest expenditure levels and variations, dividend levels and variations, change in liquidity, plus a country-level measure of labor market regulations (EPL). We estimate whether the accumulation of liquid assets is more highly valued in countries with financial and labor market imperfections.

Our results show that firms' cash holdings are higher whenever market imperfections are larger. Overall, the sign of the estimated coefficients is more consistent with the pecking order theory than with the trade off and the agency cost theories. Firms mainly hold cash because funding investment by means of internal funds is less expensive than by external funds. Further, due to the presence of imperfections, we show that financial markets attach a positive value to firms' cash holding changes, but that the contemporaneous presence of labor market imperfections decreases this value. In other words, financial markets recognize, and consistently price, that stricter employment protection laws determine less internal funding of investment and higher cash flow volatility. Another interpretation of this result is that the impact of changes in EPL on market values is the greatest for those companies with the highest cash holding accumulation.

The paper is organized as follows. Section Demand for Cash and Near-Cash Assets briefly discusses some recent empirical findings on the determinants of cash holdings and reviews the main theories. Then, in Section Empirical Specification, we describe our empirical specification, and in Section Data and Estimation Results, data and the estimation results. Section Firm Value and Labor Regulations, analyzes the impact of EPL on firm value and how EPL interacts with liquid assets. Section Concluding Remarks concludes.

The Demand for Cash and Near-Cash Assets

Studies on cash holdings date back to the 60s and the works of Selden (1961), Meltzer (1963), and Frazer (1964). More recently, interest in firm cash holdings has been revived by developments in the economics of imperfect markets (Ferreira and Vilela 2004), and by the observed increase in corporate cash holdings (Bates et al. 2008). As Opler et al. (1999) point out, many firms hold enough cash to pay off all of their outstanding debt, and firms seem to not be, in a sense, leveraged at

all. The authors show that the demand for cash depends on the size of the firm, but there seem to be economies of scale in cash balances. Among others, Almeida et al. (2004), Kim et al. (1998) and Pinkowitz et al. (2006) find that the demand for cash is lower as a percentage of assets in large firms than in small firms. Risk also plays a role in the demand for cash, and Lins et al. (2008) find that, while managers prefer to obtain lines of credit to have liquidity for strategic investment opportunities, they hold cash to buffer against possible future cash shortfalls. Kim et al. (1998) find that the demand for cash increases along with variations in future cash flows. Almeida et al. (2004) find that firms' propensity to put aside cash from their cash flows depends on the existence of financial constraints. There is a general agreement that the demand for cash varies across industries, reflecting the financing patterns and the liquidity of their assets and liabilities. Pinkowitz et al. (2006) and Ferreira and Vilela (2004) carry out cross-country studies of corporate cash demand. Ferreira and Vilela (2004) find that firms in countries with superior investment protection hold more cash, and Pinkowitz et al. (2006) examine agency theoretical models of the demand for cash and find a strong link between cash and firm value in countries with strong investor protection. Foley et al. (2007), on the contrary, find that some of the large cash balances held by firms in reality belong to subsidiaries of US multinationals who wish to avoid the tax burden they would incur if these funds were returned to the parent firm as dividends.

More recently, Himmelberg et al. (2008) showed that firms demand cash because a fraction of labor and material inputs must be purchased out of cash holdings chosen one period in advance. Because cash has transaction value, it competes with fixed capital for the scarce resources of the firm. In the absence of adjustment costs, the optimal allocation between cash and non-cash assets equates their expected marginal returns. By using a sample of European companies, the authors find that (1) firms with production technologies that are relatively material and/or labor intensive will tend to maintain higher cash-to-asset ratios; (2) the optimal cash-asset ratio of the firm depends upon capital depreciation rates and interest rates; (3) cash has option value because cash gives the firm the option to produce in good states of the world. Thus, the model predicts firms facing more volatile demand or productivity shocks will allocate a higher fraction of their assets to cash.

There are three theories that can explain why firms demand cash, which have been derived from the corresponding theories of firm capital structure. These theories are departures from the Modigliani and Miller (1958) model according to which the market value of firms is independent of their capital structure in the presence of frictionless financial markets.[1] In Modigliani and Miller (1958) cash is considered as a zero net present value investment because there are no benefits from holding

[1] Modigliani and Miller (1963) analyze the impact of financial structure on firm value in the presence of corporate income taxes. Because interest payments on debt are tax deductible, whereas dividends are not, the introduction of corporate taxation implies that the invariance proposition does not hold anymore and affects the firm's choice of bond vs. equity financing. Indeed, the use of financial leverage adds to firm value via the present value of the interest tax savings on debt financing, with the result that the optimal capital structure of the firm would be 99% debt.

cash in a world of perfect capital markets lacking information asymmetries, transaction costs or taxes. Firms undertake all positive NPV projects regardless of their level of liquidity. Indeed, once we assume no transaction costs, no information costs, brokerage fees, or other costs associated with the purchase or sale of securities or other assets, internal and external funds are perfect substitutes. In contrast, the theories briefly discussed below can be derived from costly transaction theories in which the Modigliani and Miller assumptions are removed and, consequently, internal and external finance are not perfect substitutes, due to transaction costs, tax advantages, asymmetric information, financial distress costs, or agency problems.

Trade Off Theory

According to the trade off model firms demand cash for precautionary and transaction motives up to the point where marginal benefits of holding cash are equal to marginal costs (Baumol 1952; Tobin 1956; Miller and Orr 1966). In the presence of imperfect capital markets, the benefit for firms of holding cash is the cost avoidance associated with the external-fund raising or the liquidation of existing assets to finance their growth opportunities. Cash holding costs are mainly the opportunity cost of cash, i.e., the lower return of liquid assets relative to other investments of the same level of risk. The result of the trade off theory is the determination of an optimal level of cash holdings. Consequently, firms raise external funds infrequently and use cash and liquid assets as a buffer.

Pecking Order Theory

According to the pecking order theory, firms find the issuing of new equities very costly because of information asymmetries. Thus, firms finance their investments primarily with internal funds, then with debt and finally with equities (Leland and Pyle 1977; Myers 1984; Myers and Majluf 1984; Greenwald et al. 1984).[2] According to this theory, cash holdings are simply the result of financing and investment decisions and, therefore, no optimal cash level exists. Cash holdings are used as a buffer between retained earnings and investment needs.

[2] Myers (1984) notes the following pecking order for financing decisions: firms prefer internal sources of funds; firms adapt their dividend payout policies to reflect their anticipated investment opportunities; dividends are sticky. Moreover it is possible to find unpredictable fluctuations in profitability and investment opportunities. These elements imply that an internally generated cash flow may higher or lower than investment outlays; if external financing is required, firms issue the safest security first and equity issues remain a last resource.

Agency Cost Theory

In finance, agency costs arise when there is a separation between ownership and control and, therefore, differences exist between managers' decisions (the principal) vs. shareholders' interests (the agent). Indeed, according to the managerial capitalism theory (Martin et al. 1988) managers avoid using external funds because doing so would subject them to the discipline of the marketplace. According to the agency cost theory, agency costs include the principal's monitoring expenditures, the agent's bonding expenditure, and the residual loss from imperfect monitoring (Barnea et al. 1981; Jensen and Meckling 1976).

The free cash flow theory of Jensen (1986), suggests that managers have an incentive to build up cash in order to increase the amount of assets under their control and to gain discretionary power over firm investment decisions. Cash holdings play the same role as free cash flows because they are used to finance investment projects that capital markets would not be willing to finance. The cost of external finance increases because capital markets do not know whether managers are asking for funds to increase firm value or to pursue their own interests. Therefore, debt financing is considered a means to alleviate the conflicts between shareholders and management, reducing the amount of free cash available for managers.

Empirical Specification

In summary, cash holdings may have different theoretical explanations, mainly based on the fact that internal and external finance are not perfect substitutes for one another. Indeed, internal finance may be less costly than external because of transaction costs, tax advantages, asymmetric information, and agency problems.[3]

The trade off, the pecking order and the agency cost theories are alternative, but not necessarily mutually exclusive models for explaining firms' cash holdings, given the differences existing within each economy in terms of firms' size and business entity typology, including the regulations governing them. Therefore, several variables may enter an empirical specification that encompasses results concerning cash holding demand derived from the three theories. In a list, though not exhaustive, of explanatory variables for firms' cash demand we include: the investment-to-total asset ratio, the market-to-book value, the company size, the debt issue over total assets, the cash-flow to total asset ratio, the cash-flow volatility, the debt maturity, the collection and credit periods, and, finally, some measure of labor market imperfections.

[3] Tax savings arise when earnings are retained rather than paid out because a tax dividend is replaced with a lower tax on capital gains.

The Investment-to-Total Asset and the Market-to-Book Value Ratios

According to the trade off theory, higher growth opportunities are positively correlated to firms' cash holdings. Indeed, firms with strong growth opportunities either would bear greater financial distress costs in the case of forced liquidation, or might be forced to forgo profitable investment opportunities. We capture growth opportunities with both current capital expenditures (INV/TA) and the market-to-book value ratio ($MKTBOOK$), a rough measure of the Tobin's q.[4] The estimated coefficients of these two explanatory variables should both be positive because cash holdings allow firms to avoid financial distress. Indeed, the cost associated with cash shortage is higher for firms with valuable investment opportunities. According to the pecking order theory, higher investment opportunities generate higher demand for cash because firms prefer to use internal funds to finance investment projects. Therefore, in this case, as well, the expected sign for the estimated coefficients of both (INV/TA) and ($MKTBOOK$) is positive. However, if investment is not a proxy for growth opportunities, the estimated coefficient of (INV/TA) may show a negative sign: to finance their investment projects, firms use primarily accumulated cash (Saddour 2006). Thus, it is expected that cash holdings will decrease with investment. In the case of the free cash flow theory, cash is held by firms whose managers want to increase their personal power. Therefore, according to this theory, firms with poorer investment opportunities should hold more cash so that managers do not need to provide information about the firms' investment plans to capital markets operators. Consequently the estimated coefficients of INV/TA and $MKTBOOK$ should be negative, in this case.

Firm Size

According to the trade off theory, the expected sign of the estimated coefficient of ($SIZE$) is negative because larger firms should generate lower cash demand, due to the presence of economies of scale in cash management. In the case of the pecking order theory larger firms are expected to have high levels of cash flow and, then, a positive estimated coefficient for $SIZE$ is expected. A positive estimated coefficient is also expected in the case of the agency cost theories, given that agency costs are usually positively correlated with firm size.

Debt Issue

The predicted relationship between firms' issue of debt ($DEBT/TA$) and cash holdings is not clearly determined under the trade off model. On one hand, an increasing leverage increases the probability of financial distress and bankruptcy. Then, higher

[4] Variable definitions will be provided below.

($DEBT/TA$) values are expected to generate higher cash holding demand. On the other, debt is interpreted as a cash substitute; therefore, larger debt issues may be associated with lower cash holdings, and a negative estimated coefficient of ($DEBT/TA$).

Cash Flow

Cash flow (CF/TA) is a substitute for cash holdings. Then, for the trade off theory, cash flow should be negatively correlated to cash holdings and the sign of the estimated coefficient of (CF/TA) is expected to be negative. Diversely, for the pecking order theory the estimated coefficient of (CF/TA) is expected to be positive, because cash flow is used to finance new profitable projects, to repay debts, to pay dividends and, finally, to accumulate cash. Agency cost theories provide no clear predictions regarding the effect of cash flow on cash holdings.

Cash Flow Volatility

Cash flow uncertainty ($SIGMA$) should be positively related to cash holdings because more volatile cash flows increase the probability of cash shortages. Only the trade off theory provides a clear prediction on the expected effect of cash-flow volatility on cash holdings.

Debt Maturity

According to the trade off theory the impact of debt maturity ($DEBTMT$) on cash holdings is not well determined a priori. On one hand, shorter debt maturity increases the likelihood of financial distress and should be positively correlated to cash holdings. On the other, Barclay and Smith (1995) argue that firms with the highest credit ratings issue relatively larger amounts of short-term debt. These firms have better access to capital markets and hold consequently less cash. Short-term debt can be used to finance current expenses, and thus can be seen as a cash substitute. Therefore, firms showing shorter debt maturity are expected to hold less cash. In this case as well, neither the pecking order theory nor the agency cost theory provide predictions regarding the effect of debt maturity on cash holdings.

Collection and Credit Periods

The collection period is defined as the number of days, on average, that a firm requires for collecting a credit sale. The length of the collection period indicates the effectiveness with which a firm's management grants credit and collects from customers. Therefore, the longer the collection period ($COLLPRD$) is, the lower cash holdings are.

The credit period is defined as the number of days, on average, between the purchase of inputs and the payment made for them. It measures the credit period enjoyed by the firm in paying creditors. Therefore, the longer the credit period (*CREDPRD*) is, the higher cash holdings are. Again, no predictions are made regarding cash holdings related to collection and credit periods by either the pecking order theory or the agency cost theory.

EPL

As for the impact of EPL on cash holdings, we expect that higher levels of EPL make it reasonable for firms to hold higher levels of cash holdings. This positive correlation between EPL and cash holdings is consistent with the trade off theory. Indeed, as pointed out by Calcagnini and Giombini (2008) and Calcagnini et al. (2009) regulation can increase the cost the firm faces when expanding its productive capacity, and limits its capacity to respond to changes in fundamentals. Therefore, by increasing the likelihood of financial distress, higher EPL levels make it profitable for firms to increase their cash holdings.

Table 3.1 summarizes the predicted impact of each variable of model (3.1) on cash holdings according to the three theories.

Our empirical strategy is to estimate, by means of different econometric methods, the following model (3.1) which includes the set of explanatory variables previously discussed:

$$\begin{aligned}(CASH/TA)_{i,t} = {} & \beta_0 + \beta_1(INV/TA)_{i,t} + \beta_2(MKTBOOK)_{i,t} + \beta_3(SIZE)_{i,t} \\ & + \beta_4(DEBT/TA)_{i,t} + \beta_5(CF/TA)_{i,t} + \beta_6(SIGMA)_{i,t} \\ & + \beta_7(DEBTMT)_{i,t} + \beta_8(COLLPRD)_{i,t} \\ & + \beta_9(CREDPRD)_{i,t} + \beta_{10}(EPL)_{i,t} + d_t + \eta_i + \phi_j + v_{i,j,t}\end{aligned} \tag{3.1}$$

Table 3.1 Cash holdings theories

Theory	Trade off theory	Pecking order theory	Agency cost theory
Variable			
β_1-INV/TA	+	+	−
β_2-MKTBOOK	+	+	−
β_3-SIZE	−	+	+
β_4-DEBT/TA	+/−	−	−
β_5-CF/TA	−	+	
β_6-SIGMA	+		
β_7-DEBTMT	+/−		
β_8- COLLPRD	−		
β_9-CREDPRD	+		
β_{10}-EPL	+		

where i refers to the firm, j to the country and t to the time period. Each variable is defined as follows:

- CASH/TA = Cash/total assets
- INV/TA = Investment/total assets
- MKTBOOK = Market to book value
- SIZE = Company size (log (total assets))
- DEBT/TA = Debt issue/total assets
- CF/TA = Cash flow/total assets
- SIGMA = Industry sigma (standard deviation of cash flow/total assets)
- DEBTMT = Debt maturity (long term debt/current+non-current liabilities)
- COLLPRD = Collection period (days/100): accounts receivable divided by average daily credit sales
- CREDPRD = Credit period (days/100): accounts payable divided by average daily credit sales
- EPL = Employment protection legislation index (OECD)

Moreover, in (3.1) we also add time dummies d_t, fixed effects η_i and country dummies ϕ_j. Finally, $v_{i,j,t}$ is an idiosyncratic error term.

Data and Estimation Results

We use annual firm-level observations over the period 1995–2003 for eight European Countries (Belgium, France, Germany, Great Britain, Italy, The Netherlands, Spain) taken from AMADEUS, a comprehensive, pan-European database containing financial information on public and private companies. It is produced by Bureau van Dijk whose local providers collect balance sheet information from the national Chambers of Commerce. To allow for comparability, BvD has developed a uniform format, composed of 23 balance sheet items, 25 profit and loss account items, and 26 standard ratios. Additional information, such as industry and activity codes, the incorporation year of the firm in the register, and the quoted/unquoted indicator, complete the dataset. Because of the huge number of observations (over 1,000,000), that made estimations extremely cumbersone, we extracted a 25% random sample from the original database. The random sample mantains the same country distribution as of the original database.

For the group of European countries in our sample we find that the (unweighted) average cash-total asset ratio increased from 8.6 to 14.6% between 1995 and 2003, and the median values increased from 4.5 to 8.1%. As stated above, the observed cross-country variability may reflect significant differences in the degree of market imperfections and in the quality of domestic institutions. In particular, we are interested in analyzing how employment protection legislation affects cash holdings. For this purpose, we use the time series of the OECD EPL Index for total workers, Version 1; this excludes regulations on collective dismissals. EPL for regular workers mainly concerns the cost for employers of firing workers with regular contracts, and it is measured according to the strictness of the regulations for regular procedural

inconvenience, notice and severance pay for no-fault individual dismissals, and the relative difficulty of dismissals. The strictness of EPL for temporary workers mainly concerns hiring practices such as type of contracts considered acceptable or number of successive contracts or renewals. The index is measured both for fixed-term contracts and for temporary agency workers. The overall EPL index theoretically ranges from 0 to 6, according to increasing strictness of employment protection laws.

Descriptive statistics are shown in Table 3.2. The average cash holding-to-total asset ratio is 13.43, while the median value is 7.44. France is the country with the highest values, 18.43 and 13.10 respectively, while Germany and The Netherlands show the lowest values. No clear-cut univariate relationship emerges between cash holdings and the other variables shown in Table 3.2. The only exception is the negative relationship observed between cash holdings and firm size. A more precise analysis of the determinant of firm cash demand will require a multivariate analysis that we will carry out by means of model (3.1).

Table 3.3 shows estimates of the unbalanced panel data model (3.1). We estimate model (3.1) by using an instrumental variable approach, because some explanatory variables are endogenous and we need to instrument them to obtain consistent estimates.[5]

The explanatory variables display statistically significant coefficients, with the exception of the cash-flow volatility coefficient, while the estimated coefficients reflect the mixed predictions on cash holdings provided by the three theoretical theories. Comparing the sign of the estimated coefficients shown in the first two columns of Table 3.3 with the expected signs shown in Table 3.1, and limiting the analysis to the first five common variables, the results seem to favor the pecking order theory.[6] Indeed, four out of five estimated coefficients in the first two columns of Table 3.3, namely the coefficients of variables *INV/TA*, *MKTBOOK*, *SIZE* and *CF/TA*, have the expected sign according to the pecking order theory. However, the remaining variables, namely *DEBT/TA*, *DEBTMT*, *COLLPRD*, *CREDPRD* and *EPL*, show estimated coefficients consistent with the trade off theory. This latter result is no surprise, given the complexity of the economic environment and the differences in firms' size and business entity typologies within and across countries. However, crucial to this paper's purpose, we find that the estimated coefficient of EPL is positive and statistically significant; i.e., higher EPL levels are associated with higher cash holdings. This result implies that more rigid labor markets, by increasing the likelihood of financial distress, make it profitable for firms to accumulate cash holdings.

[5] Unlike Baum et al. (2006) our panel data model is static. We also estimated a dynamic panel data model, but we failed to reject the null hypothesis of the Arellano and Bond test for first order residual autocorrelation.

[6] Columns (1) and (2) differ for the type of instruments used: first differences in the first case and levels in the second case. Results for the endogenous variables (*INV/TA* and *CF/TA*) do not change significantly by using previous period levels of the same variables as instruments; but, according to the Hansen test, the instrument's power is lower than the case of first-differenced instruments.

Table 3.2 Firm cash holdings. Descriptive statistics: 1995–2003

Country	Statistics	CASH/TA	INV/TA	SIZE	SIGMA	CF/TA	DEBTMT	COLLPRD	CREDPRD	MKTBOOK	DEBT/TA	EPL
Belgium	Nr Obs	5,077	4,280	5,112	5,112	5,112	3,815	5,112	5,112	5,112	4,280	5,112
	Mean	9.58	0.42	9.29	0.33	9.59	21.19	0.71	0.53	81.96	−0.30	2.40
	Median	4.96	−0.48	9.08	0.18	9.11	17.64	0.67	0.48	88.44	−0.05	2.20
France	Nr Obs	104,495	89,433	107,829	107,829	107,829	22,822	107,829	107,829	107,829	89,433	107,829
	Mean	18.43	0.41	6.49	0.35	10.50	24.83	0.70	0.45	88.14	−0.17	3.00
	Median	13.10	−0.63	6.29	0.18	9.74	20.59	0.70	0.40	91.91	0.00	3.00
Germany	Nr Obs	557	425	567	567	567	313	567	567	567	425	567
	Mean	6.39	1.00	10.66	0.32	9.27	28.15	0.12	0.20	87.17	0.65	2.60
	Median	2.04	0.00	10.65	0.18	7.68	21.43	0.00	0.15	88.39	0.00	2.50
Italy	Nr Obs	50,174	42,730	51,240	51,240	51,240	2,702	51,240	51,240	51,240	42,730	51,240
	Mean	7.35	1.23	8.38	0.29	6.72	11.59	0.71	0.52	92.45	0.05	2.62
	Median	3.08	0.00	8.25	0.18	5.54	9.06	0.73	0.56	95.61	0.00	2.59
Netherlands	Nr Obs	348	294	353	353	353	103	353	353	353	294	353
	Mean	6.90	1.19	10.57	0.31	11.84	21.04	0.75	0.28	84.68	−0.36	2.34
	Median	3.06	−0.16	10.24	0.18	11.48	22.22	0.65	0.24	94.16	0.00	2.10
Spain	Nr Obs	63,205	52,530	64,709	64,709	64,709	54,480	64,709	64,709	64,709	52,530	64,709
	Mean	11.20	2.33	6.98	0.33	9.01	23.12	0.87	0.10	89.41	0.31	3.01
	Median	6.48	0.19	6.83	0.18	8.10	18.88	0.83	0.00	93.85	−0.33	3.10
UK	Nr Obs	12,835	10,789	13,252	13,252	13,252	9,532	13,252	13,252	13,252	10,789	13,252
	Mean	9.41	1.25	8.59	0.34	10.38	20.53	0.60	0.36	91.29	−0.03	0.64
	Median	3.58	0.22	8.51	0.18	10.01	14.97	0.61	0.33	98.67	0.00	0.60
Total	Nr Obs	236,691	200,481	243,062	243,062	243,062	93,767	243,062	243,062	243,062	200,481	243,062
	Mean	13.43	1.13	7.21	0.33	9.28	22.88	0.74	0.36	89.42	0.01	2.78
	Median	7.44	−0.26	7.13	0.18	8.33	18.43	0.73	0.31	93.41	0.00	3.00

Our calculations based on the AMADEUS – Bureau van Dijk database

Column (3) shows the estimated coefficients of a fixed effect model. In this case, we assumed that each explanatory variable is exogenous. The main difference between the results shown in columns (1) and (2) is the negative and significant estimated coefficients of the investment-to-total assets ratio INV/TA. However, the latter result is to be expected: the within-group estimator is inconsistent and downward biased in the presence of endogenous explanatory variables.

Finally, column (4) shows the estimated coefficients of model (3.1) obtained by using the Fama and MacBeth (1973) two step procedure estimator. This econometric

Table 3.3 Firm cash holdings: IV estimates. Amadeus 1995–2003

Explanatory variables	(1) Instruments: first-differenced	(2) Instruments: levels of vars	(3) Fixed-effects	(4) Fama and MacBeth (1973) two step procedure
INV/TA[a]	0.027***	0.027***	−0.104***	−0.115***
	[0.006]	[0.004]	[0.003]	[0.009]
MKTBOOK	0.021*	0.029***	0.023***	0.018**
	[0.011]	[0.009]	[0.004]	[0.005]
SIZE	6.408***	5.948***	3.227***	−1.935***
	[0.346]	[0.286]	[0.086]	[0.136]
DEBT/TA	0.025***	0.023***	0.113***	0.171***
	[0.007]	[0.006]	[0.004]	[0.013]
CF/TA[a]	0.079***	0.093***	0.207***	0.422***
	[0.013]	[0.010]	[0.003]	[0.020]
SIGMA	0.033	0.064	0.090	1.949**
	[0.079]	[0.070]	[0.058]	[0.814]
DEBTMT	−0.087***	−0.087***	−0.098***	−0.140***
	[0.007]	[0.006]	[0.002]	[0.008]
COLLPRD	−10.620***	−10.596***	−8.666***	−2.601***
	[0.228]	[0.194]	[0.080]	[0.129]
CREDPRD	2.811***	3.222***	2.772***	−0.806**
	[0.241]	[0.199]	[0.119]	[0.254]
EPL	0.536**	0.539***	0.839***	1.619***
	[0.228]	[0.188]	[0.090]	[0.316]
Year dummy	Yes	Yes	Yes	Yes
Constant			−10.194***	20.474***
			[0.641]	[0.975]
Observations	61,162	89,758	195,508	195,508
Number of clusters	24,054	29,494	34,184	
R^2	0.127	0.127	0.116	0.156
F test (p-value)	0.000	0.000	0.000	0.000
Hansen test (p-value)	0.343	0.187		

Robust standard errors in brackets; *p < 0.1, **p < 0.05, ***p < 0.01; [a]instrumented variables

procedure is as follows. In the first step, a cross-sectional regression is performed for each time period. Regressions are estimated independently for each subsample, allowing coefficients on control variables to vary across subsamples. Then, in the second step, the final coefficient estimates are obtained as the average of the first step coefficient estimates. The estimator permits testing for the significance of coefficient combinations, as in ordinary linear regressions. R-squared is computed as the average value of the R-squares from the cross-sectional regressions in the first step of the Fama–MacBeth procedure. The main differences concern the coefficients of the investment-to-total assets ratio *INV/TA*, of firm dimension *SIZE*, and of the credit period *CREDPRD*, which are all negative and statistically significant, as opposed to those shown in columns (1) and (2). Again, these estimates might be affected by endogeneity problems that cannot be controlled by this estimation procedure.

Firm Value and Labor Regulations

In the previous section we showed that, in the presence of market imperfections, firms' cash holdings are not just an accounting balance, but they seem to be linked to other important characteristics of firms and the economic environment in which they operate. To confirm this result, in this section we analyze how firms' market values change with cash holding accumulation and, contemporaneously, with labor market regulations (as measured by EPL). Specifically, for a sample of listed companies we estimate whether liquid assets are valued less in countries with capital and labor market imperfections. To do so we use the Fama and French (1998) and Pinkowitz et al. (2006) approach. Fama and French (1998) developed a valuation regression that relates firm value to firm characteristics. Even if this valuation regression does not specify a functional form resulting directly from a theoretical model, it does a good job in explaining the cross-section variation in firm values.

The starting equation of the Fama and French (1998) model is as follows:

$$\begin{aligned}(V/TA)_{i,t} = {} & \beta_0 + \beta_1(E/TA)_{i,t} + \beta_2(dE/TA)_{i,t} + \beta_3(dE/TA)_{i,t+1} \\ & + \beta_4(dTA/TA)_{i,t} + \beta_5(dTA/TA)_{i,t+1} + \beta_6(RD/TA)_{i,t} \\ & + \beta_7(dRD/TA)_{i,t} + \beta_8(dRD/TA)_{i,t+1} + \beta_9(I/TA)_{i,t} \\ & + \beta_{10}(dI/TA)_{i,t} + \beta_{11}(dI/TA)_{i,t+1} + \beta_{12}(D/TA)_{i,t} \\ & + \beta_{13}(dD/TA)_{i,t} + \beta_{14}(dD/TA)_{i,t+1} + \beta_{15}(dV/TA)_{i,t+1} + \varepsilon_{i,t}\end{aligned}$$

where:

- V/TA = (Market value of equities + Book value of debt)/total assets
- E/TA = (Income before income tax + Net items − Appropriation to untaxed reserves − Income tax − Minority interests + Interests and related expense)/total assets
- TA = Total assets

- RD/TA = Research and development expense/total assets
- I/TA = Interest expense/total assets
- D/TA = Total dividend/total assets
- L/TA = (Cash + Short term investment)/total assets
- $d(X/TA)_t = ((X_t - X_{t-1})/A_t$ and $d(X/TA)_{t+1} = ((X_{t+1} - X_t)/A_t$.

The authors control for profitability, i.e., expected cash flow, with the current, past and future earning variables (E/TA). The past and future change in total assets (dTA/TA) are meant to proxy for the net investment component of the expected net cash flow. In the Fama and French (1998) model, next period variables are introduced to control for the change in expectations.

Pinkowitz et al. (2006), analyze the agency cost theory in the framework of the investor protection offered by a country's laws, i.e., to what extent does the law protect the owners of a firm from exploitation by the firm's management and protect outside shareholders from the predations by insiders? In the presence of agency problems, investing in cash can negatively affect firm value, by enabling managers to avoid the discipline of the marketplace.

The aforesaid authors use the Fama and French (1998) valuation approach to estimate the relationship between market value and cash holdings by splitting the change in assets into its cash (L) and noncash (NA) components. The idea is that managers can turn liquid assets into private benefits at a lower cost than with other assets. Liquid assets therefore represent a promising opportunity to investigate the implications of agency theory. Pinkowitz et al. (2006) find that the relationship between cash holdings and firm value is much weaker in countries with poor investor protection than in other countries, supporting the implications of the agency theory. Indeed, agency theory predicts that the value of corporate cash holdings is lower in countries with poor investor protection, because of the greater ability of controlling shareholders to extract private benefits from cash holdings in such countries.

Besides capital market imperfections, we analyze the impact of labor market regulations on firms' market value. As we described in previous sections, labor market imperfections lower firms' value. On one hand, they reduce the freedom management has to change the labor force in response to changes in demand and, consequently, increase cash flow volatility and the likelihood of financial distress.[7] On the other, there may be an indirect effect of EPL on firms' value: firm values are deemed to be lower in the presence of EPL because, *ceteris paribus*, it increases the amount of cash they must hold in the face of adverse demand shocks.

The regression equation (Model 3.2) is a modified version of the Pinkowitz et al. (2006) (2) to which we added the EPL variable and the interaction term $EPL * dL$, where dL stands for changes in cash holdings. We expect both estimated coefficients of EPL and $EPL * dL$ to be negative.

[7] Calcagnini et al. (2009) showed that EPL reduces firm investment by increasing firm adjustment costs. Smaller growth opportunities, due to less investment, may result in lower market values.

$$
\begin{aligned}
(V/TA)_{i,t} = {} & \beta_0 + \beta_1(E/TA)_{i,t} + \beta_2(dE/TA)_{i,t} + \beta_3(dE/TA)_{i,t+1} \\
& + \beta_4(dNA)_{i,t} + \beta_5(dNA)_{i,t+1} + \beta_6(RD/TA)_{i,t} + \beta_7(dRD/TA)_{i,t} \\
& + \beta_8(dRD/TA)_{i,t+1} + \beta_9(I/TA)_{i,t} + \beta_{10}(dI/TA)_{i,t} \\
& + \beta_{11}(dI/TA)_{i,t+1} + \beta_{12}(D/TA)_{i,t} + \beta_{13}(dD/TA)_{i,t} \\
& + \beta_{14}(dD/TA)_{i,t+1} + \beta_{15}(dV/TA)_{i,t+1} + \beta_{16}(dL/TA)_{i,t} \\
& + \beta_{17}(dL/TA)_{i,t+1} + \beta_{18}(EPL)_{i,t} \\
& + \beta_{19}(EPL)_{i,t} * (dL/TA)_{i,t} + \varepsilon_{i,t} \qquad (3.2)
\end{aligned}
$$

where:

- NA = Total assets − Cash and short term investment
- L/TA = (Cash + Short term investment)/total assets

Data and Estimation Results

Our data are obtained from Compustat Global. The Compustat Global database provides authoritative financial and market data on publicly traded companies. We selected companies located in 10 countries which had as their fiscal year end December 31 and for which we had information on share closing prices and the number of shares outstanding. The initial sample was composed of 6,834 companies for a total of 67,063 observations. To reduce the effects of outliers, we trimmed our sample at the 1% level by dropping 0.5% observations on the tail of each variable. We ended up with an unbalanced panel data that contains 6,758 companies, for a total of 6,1391 observations for the time period 1988–2006. Table 3.4 shows descriptive statistics for our sample.

Model (3.2) estimates are shown in Table 3.5. Column (1) shows our estimates of the standard Fama and French (1998) model in which the cash contribution to firms' market value is split into its cash and noncash component as in Pinkowitz et al. (2006). The estimated coefficients show the contribution to firms' market value of levels and changes of the following variables: earnings, research and development expenditures, interest expenditures, and dividends. The results show that both current and future changes in net assets ($(dNA/TA)_{i,t}$ and $(dNA/TA)_{i,t+1}$, respectively) have positive and statistically significant estimated coefficients, as does the change in current and future cash component of cash holdings ($(dL/TA)_{i,t}$ and $(dL/TA)_{i,t+1}$, respectively). As expected, therefore, cash holdings increase the market value of the firm.

Column (2) shows results of the standard model with the addition of the EPL variable. As expected, the estimated coefficient of EPL is negative and statistically significant ($\hat{\beta_{18}} = -0.079$) – firms that operate in stricter labor markets are valued less than firms that operate in more flexible labor markets. Cash and noncash components of cash holdings continue to display positive and statistically significant estimated coefficients as in the standard model of column (1).

Table 3.4 Firm value and employment protection. Descriptive statistics: compustat 1988–2003

Country	Statistics	V/TA	E/TA	NA/TA	RD/TA	I/TA	D/TA	L/TA	EPL
Canada	Nr Obs	4,543	4,259	4,820	4,820	4,557	4,713	4,820	4,074
	Mean	1.66	0.02	0.89	0.01	0.02	0.01	0.11	0.78
	Median	1.30	0.05	0.97	0.00	0.02	0.00	0.03	0.78
France	Nr Obs	4,708	5,120	5,645	5,646	5,437	850	5,645	4,600
	Mean	1.43	0.04	0.86	0.01	0.02	0.02	0.14	2.99
	Median	1.16	0.05	0.91	0.00	0.01	0.01	0.09	2.98
Germany	Nr Obs	4,722	5,046	5,383	5,384	5,305	2,795	5,383	4,672
	Mean	1.50	0.01	0.87	0.01	0.02	0.02	0.13	2.61
	Median	1.22	0.04	0.93	0 .00	0.02	0.01	0.07	2.46
Italy	Nr Obs	1,124	1,277	1,319	1,319	1,315	671	1,319	840
	Mean	1.32	0.03	0.89	0.00	0.02	0.02	0.11	2.69
	Median	1.17	0.04	0.93	0.00	0.01	0.01	0.07	2.70
Japan	Nr Obs	3,563	3,876	4,510	4,510	4,411	3,578	4,510	3,667
	Mean	1.44	0.02	0.80	0.01	0.01	0.01	0.20	2.00
	Median	1.17	0.03	0.84	0.00	0.01	0.01	0.16	2.03
Netherlands	Nr Obs	1,612	1,694	1,755	1,755	1,719	1,329	1,755	1,474
	Mean	1.61	0.06	0.89	0.01	0.02	0.02	0.11	2.48
	Median	1.28	0.07	0.95	0.00	0.02	0.02	0.05	2.73
Portugal	Nr Obs	351	394	399	399	397	154	399	354
	Mean	1.20	0.04	0.94	0.00	0.02	0.02	0.06	3.70
	Median	1.08	0.05	0.96	0.00	0.02	0.01	0.04	3.67
Spain	Nr Obs	1,125	1,304	1,345	1,345	1,333	640	1,345	1,081
	Mean	1.34	0.05	0.92	0	0.02	0.02	0.08	3.19
	Median	1.19	0.06	0.96	0	0.02	0.02	0.04	3.05
UK	Nr Obs	5,844	6,131	6,435	6,445	6,336	4,589	6,435	5,046
	Mean	1.81	0.01	0.85	0.02	0.02	0.03	0.15	0.64
	Median	1.41	0.06	0.91	0.00	0.01	0.03	0.09	0.60
United States	Nr Obs	27,703	22,379	29,618	29,630	27,985	29,100	29,618	25,327
	Mean	1.92	0.02	0.85	0.04	0.02	0.01	0.15	0.21
	Median	1.44	0.06	0.94	0.00	0.02	0.00	0.06	0.21
Total	Nr Obs	55,295	51,480	61,229	61,253	58,795	48,419	61,229	51,135
	Mean	1.74	0.02	0.86	0.02	0.02	0.01	0.14	1.09
	Median	1.33	0.05	0.93	0.00	0.02	0.01	0.07	0.60

Our calculations based on Compustat

Finally, column (3) shows estimated coefficients of the equation that includes both EPL and the interaction term $(EPL)_{i,t} * (dL/TA)_{i,t}$. The estimated coefficients of both EPL and the interaction term are statistically significant ($\hat{\beta_{18}} = -0.078$ and $\hat{\beta_{19}} = -0.694$, respectively) and, as expected, negative.

Therefore, estimated coefficients confirm our hypotheses about the impact on firm value of labor market imperfections and the interaction between changes in firms' liquidity and labor market imperfections. First, firms' market value is directly and negatively affected by the existence of more rigid labor markets. Secondly, the interaction of labor market imperfections and liquidity accumulation is negative –

Table 3.5 The Change in the value of cash and employment protection. Fama and MacBeth (1973) estimates. Compustat 1988–2003

Explanatory variables	(1) Fama and French (1988) model	(2) Employment protection effect	(3) Employment protection and liquidity interaction
$(E/TA)_{i,t}$	0.709**	1.110	1.079
	[0.259]	[0.667]	[0.671]
$(dE/TA)_{i,t}$	0.320**	0.135	0.148
	[0.117]	[0.271]	[0.271]
$(dE/TA)_{i,t+1}$	1.056***	1.156***	1.166***
	[0.171]	[0.309]	[0.309]
$(dNA/TA)_{i,t}$	0.681***	0.479***	0.498***
	[0.074]	[0.152]	[0.154]
$(dNA/TA)_{i,t+1}$	0.736***	0.764***	0.763***
	[0.130]	[0.131]	[0.130]
$(RD/TA)_{i,t}$	6.934***	6.463***	6.452***
	[0.615]	[0.608]	[0.605]
$(dRD/TA)_{i,t}$	0.306	−0.091	−0.126
	[0.817]	[1.007]	[1.000]
$(dRD/TA)_{i,t+1}$	6.090***	5.977***	5.790***
	[0.770]	[0.797]	[0.760]
$(I/TA)_{i,t}$	−3.663***	−5.035***	−4.920***
	[0.638]	[0.784]	[0.798]
$(dI/TA)_{i,t}$	−5.750***	−3.070	−3.128
	[0.916]	[2.481]	[2.489]
$(dI/TA)_{i,t+1}$	−7.833***	−8.938***	−9.023***
	[1.288]	[1.467]	[1.445]
$(D/TA)_{i,t}$	6.996***	7.474***	7.569***
	[0.571]	[0.716]	[0.733]
$(dD/TA)_{i,t}$	−1.153*	−0.707	−0.461
	[0.633]	[0.918]	[0.877]
$(dD/TA)_{i,t+1}$	2.914**	3.417***	3.592***
	[1.067]	[1.104]	[1.073]
$(dL/TA)_{i,t}$	1.814***	1.611***	1.730***
	[0.151]	[0.197]	[0.491]
$(dL/TA)_{i,t+1}$	1.302***	1.285***	1.284***
	[0.244]	[0.245]	[0.246]
$(dV)_{i,t+1}$	−0.129*	−0.126	−0.125
	[0.068]	[0.072]	[0.072]
$(EPL)_{i,t}$		−0.079*	−0.078*
		[0.040]	[0.042]

(*continued*)

Table 3.5 (Continued)

Explanatory variables	(1) Fama and French (1988) model	(2) Employment protection effect	(3) Employment protection and liquidity interaction
$(EPL)_{i,t} * (dL/TA)_{i,t}$			−0.694**
			[0.264]
Constant	1.336***	1.354***	1.344***
	[0.027]	[0.095]	[0.099]
Observations	26,717	23,646	23,646
Number of time periods	17	16	16
R^2	0.343	0.381	0.384
F test (p-value)	0.00	0.00	0.00

Standard errors in brackets. *p < 0.1, **p < 0.05, ***p < 0.01

the market value of liquidity is lower in the presence of larger market imperfections. In other words, we find that financial markets recognize, and consistently price the reduced internal funding opportunities and higher cash flow volatility caused by stricter employment protection.

Concluding Remarks

The paper has analyzed the impact of imperfect financial and labor markets on firms' asset management and on their market value.

For firm cash holdings, we estimated an empirical cash holding equation by an instrumental variable approach. To interpret and sign the estimated coefficients of the explanatory variables, we made use of three well known theories, namely, the trade off, the pecking order, and the agency cost theories.

Overall, our findings are more in line with results from the pecking order theory according to which firms hold cash because internal funds are less expensive than the external ones when financing investment. Precautionary and transaction motives, associated with the trade off theory, come second.

As for the role of labor market regulations, our results show that, in the presence of imperfect markets, cash holdings are positively associated with EPL levels: higher EPL levels, by increasing the likelihood of financial distress, make it profitable for firms to increase their cash holdings.

The economic importance of cash holdings was also tested by the response of markets. Specifically, our results show that firms' market value is positively affected by the accumulation of cash holdings, but negatively affected by an economic environment characterized by strict labor market regulations. Moreover, the contemporaneous presence of financial and labor market imperfections reduces the market value of cash holdings, because stricter labor market regulations decrease internal funding for investment and increase higher cash flow volatility.

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