DO SMALL AND MEDIUM SIZED ENTERPRISES MATCH THEIR ASSETS AND LIABILITIES? EVIDENCE FROM PORTUGAL

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ABSTRACT

For small and medium-sized enterprises, various types of debt are not identical. There are specific costs and benefits associated with each funding source. We argue that the asset and liability sides of the balance sheet are interrelated. Specifically, we hypothesize that firms match specific assets with a specific set of liabilities. We test our theory using a unique sample of Portuguese firms for the years 1990-2000. Our data set identifies various short-term and long-term funding sources, as well as the uses of these funds to purchase various assets. Our results reject independence between the two sides of the balance sheet—suggesting that small and medium-sized firms in Portugal do indeed match specific assets with specific liabilities. The implication for financial theory is that each asset or project may have a different weighted average cost of capital. That is, there is no single weighted average cost of capital for a typical small to medium-sized firm.

JEL: G32, M40

KEYWORDS: Asset-liability matching, SMEs, capital structure, sources and uses of funds

INTRODUCTION

Most of the literature on capital structure has implicitly assumed that the choice between debt and equity depends solely on firm characteristics, or the firm's demand for debt. For example, Rajan and Zingales (1995) and Booth et al (2001) focus on the demand side of capital structure for large listed firms. However, Faulkender and Petersen (2005, p. 46) have shown that a firm's debt-equity structure depends "not only on the determinants of its preferred leverage (the demand side) but also the variables that measure the constraints on a firm's ability to increase its leverage (the supply side)." Also, as noted by Stowe, Watson, and Robertson (1980, p. 973), "the actual balance sheets of modern corporations do not exhibit an independence between the two sides of the balance sheet."

Although the finance literature has recognized the interrelationship between the two sides of the balance sheet, the implications have received little attention. It means the cost of capital can vary between assets, so that a firm need not have a single weighted average cost of capital (WACC).
While asset and liability interdependence may not be so important for large corporations, capital constraints and differential costs between the sources of debt capital can have a major impact on small and medium enterprises (SMEs). For SMEs, the cost of funds may vary on a project-by-project basis depending on project size, riskiness, and time horizon. Each source of debt conveys its own particular set of costs and benefits and a firm may choose a different mix of funding sources for each asset it purchases. In this paper, we propose that the two sides of the balance sheet of SMEs are interdependent causing them to match specific assets with specific liabilities. The firm's optimal capital structure then depends on the assets they purchase.

We empirically test our theory of asset and liability matching using a unique sample of 1416 Portuguese industrial SMEs over the years 1990-2000. This data set provides detailed information about sources of SME funding—including internal equity, bank loans, trade credits, non-bank loans, leasing, and other short-term debt. For these SMEs, we test for independence between sources of funding and the uses of funds to purchase various assets. Our tests reject independence, suggesting the asset and liability sides of the balance sheets are interrelated. Each asset class has its own unique

mix of financing sources. Our results suggest that all types of debt are important for SMEs and that empirical work in finance should distinguish between various types of debt. Thus, a firm does not have a unique average weighted cost of capital and decisions about capital structure become more complicated than in traditional analysis. The debt portion of the debt-equity ratio depends upon the type of debt a firm uses.

The remainder of the paper proceeds as follows. The next section provides a brief literature review, the third section describes the data sample, and section 4 discusses sources and uses of funding. The fifth section shows how we distinguished between cheap and expensive trade credits, section 6 presents the empirical results, and section 7 concludes the study.

LITERATURE REVIEW

In a world of frictionless capital markets with no asymmetric information or agency costs, even small firms can fund all of their positive net present value projects. However, the presence of asymmetric information, as stated by Fama (1985), James (1987), and Carey, Post, and Sharpe (1998), means that the firm knows more about the quality of their own projects than outside lenders. As discussed by Leland and Pyle (1977), Diamond (1984), Ramakrishnan and Thakor (1984), Fama (1985), Haubrich (1989), and Diamond (1991), this problem has encouraged the development of specialized or differentiated financial markets and institutions.

Different institutions specialize in extending credit to various firms and banks have some clear advantages in solving the asymmetric information problem for small firms. Mester, Nakamura, and Renault (2001) mention that banks involved in the payment function often know cash inflows before the firms do. Hoshi, Kashyap, and Scharfstein (1990a, 1990b), Petersen and Rajan (1994, 1995) and Berger and Udell (1998) have documented the importance of such relationships between lenders and borrowers and the impact on the cost of borrowing.

The advantages of banking relationships are more important for small firms than for large firms. More information is public for large firms, they often have more than one banking relationship, and many of these firms have access to bond financing. Since bonds come with high fixed costs and lower interest rates than bank loans, Faulkender and Petersen (2006) state that large firms are more likely to borrow from financial markets than from financial institutions. Financial institutions also have advantages in solving moral hazard problems (ex-post contractual problems). By offering both short-term lines of credit and long-term loans, banks can withdraw funds and/or renegotiate the conditions and interest rates if the firm engages in "moral hazard" actions (risk shifting etc.). Creditors in financial markets, on the other hand, have to rely on covenants negotiated ex-ante since it is nearly impossible to renegotiate the terms of corporate bonds ex-post. To the extent that banks are successful ex-post monitors and reduce the moral hazard problems, then bank debt becomes the preferred source of external capital for small firms.

Rajan (1992), Bolton and Scharfstein (1996), and Bolton and Freixas (2000) have noted that different institutions have comparative advantages in resolving financial distress, including the restructuring of firms. Leasing companies (often subsidiaries of banks) are a particular efficient way of minimizing the costs of financial distress. If the firm misses payments, the leasing company simply repossesses the asset. Based on work by Cassar and Holmes (2003), Michaelas and Chittenden (1999), and Daskalakis and Psillaki (2008), some observations can be made about the demand for debt versus equity for SMEs. First, different types of loans and/or institutions finance different types of assets, and secondly, a single external source or type of funding is rarely sufficient to fund most projects. Thus, Iturralde, Maseda, and San-Jose (2010) suggest that Spanish SMEs benefit from multiple bank relationships and multiple funding sources. Garcia-Teruel and Martinez-Solano (2010) argue that the debt maturity structure for SMEs conveys information to lenders—meaning that debt is not homogeneous. Similarly, Scherr and Hulbert (2001) and Aivazian, Ge and Qui (2005) have shown that the maturity of assets affects the maturity of liabilities. This finding shows the two sides of the balance sheet are not independent.

Most of the capital structure literature has focused on homogeneous debt and the general debt-equity trade-off. An exception is Bolton and Freixas (2000) who examine the choice between bonds, bank loans, and equity. In addition, Berger and Udell (1998) have shown that different capital structures are optimal during different stages in the growth cycle of a firm. Taking this argument a step further, we suggest that different capital structures are optimal for funding different assets, even at a given point in time. Some funding sources are better for financing certain assets and each financing source may have its own collateral (which may only be the future earnings of the firm).

The finance literature somewhat recognizes that financing for SMEs is different from financing for large firms and that debt is not homogeneous. Our hypothesis of asset and liability matching builds most specifically upon two pieces of research. First, Faulkender and Peterson (2005) have shown the importance of the supply, or the availability of debt, in determining firms a firm's capital structure. Second, Stowe, Watson, and Robertson (1980) have specifically stated that the asset and liability sides of the balance are interrelated for most firms. This lack of independence means the investing decision is not separate from the financing decision for most assets or projects.

DATA

The primary data source for this study is the Bank of Portugal Statistical Departments database. This database contains balance sheet and income statement data on 1,811 non-listed firms with 11,359 non-continuous firm year observations. We imposed several selection criteria to obtain a more homogeneous and usable sample. Only manufacturing firms for the period 1990-2000 with more than 100 employees for at least one year are included. This restriction minimizes the number of cases where the owner or the owner's family uses their personal wealth to guarantee loans of the firm. Firms with negative net worth and less than three continuous data years are not included in the sample. We also deleted companies with observations lying in either tail (0.5%) of the distribution.

The final sample consists of 1416 firms and 7546 firm year observations. As shown in Table 1, 271 firms have data for the entire sample and about 200 firms have data for one or two years only. The analysis that follows uses only 10 years of data because one year is lost in calculating changes in assets and liabilities. Around 100 firms have consecutive data for 4 to 9 years. Thus, the dataset over weights firms with only a few years of observations and firms with data for the entire 10-year period. The Portuguese government collected this SME data annually during the 1990s, but unfortunately quit collecting such detailed data after the year 2000.

Table 1: Number of Firms with Consecutive Years of Data

Consecutive years of data	Number of firms
1	196
2	200
3	149
4	123
5	108
6	100
7	90
8	90
9	89
10	271
Total	1416

The table shows the number of firms in the sample and the number of years for which they have consecutive annual data. For example, only 271 of the 1416 total firms included in the sample have data for all 10 years. The sample is an unbalanced panel because many companies have less than 10 years of data.

As shown in Table 2, the data include six industry groups: Food and drinks, Textiles and clothes, Wood and paper past, Chemical products, Heavy industry, and Machinery and equipment. The total number of observations varies between 699 and 798 per year and each industry group includes a similar number of firms each year. An examination of the Bank of Portugal Statistical Department's database indicates that our sample is representative of the structure of the Portuguese economy. Looking at the distribution of observations across industries, "Textiles and clothes" includes about a third of the total observations, whereas "Heavy industry" and "Wood and paper paste" each only contain about 15% of total observations.

Table 2: Number of Observations by Years and Industry

	Industry						
Year	Food and drinks	Textiles and clothes	Wood and paper paste	Chemical products	Heavy industry	Machinery and equipment	Total
1991	102	236	56	125	53	127	699
1992	114	278	61	119	49	139	760
1993	107	272	63	121	48	128	739
1994	105	274	59	120	50	133	741
1995	109	274	67	130	51	137	768
1996	108	270	71	130	51	134	764
1997	106	272	70	132	56	128	764
1998	113	282	67	133	63	140	798
1999	111	277	70	133	61	138	790
2000	97	232	59	133	65	137	723
Total	1072	2667	643	1276	547	1341	7546

This table shows the number of observations in the sample for each industry for each year from 1991 to 2000. Annual totals across the six industries are shown in the right-most column. The bottom row shows the total number of observations for each industry for the entire 10-year period.

SOURCES AND USES OF FUNDS FOR PORTUGUESE FIRMS

In Table 3, the owners of the Portuguese firms provide nearly half (46-49%) of their firm's required capital as equity. The common size balance sheet in Tables 4 and 5 show that Portuguese firms have close to 50% equity, which is similar to levels reported by Berger and Udell (1998) for SMEs in the US. In contrast, Rajan and Zingales (1995) report that large listed firms in the G7 countries have equity percentages ranging from 28% in Germany to 42% in the UK.

Table 3: Sources of Funds for Portuguese (Industrial) SMEs

	1990	1994	1998	2000
	% of total funds provided by			
Equity	49	46	49	46
Creditors (trade credit)	10	12	12	14
Banks	20	19	16	18
Other institutions and miscellaneous providers of credit	15	16	15	14
Provisions and accrued expenses	6	7	8	8

This table indicates the % of Portuguese SME funds provided in four different representative years by five broad categories of financing sources.

After internal equity, our data categorizes the liabilities on the balance sheet by three sources of external funding: (1) Other firms (Trade Credits), (2) Banks, and (3) Other Institutions and Miscellaneous providers of finance (e.g., leasing). Trade credits from suppliers constitute from 10%

to 14% of SME funds. This compares to 26% for French, 22% for Spanish, and 11% for Swedish manufacturing SMEs, as reported by Garcia-Teruel and Martinez-Solano (2010) over the period 1996-2002.

Banks provide 16-20% of SME funds, and as shown in Table 4, about half of the bank loans are long-term and half are short-term. Most firms use a variety of sources of debt—meaning the debt-equity trade-off involves non-homogeneous debt.

Table 4: Average Liabilities and Equity of Portuguese (Industrial) SMEs

	1990	1992	1994	1996	1998	2000
Shareholder's Funds	**0.49**	**0.47**	**0.46**	**0.48**	**0.49**	**0.46**
Capital	0.22	0.21	0.25	0.25	0.24	0.20
Reserves	0.23	0.25	0.19	0.21	0.22	0.21
Net Income of the Year	0.04	0.01	0.02	0.02	0.03	0.05
Provisions	**0.02**	**0.01**	**0.01**	**0.01**	**0.01**	**0.01**
Liabilities	**0.49**	**0.52**	**0.53**	**0.51**	**0.50**	**0.53**
Non-Current Liabilities	0.16	0.15	0.14	0.15	0.13	0.13
Long-Term Debt	0.13	0.12	0.09	0.11	0.09	0.10
Bank Loans	0.10	0.10	0.07	0.09	0.08	0.09
Other	0.03	0.02	0.02	0.02	0.01	0.01
Other Non-Current Liabilities	0.03	0.03	0.05	0.04	0.04	0.03
Current Liabilities	0.33	0.37	0.39	0.36	0.37	0.40
Loans	0.10	0.13	0.12	0.08	0.08	0.09
Bank Loans	0.10	0.13	0.10	0.08	0.08	0.09
Others	<0.01	<0.01	<0.01	<0.01	<0.01	<0.00
Creditors	0.10	0.10	0.12	0.12	0.12	0.14
Other Current Liabilities[1]	0.09	0.09	0.09	0.09	0.10	0.10
Accrued Expenses	0.04	0.05	0.06	0.07	0.07	0.07

The reported values are the fraction of shareholder funds and liabilities as a portion of total assets. They represent the right-hand side of an average common size balance sheet for the 1416 Portuguese SMEs. The bold-faced numbers are aggregate percentages for the three broadest categories—internal equity, provisions, and liabilities. Shareholder funds (internal equity) include 3 components: capital reserves, and net income of the year. Liabilities are the sum of non-current and current liabilities. Non-current liabilities are the sum of long-term debt and other non-current liabilities. Long-term debt consists of both bank loans and other loans. Similarly, current liabilities are the sum of short-term loans, creditors, other current liabilities, and accrued expenses.

Other institutions (including leasing and factoring) account for 14 -16% of funds, while the remaining 6% to 8% of funding comes from provisions and accrued expenses. Funds from this last category eventually probably belong to one of the preceding categories of equity or debt. For example, provisions probably are part of internal equity. Accrued expenses are short-term liabilities recognized currently for expenses that will occur next year (e.g., vacation subsidies, social expenses, and rent). Any funding source can pay such expenses.

In Table 4, current liabilities for Portuguese SMEs range from 33% to 40% of assets. For G7 countries, it ranges from 23% for Canada to 43% for France. Bank loans are the largest component of current liabilities (between 8% and 13% of assets). Trade credits total between 8% and 14% of total assets, while other liabilities represent about 10%. Banks provide 9% to 13% of common-size long-term debt. Overall banks and financial institutions account for 20 to 25% of SME financing in terms of loans. This is virtually identical to the 25% figure presented by Berger and Udell (1998) for US small business financing. Similarly, trade credits of 10% to 14% of funding are only slightly smaller than the 15% number reported by Berger and Udell (1998) for the US. Overall, SMEs in Portugal are financed much like SMEs in the US, but different from large listed firms in the G7.

The discussion that follows lists the individual sources and uses of funds for Portuguese SMEs. It provides a rationale for our expectations for our expectations of which funding sources or sources should fund specific asset classes.

Sources of funds

1. *Internal equity*. Owners of SMEs often work in the company and they can generate more equity by drawing less salary and/or reducing dividend payments. The first role of equity for SMEs is the same as for larger companies--reducing the probability of default. For SMEs, equity also helps solve the asymmetric information problem encountered in debt financing. Since owners usually work in the company, they send a strong positive signal to lenders if they are willing to forego investment in other assets to invest in the company. Internal equity should be the primary funding source for assets with the most asymmetric information--intangible assets. In descending order of importance, internal equity would then be used for tangible assets, and then for working capital.

2. *Cheap Trade credits*. Trade credits represent financial services provided by other firms in competition with financial intermediaries. In a simple trade credit contract, the firm gets a discount if it pays on time. For example, perhaps a firm receives a 2% discount if it pays within 30 days. It gets no discount if it pays after 30 days. We categorize on-time payments as Cheap Trade Credits and late payments as Expensive Trade Credits. Smith (1987) and Petersen and Rajan (1997) have identified two broad motives for trade credits. The strategic motive of trade credits is that they are a signal that helps solve the asymmetric information problem regarding the firm's products. They permit the buyer to verify the quantity and quality of a firm's products before submitting payments. Trade credits also help establish long-term relationships between suppliers and buyers. The financial motive for trade credits is that firms compete with financial institutions in offering credit to other firms. Petersen and Rajan (1997) argue that suppliers have a closer relationship with the producing firm than the bank. These firms may know more about a firm's ability to pay than a bank. The use of early payment discounts provides the supplier with an indication of credit worthiness.

   The supplier may have advantages over financial institutions in collecting payments. If the supplier has a local monopoly for the goods, it can to withhold future deliveries to encourage payment. In case of default, the supplier can take back the goods and resell them easier than a financial intermediary reclaiming the same goods. Due to supplier's general knowledge of the firm and the industry, the level of asymmetric information is relatively low between the providers of trade credits and the borrowers. It is an efficient source of funding for current assets, such as inventories. However, if a firm overdraws these credits, trade credits can become expensive.

3. *Expensive trade credits*. Delayed payment of trade credits is expensive because it involves giving up the discount and it may incur penalty payments. Use of expensive trade credits affects reputation and it may reduce access to future trade credits. Overdrawn trade credits also send a signal to the bank that may increase the cost of bank financing. Firms should avoid expensive trade credits and treat them as a financing source of last resort.

4. *Bank loans*. Banks have information about the general financial health of the firm whereas providers of trade credit have specific information about the conditions in the industry and the general competitive position of the firm. Banks collects the information through due diligence and through the transactions accounts of the firm. Although providers of trade credits have an advantage over banks in assessing the value of the collateral they have themselves delivered, banks have an advantage in selling general collateral such as buildings, machinery etc. Banks therefore prefer to issue loans using tangible assets as collateral. Due to asymmetric information, small firms and high growth firms may have to provide considerable internal equity to convince the bank to extend loans for some tangible assets. Overall, however, banks are likely to be a major provider of capital for the purchase of tangible assets for SMEs. Short-term bank loans serve different purposes. The first is the simple provision of liquidity, e.g. to bridge seasonality in payments. The second is financing accounts receivable, translated as debtors on Portuguese balance sheets. Banks have a comparative advantage in evaluating

the creditworthiness of the debtors, because for a large bank several of the debtors may be bank customers. Short-term bank loans issued in conjunction with long-term bank loans to finance tangible assets provide the bank with an easy option to stop unprofitable projects. Thus, short-term bank loans may be used for a variety of purposes—short-term liquidity, and to finance debtors, intangible assets, and tangible assets.

5. *Other non-current liabilities (leasing)*. The balance sheets of Portuguese SMEs (Table 4) contain two items for miscellaneous long- term debt labeled "Long-Term Debt Other" and "Other Non-Current Liabilities". "Long-term Debt Other" may contain car or equipment loans, which are more expensive than bank loans. "Other Non-Current Liabilities" contains, among other items, leasing contracts and factoring. Leasing is an efficient way of resolving financial distress. When a firm misses a payment, the lessor can simply retrieve the asset. "Other Non-Current Liabilities" should primarily finance Tangible Assets.

6. *Other short-term debt*. This category of short-term liabilities includes "Others" and "Other Current Liabilities". Factoring, or the sale of receivables for immediate funds, is included in "Other Current Liabilities". However, the financial statements provide little information about the content of these two accounts.

Uses of funds

Table 5 indicates the uses of funds. Tangible assets comprise about 40% of total assets, intangible assets represent 2%, and investments are 10% of total assets. About 50% of firm assets are current assets—primarily consisting of debtors (about 25%) and inventories (about 15%). Cash represents 3%-4% of total assets, while stocks (liquidity) and prepaid expenses together comprise the remaining 2% of total assets.

Table 5: Average Assets of Portuguese (Industrial) SMEs

	1990	1992	1994	1996	1998	2000
Assets						
Fixed Assets	**0.52**	**0.53**	**0.54**	**0.50**	**0.51**	**0.47**
Intangible Assets	0.01	0.01	0.04	0.04	0.03	0.02
Tangible Assets	0.43	0.42	0.40	0.37	0.39	0.34
Investments	0.08	0.10	0.10	0.09	0.09	0.11
Current Assets	**0.48**	**0.47**	**0.46**	**0.50**	**0.49**	**0.52**
Stocks (Liquidity)	0.02	0.01	0.01	0.02	0.01	0.01
Debtors	0.24	0.24	0.26	0.29	0.26	0.30
Inventories	0.19	0.17	0.15	0.14	0.15	0.16
Cash and cash Equivalents	0.02	0.03	0.03	0.04	0.06	0.04
Prepaid Expenses	0.01	0.02	0.01	0.01	0.01	0.01

The numbers represent the left-hand side of an average common size balance sheet for the 1416 Portuguese SMEs. The reported values are the fraction of various assets as a portion of total assets for six representative years. It indicates the uses of SME funds. Fixed assets are the sum of intangible assets, tangible assets, and investments. Current asset are the sum of stocks (liquidity), debtors (accounts receivable), inventories, cash and cash equivalents, and prepaid expenses

1. *Intangible assets*. To reiterate the discussion above, intangible assets are associated with considerable asymmetric information. Therefore, we expect internal equity to be the primary funding source and bank loans to be the secondary funding source.

2. *Tangible assets*. Tangible assets have less asymmetric information and they are better collateral than intangible assets. Because of the important signal conveyed by using internal equity, it usually finances a portion of tangible assets. Bank loans are the main funding source for most tangible assets. Banks issue mainly long-term loans, but combine these with some short-term bank loans to solve the moral hazard problem. Leasing, which is included in "Other Non-Current Liabilities" is a secondary avenue for financing tangible assets.

3. *Investments*. This category includes real estate, stocks, bonds, and investments in subsidiaries. Long-term investments have various degrees of asymmetric information and collateral value. Internal equity and long-term bank debt are probably the primary sources for this type of financing.

4. *Liquid assets*. These assets include cash and cash equivalents, inventories, debtors (accounts receivable), stocks (liquidity), and prepaid expenses. Most of these assets have very little asymmetric information and should funded primarily by short-term and somewhat by long-term bank loans. The data on inventories does not distinguish between own produced goods and goods purchased from other suppliers. Since Cheap Trade Credits are quite efficient, they should finance goods and services purchased from other firms. For own produced goods, the asymmetric information problem likely requires some combination of internal equity and short-term bank loans. For debtors (accounts receivable), banks have comparative advantages in assessing credit. Short-term bank loans probably fund these assets, but some internal equity might be necessary if there is considerable uncertainty about making payments. If the firm uses factoring, then Other Short Term Debt becomes an important of financing for debtors. Firms will use Expensive Trade Credits only they cannot use other lower cost and preferred sources.

In the discussion above, we have hypothesized that each asset has its own primary and secondary sources of funding and that different assets have different capital structures. In the pecking order theory of Myers and Majluf (1984), firms add up external funding needs and then choose the cheapest funding source first, regardless of the use of the funds. They exhaust this source and move to the next one. Our theory does not preclude pecking order financing, but instead suggests there may be a separate pecking order for each type of asset. The other popular theory about capital structure is the static trade-off theory. In this theory, the cost of financing depends on expected bankruptcy costs and agency problems. Firms choose financing so that the marginal cost of each source is equal. At equilibrium, a firm is indifferent between borrowing a new Euro of funds from any of the financing sources. As with the pecking order theory, this theory could be consistent with our model if each type of asset has its own static trade-off representing the relative costs of bankruptcy, asymmetric information, and agency problems.

CLASSIFYING TRADE CREDITS

Table 1 indicates that Trade Credits are an important source of funds—constituting 10% to 14% of all funds provided to Portuguese SMEs.

A standard textbook trade credit contract quoted is 2-10 net 30. The contract has a discount rate of 2% if the customer pays the bill within 10 days. Otherwise, the full amount is due in 30 days. The contracts in Portugal are simpler than standard contracts. A quote of 2 net 30, for example, means the customer receives the full 2% discount for paying the bill within 30 days. The customer forgoes the discount and often pays a penalty on payments after the due date. Eurofactor (2006) reported that 22% of Portuguese companies imposed late payment charges in 2005 and that 93% of these companies actually collected late payment penalties.

At some point after the due date, the firm extending credit may start legal proceedings to collect the debt. According to Eurofactor (2006), the average payment period for trade credits in Portugal was 53 days in 2003. This time frame is roughly equivalent to the UK, based on Poutziouris, Michaelas and Soufani 2005). They also found that the average late payment was 45 days beyond the due date. In Portugal, 88% of the companies start the debt recovery process after an average late period of 42 days. Thus, it appears that the threat of starting debt recovery process encourages rather quick payment on late accounts.

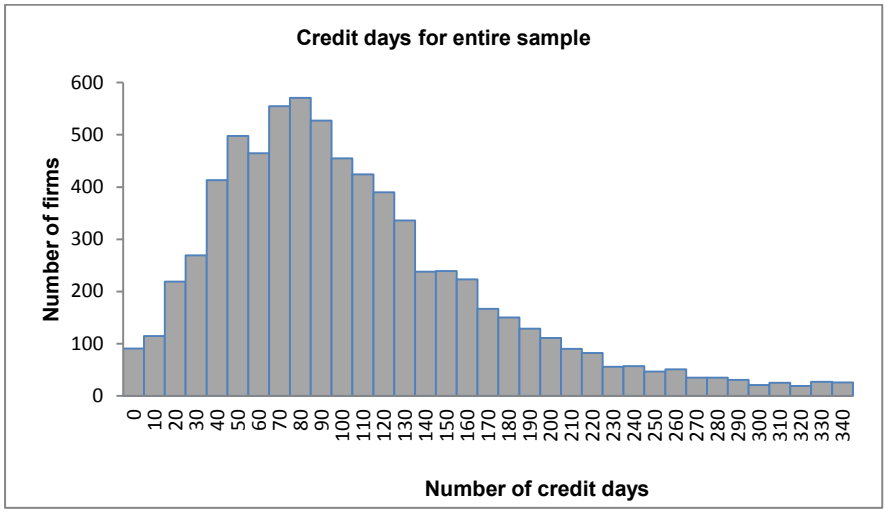
In theory, the definitions of cheap and expensive trade credits are straightforward. If the number of credit days is larger than specified in the contract, then the trade credits are expensive. Payments

made before the due date are cheap trade credits. Unfortunately, the balance sheet does not provide information about the cost of trade credits, nor the terms of the contracts. We propose to distinguish between cheap and expensive trade credits by estimating three numbers. These are the current "age" of Trade Credits on the balance sheet, the terms (number of trade credit contracts in the industry), and the standard deviation of the number of credits days for in each industry. The Appendix provides the details concerning these calculations.

We calculate the number of credit days for firms shown in Figure 1 as the value of trade credits divided by the cost of goods sold divided by 365. Since the distribution of credit days is right-skewed, we use the most common number of credit days (mode) for each industry as a point estimate of the number of credit days in the trade credit contract for that industry. The numbers reported contain random fluctuations, so we need to calculate the standard deviation (σ) of credit days. We use the left-side semi-variance to calculate the variance of the distribution of credit days for each industry. If the "age" of the Trade Credits reported on the balance sheet is greater than estimated contract terms, or credit days plus an amount added to account for uncertainty in reporting, then the trade credits are Expensive. Otherwise, trade credits are Cheap. To summarize, the distinction between Expensive and Cheap Trade Credits is:

Cheap Trade Credits: *If actual credit days < contract credit days +1.96σ* (1)
Expensive Trade Credits: *If actual credit days > contract credit days +1.96σ* (2)

Figure 1: Credit days for sample of Portuguese SMEs



This figure shows the frequency distribution of credit days used among the 9187 firm-years of data. The mode is between 75 and 85 days meaning that in 571 of the 9187 cases, firms pay their credits between 75 and 85 days after receiving trade credit. The average number of days of trade credit is 106 days and the median is 92 days.

Table 6 indicates that there is a large variation in the use of expensive trade credits across industries. In the Machinery and Equipment industry, only 8% of the firms make use of expensive credits. For the Food and Drink, and Heavy Machinery industries, about 47% of the firms use expensive credits. A survey by Howorth and Reber (2003) indicates that 57% of SMEs in the UK occasionally pay their creditors late, while Ng, Smith and Smith (1999) report that 30% of US firms do not claim the trade credit discount. Our estimates for Portugal are below those for the UK, but generally in line with survey evidence about the prevalence of cheap versus expensive trade credits.

Table 6: Distribution of Expensive Trade Credits

Industry	Number of firms	% of firms with expensive credit	Expensive credits as a % of total credit
Food and drinks	818	47.07	63.58
Textiles and clothes	1913	27.76	38.89
Wood and paper paste	481	16.01	19.14
Chemical products	956	33.62	32.87
Heavy machinery	383	47.26	41.45
Machinery production and equipment	954	8.07	5.97

This table shows the total number of firms in each industry, the percentage of those firms that we estimate that are using expensive trade credits, and the percentage of all trade credit in an industry that represents expensive trade credit. The appendix presents the details for making these calculations.

EMPIRICAL RESULTS

The simultaneous equation model

As previously discussed, the eight sources of funds are internal equity (EQ), cheap trade credits, expensive trade credits (ETC), long-term bank loans (LTB), short-term bank loans STB), other short-term loans from non-bank financial institutions (OST), other non-current credits (ONC) , and long-term debt (other) (LDO). Funding requirements on the asset side of the balance sheet for the six asset classes therefore determine the annual change in each of the eight sources of funds. The asset classes are intangible assets (*Intan*), tangible assets (*Tan*), investments (*Inv*), and changes in working capital. Working capital is the sum of liquid assets (*Liquid*), accounts receivable (*Debtors*), and inventories (*Inven*). The economic intuition behind the system is that the firm generates the projects requiring financing and then approaches the financial institutions for funding. Causation is from projects or assets to financing. To test this hypothesis, we setup a simultaneous system of equations, as shown in equations (3) – (10).

$$\Delta EQ_{it} = \alpha^{EQ} + \beta_1^{EQ}\,\Delta Inv_{it} + \beta_2^{EQ} Intan_{it} + \beta_3^{EQ} Tan_{it} + \beta_4^{EQ} Liquid_{it} + \beta_5^{EQ} Debtors_{it} + \beta_6^{EQ} Inven_{it} + \varepsilon_{it} \quad (3)$$

$$\Delta CTC_{it} = \alpha^{CTC} + \beta_1^{CTC}\,\Delta Inv_{it} + \beta_2^{CTC} Intan_{it} + \beta_3^{CTC} Tan_{it} + \beta_4^{CTC} Liquid_{it} + \beta_5^{CTC} Debtors_{it} + \beta_6^{CTC} Inven_{it} + \varepsilon_{it} \quad (4)$$

$$\Delta STB_{it} = \alpha^{STB} + \beta_1^{STB}\Delta Inv_{it} + \beta_2^{STB} Intan_{it} + \beta_3^{STB} Tan_{it} + \beta_4^{STB} Liquid_{it} + \beta_5^{STB} Debtors_{it} + \beta_6^{STB} Inven_{it} + \varepsilon_{it} \quad (5)$$

$$\Delta OST_{it} = \alpha^{OST} + \beta_1^{OST}\Delta Inv_{it} + \beta_2^{OST} Intan_{it} + \beta_3^{OST} Tan_{it} + \beta_4^{OST} Liquid_{it} + \beta_5^{OST} Debtors_{it} + \beta_6^{OST} Inven_{it} + \varepsilon_{it} \quad (6)$$

$$\Delta ETC_{it} = \alpha^{ETC} + \beta_1^{ETC}\,\Delta Inv_{it} + \beta_2^{ETC} Intan_{it} + \beta_3^{ETC} Tan_{it} + \beta_4^{ETC} Liquid_{it} + \beta_5^{ETC} Debtors_{it} + \beta_6^{ETC} Inven_{it} + \varepsilon_{it} \quad (7)$$

$$\Delta LTB_{it} = \alpha^{LTB} + \beta_1^{LTB}\,\Delta Inv_{it} + \beta_2^{LTB} Intan_{it} + \beta_3^{LTB} Tan_{it} + \beta_4^{LTB} Liquid_{it} + \beta_5^{LTB} Debtors_{it} + \beta_6^{LTB} Inven_{it} + \varepsilon_{it} \quad (8)$$

$$\Delta ONC_{it} = \alpha^{ONC} + \beta_1^{ONC}\,\Delta Inv_{it} + \beta_2^{ONC} Intan_{it} + \beta_3^{ONC} Tan_{it} + \beta_4^{ONC} Liquid_{it} + \beta_5^{ONC} Debtors_{it} + \beta_6^{ONC} Inven_{it} + \varepsilon_{it} \quad (9)$$

$$\Delta LDO_{it} = \alpha^{LDO} + \beta_1^{LDO}\,\Delta Inv_{it} + \beta_2^{LDO} Intan_{it} + \beta_3^{LDO} Tan_{it} + \beta_4^{LDO} Liquid_{it} + \beta_5^{LDO} Debtors_{it} + \beta_6^{LDO} Inven_{it} + \varepsilon_{it} \quad (10)$$

The changes in assets requiring funding are the dependent or right-hand side variables. The changes in the various types of liabilities are the left-hand side, or independent variables. The notation Δ denotes change in, and the names of the funding sources (EQ, CTC, STB, OST, ETC, LTB, ONC, and LDO) and asset classes (*Inv, Intan, Tan, Liquid, Debtors,* and *Inven*) are as presented above. We estimate this system of equations using seemingly unrelated regression with the equation for prepaid expenses and provisions left out of the estimation procedure. The various α coefficients are the intercept coefficients for each funding source equation. Each β coefficient represents the estimated change in a funding source required (in Euros) for a one Euro change in the use of the asset considered. Alternatively, the coefficients are the percentage of funds for a given asset on the right-hand side of the equation that comes from the funding source on the left-hand side of the equation.

Tests for independence

The first question examined is the independence of the asset and liability sides of the balance sheet. There are two different ways of looking at independence. First, if the financing of an asset is independent of the type of asset in question, then an increase in any asset (e.g. tangible assets) should have the same impact on a funding source (e.g. long-term bank debt) as an increase in another asset (e.g. intangible assets). The hypothesis becomes a within equation test of the following linear restrictions applied to each of the eight individual sources of funds, such that:

$$\beta_1^j = \beta_2^j = \beta_3^j = \beta_4^j = \beta_5^j = \beta_6^j,\ for\ j = 1, \dots 8\ (EQ, CTC, STB, OST, ETC, LTB, ONC, and\ LDO) \quad (11)$$

The results in Table 7 indicate that the β coefficients are not identical in each of the eight equations. Such results reject this definition of independence for each source of debt.

The second way of describing independence is by using the static-trade-off model. At equilibrium, if the model holds, the marginal cost of one Euro of any of the six asset classes should be equal for each of the eight sources of funds. For example, at equilibrium, each of the eight sources of funds equally funds a one Euro investment in tangible assets. For the system of equations, the static trade-off model is a test of the cross equation restrictions on each type of asset as follows:

$$\beta_i^{EQ} = \beta_i^{CTC} = \beta_i^{STB} = \beta_i^{OST} = \beta_i^{ETC} = \beta_i^{LTB} = \beta_i^{ONC} = \beta_i^{CTC} = \beta_i^{CTC},\ for\ i = 1, \dots 6\ (Inv, Intan, Tan, Liquid, Debtors, Inven) \quad (12)$$

Again, from Table 7, we reject these restrictions for each type of asset (as well as jointly across all the assets). Thus, we reject both independence and static-trade-off theory for our sample of Portuguese SMEs.

The second question to examine is what constitutes debt in the capital structure decision. The main concern is whether short-term debt is part of the capital structure decision, or if it is only part of working capital. Reflecting the lack of guidance from the theoretical literature on capital structure, many researchers only consider long-term debt in the capital structure. Some also include a portion of short-term debt, while others incorporate all forms of short-term and long-term debt into their measurement of debt. The broadest measure of the debt ratio is total liabilities divided by total liabilities plus net worth, as in Rajan and Zingales (1995) and Booth et al (2001).

Under a narrow interpretation of debt, cheap trade credits, short-term bank loans, other short debt, and expensive trade credits should only finance working capital. In our framework, the following restrictions represent this narrow interpretation of debt:

$$\beta_1^{CTC} = \beta_2^{CTC} = \beta_3^{CTC} = \beta_1^{STB} = \beta_2^{STB} = \beta_3^{STB} = \beta_1^{CTC} = \beta_2^{OST} = \beta_3^{OST} = \beta_1^{ETC} = \beta_2^{ETC} = \beta_3^{ETC} = 0, where\ 1,2,3 = Inv, Intan, Tan \quad (13)$$

The restrictions imply a coefficient of zero for the impact of changes in the three components of working capital on the financing of Investments, Intangible assets and Tangible assets. If the restrictions hold, working capital does not fund these assets and it is not part debt in the capital structure. Another possible restriction is that long-term bank loans and other long-term debt finance only long-term assets (investments, intangible assets, and tangible assets), so that:

$$\beta_4^{LTB} = \beta_5^{LTB} = \beta_6^{LTB} = \beta_4^{ONC} = \beta_5^{ONC} = \beta_6^{ONC} = \beta_4^{LDO} = \beta_5^{LDO} = \beta_6^{LDO} = 0, where\ 4,5,6 = Liquid, Debtors, Inventory \quad (14)$$

Results from the tests presented in Table 7 strongly reject both the restrictions implied by equations (13 and (14). Thus, all types of debt are part of the capital structure decision. Empirical studies using debt ratios should adopt broad debt measures containing all types of short-term and long-term debt, as well as trade credits.

Table 7: Tests of Independence

The following model is estimated by Seemingly Unrelated Regressions (SUR).

$$\Delta EQ_{it} = \alpha^{EQ} + \beta_1^{EQ}\,\Delta Inv_{it} + \beta_2^{EQ} Intan_{it} + \beta_3^{EQ} Tan_{it} + \beta_4^{EQ} Liquid_{it} + \beta_5^{EQ} Debtors_{it} + \beta_6^{EQ} Inven_{it} + \varepsilon_{it} \quad (3)$$

$$\Delta CTC_{it} = \alpha^{CTC} + \beta_1^{CTC}\,\Delta Inv_{it} + \beta_2^{CTC} Intan_{it} + \beta_3^{CTC} Tan_{it} + \beta_4^{CTC} Liquid_{it} + \beta_5^{CTC} Debtors_{it} + \beta_6^{CTC} Inven_{it} + \varepsilon_{it} \quad (4)$$

$$\Delta STB_{it} = \alpha^{STB} + \beta_1^{STB}\Delta Inv_{it} + \beta_2^{STB} Intan_{it} + \beta_3^{STB} Tan_{it} + \beta_4^{STB} Liquid_{it} + \beta_5^{STB} Debtors_{it} + \beta_6^{STB} Inven_{it} + \varepsilon_{it} \quad (5)$$

$$\Delta OST_{it} = \alpha^{OST} + \beta_1^{OST}\Delta Inv_{it} + \beta_2^{OST} Intan_{it} + \beta_3^{OST} Tan_{it} + \beta_4^{OST} Liquid_{it} + \beta_5^{OST} Debtors_{it} + \beta_6^{OST} Inven_{it} + \varepsilon_{it} \quad (6)$$

$$\Delta ETC_{it} = \alpha^{ETC} + \beta_1^{ETC}\,\Delta Inv_{it} + \beta_2^{ETC} Intan_{it} + \beta_3^{ETC} Tan_{it} + \beta_4^{ETC} Liquid_{it} + \beta_5^{ETC} Debtors_{it} + \beta_6^{ETC} Inven_{it} + \varepsilon_{it} \quad (7)$$

$$\Delta LTB_{it} = \alpha^{LTB} + \beta_1^{LTB}\,\Delta Inv_{it} + \beta_2^{LTB} Intan_{it} + \beta_3^{LTB} Tan_{it} + \beta_4^{LTB} Liquid_{it} + \beta_5^{LTB} Debtors_{it} + \beta_6^{LTB} Inven_{it} + \varepsilon_{it} \quad (8)$$

$$\Delta ONC_{it} = \alpha^{ONC} + \beta_1^{ONC}\,\Delta Inv_{it} + \beta_2^{ONC} Intan_{it} + \beta_3^{ONC} Tan_{it} + \beta_4^{ONC} Liquid_{it} + \beta_5^{ONC} Debtors_{it} + \beta_6^{ONC} Inven_{it} + \varepsilon_{it} \quad (9)$$

$$\Delta LDO_{it} = \alpha^{LDO} + \beta_1^{LDO}\,\Delta Inv_{it} + \beta_2^{LDO} Intan_{it} + \beta_3^{LDO} Tan_{it} + \beta_4^{LDO} Liquid_{it} + \beta_5^{LDO} Debtors_{it} + \beta_6^{LDO} Inven_{it} + \varepsilon_{it} \quad (10)$$

The funding sources are EQ = Internal Equity, CTC = cheap trade credits, LTB = long term bank loans, ONC = other non-current liabilities, STB = short term bank loans, OST = other short term bank loans, LDO = other long term debt, and ETC = expensive trade credits. For the right-hand side variables, *Inv* = 1= investments in long-term financial assets, *Intan* = 2 = intangible assets, *Tan* = 3 = Tangible Assets, *Liquid* = 4 = cash and liquid investments, *Debtors* = 5 = accounts receivable, and *Inven* = 6 = inventories. The system is estimated by SUR to facilitate cross-equation tests, with the equation for prepaid expenses left out. The model also contains five unreported industry dummies that effectively expand the intercept terms.

Hypothesis tests for independence between the six asset classes and liabilities:		Chi-squared	Significance level
Cheap trade credits:	$\beta_1^{CTC} = \beta_2^{CTC} = \beta_3^{CTC} = \beta_4^{CTC} = \beta_5^{CTC} = \beta_6^{CTC}$	61.06***	0.000
Short-bank loans:	$\beta_1^{STB} = \beta_2^{STB} = \beta_3^{STB} = \beta_4^{STB} = \beta_5^{STB} = \beta_6^{CSTB}$	12.37***	0.000
Other short term loans:	$\beta_1^{OST} = \beta_2^{OST} = \beta_3^{OST} = \beta_4^{OST} = \beta_5^{OST} = \beta_6^{OST}$	26.14***	0.000
Expensive trade credits:	$\beta_1^{ETC} = \beta_2^{ETC} = \beta_3^{ETC} = \beta_4^{ETC} = \beta_5^{ETC} = \beta_6^{ETC}$	16.07***	0.000
Long term bank loans:	$\beta_1^{LTB} = \beta_2^{LTB} = \beta_3^{LTB} = \beta_4^{LTB} = \beta_5^{LTB} = \beta_6^{LTB}$	395.38***	0.000
Other Non-Current-Liabilities:	$\beta_1^{ONC} = \beta_2^{ONC} = \beta_3^{ONC} = \beta_4^{ONC} = \beta_5^{ONC} = \beta_6^{ONC}$	154.03***	0.000
Independence of long-term assets and short-term funds: $\beta_1^{CTC} = \beta_2^{CTC} = \beta_3^{CTC} = \beta_1^{STB} = \beta_2^{STB} = \beta_3^{STB} = \beta_1^{CTC} = \beta_2^{OST} = \beta_3^{OST} = \beta_1^{ETC} = \beta_2^{ETC} = \beta_3^{ETC} = 0$, $where\ 1,2,3 = Inv, Intan, Tan$		518.59***	0.000
Independence of short-term assets and long-term funds: $\beta_4^{LTB} = \beta_5^{LTB} = \beta_6^{LTB} = \beta_4^{ONC} = \beta_5^{ONC} = \beta_6^{ONC} = \beta_4^{LDO} = \beta_5^{LDO} = \beta_6^{LDO} = 0$, $where\ 4,5,6 = Liquid, Debtors, Inventory$		2511.4***	0.000

This table shows the equations used to test for independence between asset and liabilities. The chi-squared statistic tests reject the null hypotheses implied by each of the coefficient restrictions at the 1% level of significance. Results therefore reject independence between short and long term funding sources. The notation ***, **, and * denoted significance at the 1, 5 and 10 percent levels, respectively.

Funding for individual assets

Based on the theory of asymmetric information and financial distress in previous sections, we developed a set of predictions of financing sources for each individual asset class.

Investments in real estate, stocks, bonds, and subsidiaries have little asymmetric information. However, the reasons for the investments vary and the preferred financing source may depend on the type of investment. One might expect a variety of financing sources and Table 8 shows that all financing sources except trade credits fund additional investments. The two main financing sources are internal equity (18%) and long-term bank loans (61%).

Intangible assets have considerable asymmetric information and no collateral value. Internal equity should be the primary source of funding. In Table 8, a one Euro investment in intangible assets

increases internal equity by 0.719. Coefficients for other funding sources are quite small and only marginally significant (at the 10% level) from other sources.

Table 8: Testing for Factors Driving the Change in Financing Sources

The following model (as presented in Table 7) is estimated by Seemingly Unrelated Regressions (SUR).

$$\Delta EQ_{it} = \alpha^{EQ} + \beta_1^{EQ}\,\Delta Inv_{it} + \beta_2^{EQ} Intan_{it} + \beta_3^{EQ} Tan_{it} + \beta_4^{EQ} Liquid_{it} + \beta_5^{EQ} Debtors_{it} + \beta_6^{EQ} Inven_{it} + \varepsilon_{it} \quad (3)$$

$$\Delta CTC_{it} = \alpha^{CTC} + \beta_1^{CTC}\,\Delta Inv_{it} + \beta_2^{CTC} Intan_{it} + \beta_3^{CTC} Tan_{it} + \beta_4^{CTC} Liquid_{it} + \beta_5^{CTC} Debtors_{it} + \beta_6^{CTC} Inven_{it} + \varepsilon_{it} \quad (4)$$

$$\Delta STB_{it} = \alpha^{STB} + \beta_1^{STB}\Delta Inv_{it} + \beta_2^{STB} Intan_{it} + \beta_3^{STB} Tan_{it} + \beta_4^{STB} Liquid_{it} + \beta_5^{STB} Debtors_{it} + \beta_6^{STB} Inven_{it} + \varepsilon_{it} \quad (5)$$

$$\Delta OST_{it} = \alpha^{OST} + \beta_1^{OST}\Delta Inv_{it} + \beta_2^{OST} Intan_{it} + \beta_3^{OST} Tan_{it} + \beta_4^{OST} Liquid_{it} + \beta_5^{OST} Debtors_{it} + \beta_6^{OST} Inven_{it} + \varepsilon_{it} \quad (6)$$

$$\Delta ETC_{it} = \alpha^{ETC} + \beta_1^{ETC}\,\Delta Inv_{it} + \beta_2^{ETC} Intan_{it} + \beta_3^{ETC} Tan_{it} + \beta_4^{ETC} Liquid_{it} + \beta_5^{ETC} Debtors_{it} + \beta_6^{ETC} Inven_{it} + \varepsilon_{it} \quad (7)$$

$$\Delta LTB_{it} = \alpha^{LTB} + \beta_1^{LTB}\,\Delta Inv_{it} + \beta_2^{LTB} Intan_{it} + \beta_3^{LTB} Tan_{it} + \beta_4^{LTB} Liquid_{it} + \beta_5^{LTB} Debtors_{it} + \beta_6^{LTB} Inven_{it} + \varepsilon_{it} \quad (8)$$

$$\Delta ONC_{it} = \alpha^{ONC} + \beta_1^{ONC}\,\Delta Inv_{it} + \beta_2^{ONC} Intan_{it} + \beta_3^{ONC} Tan_{it} + \beta_4^{ONC} Liquid_{it} + \beta_5^{ONC} Debtors_{it} + \beta_6^{ONC} Inven_{it} + \varepsilon_{it} \quad (9)$$

$$\Delta LDO_{it} = \alpha^{LDO} + \beta_1^{LDO}\,\Delta Inv_{it} + \beta_2^{LDO} Intan_{it} + \beta_3^{LDO} Tan_{it} + \beta_4^{LDO} Liquid_{it} + \beta_5^{LDO} Debtors_{it} + \beta_6^{LDO} Inven_{it} + \varepsilon_{it} \quad (10)$$

The funding sources are EQ = Internal Equity, CTC = cheap trade credits, LTB = long term bank loans, ONC = other non-current liabilities, STB = short term bank loans, OST = other short term bank loans, LDO = other long term debt, and ETC = expensive trade credits. For the right-hand side variables, *Inv* = 1= investments in long-term financial assets, *Intan* = 2 = intangible assets, *Tan* = 3 = Tangible Assets, *Liquid* = 4 = cash and liquid investments, *Debtors* = 5 = accounts receivable, and *Inven* = 6 = inventories. The system is estimated by SUR to facilitate cross-equation tests, with the equation for prepaid expenses left out. The model also contains five unreported industry dummies that effectively expand the intercept terms, but do not affect reported coefficients. Approximate R-squared statistics are obtained by estimating each equation individually using ordinary least squares regression.

	Changes in							
Variables	EQ	CTC	STB	OST	ETC	LTB	ONC	LDO
Constant	0.011***	-0.001	0.005*	0.000	-0.000	-0.003	0.012***	0.002***
	(4.08)	(-0.32)	(1.83)	(0.05)	(-0.06)	(-1.38)	(-4.23)	(-2.59)
Intangible	0.719***	0.013	0.007	0.026	0.076*	0.064*	0.034	0.016
assets	(20.20)	(0.37)	(0.20)	(0.71)	(1.72)	(1.92)	(0.89)	(1.74)
Tangible	0.350***	0.015	0.128***	0.067***	0.100***	0.169***	0.128***	0.006**
assets	(32.39)	(1.40)	(11.92)	(6.09)	(7.45)	(16.64)	(11.12)	(2.01)
Investments	0.183***	0.015	0.065***	0.041***	0.0121	0.613***	0.062***	0.009***
	(14.71)	(1.18)	(5.30)	(3.24)	(0.78)	(52.32)	(4.63)	(2.79)
Liquid assets	0.388***	0.065***	0.060***	0.151***	0.081***	0.054***	0.136***	0.004
	(24.38)***	(4.02)	(3.83)	(9.38)	(4.07)	(3.59)	(8.01)	(0.92)
Debtors	0.173***	0.069***	0.110***	0.088***	0.135***	0.034***	0.364***	0.001
	(23.96)	(9.36)	(15.32)	(12.07)	(14.98)	(4.95)	(47.18)	(0.53)
Inventories	0.106***	0.140***	0.177***	0.2333***	0.203***	0.052***	0.034**	-0.000
	(7.56)	(9.81)	(12.76)	(16.40)	(11.58)	(3.93)	(2.24)	(-0.10)
"R-Squared"	0.2714	0.0265	0.0731	0.0671	0.0556	0.2880	0.2413	0.0032

This table presents the coefficient estimates for equations (3) – (10). However, the entries have been transposed from the normal representation between rows and columns to provide a more intuitive explanation of how each asset is funded. For example, for a one Euro increase in Intangible assets, .719 comes from internal equity, .013 from cheap trade credits, .007 from short-term bank loans, .007 from other short-term loans, .076 from expensive trade credits, .064 from long-term bank loans, .034 from other non-current liabilities, and .01 from other long-term debt. Sources of funding for each of the other five asset classes can be similarly read by going across each row in the table. The notation ***, **, and * denoted significance at the 1, 5 and 10 percent levels, respectively.

Tangible Assets have some asymmetric information. They have a collateral value, but there may be agency and moral hazard problems. We therefore expect a mixture of internal equity, long-term bank debt, short-term bank loans, other short-term loans, other non-current liabilities (leasing). A one Euro investment in tangible assets is financed by Euro 0.35 in internal equity, Euro 0.17 in long-term bank loans, Euro 0.13 in other non-current liabilities, and Euro 0.13 in short-term bank loans. However, it

also appears that firms are somewhat constrained in their financing of tangible assets since Euro 0.1 comes from the most expensive type of financing--expensive trade credits.

Financing for *Liquid assets* comes primarily from internal equity (39%) and short-term other loans (15%). An unexpected result is that Expensive Trade Credits finance 8% of additional liquid assets. It is unclear why any firm would use such expensive financing for liquid assets. Notice also that 19% of the financing for liquid assets comes from various long-term financing sources. This result rejects the notion that we can separate the financing of working capital from the long-term sources of debt.

The primary source of financing for *Debtors (accounts receivable*) is other non-current liabilities (36%), which may be from long-term factoring contracts. Other important funding sources include internal equity (17%) and short-term bank loans (11%). This funding mix is about what we expected. Cheap trade credits provide 7% of funding, while expensive trade credits contribute 13%. Thus, it appears that Portuguese firms may extend their own trade credits to finance their own customers.

Inventories, both finished goods and supplies, obtain 14% of their financing from cheap trade credits and 20% from expensive trade credits. The other main funding sources are short-term bank loans (18%) and short-term other loans (23%). Long-term financing sources play only a minor role--supporting the standard practice of separating the financing of working capital and long-term assets.

Our empirical results generally confirm the financing predictions from section 4 concerning the sources and uses of funds for Portuguese SMEs. Each asset appears to have its own capital structure and the weighted average cost of capital may vary on a project-by-project basis. All debt is important in the capital structure and different assets will incur different financing costs.

CONCLUSION

This paper has demonstrated that the asset and liability sides of the balance sheet are interrelated for a sample of small and medium-sized Portuguese firms. Tests of independence reject the independence between the two sides of the balance sheet—a result that is consistent with our theory that firms match specific assets with a specific set of liabilities. We have shown that firms finance long-term assets using both short-term and long-term debt and that all types of debt (trade credits, bank loans, leasing, non-bank loans, and other debt) are part of the capital structure decision. Thus, empirical studies should use broad debt measures in capital structure calculations and recognize that there may not be a unique weighted average cost of capital. Instead, each asset or project may have a different weighted average cost of capital.

Limitations

In this study, we have examined only small and medium-sized Portuguese firms for the years 1990-2000. The introduction of the Euro in 1999 has increased the competition in the financial sector in Europe. Therefore, if data were available, and it would be interesting to see whether the behavior of Portuguese SMEs has changed. That is, we would like to perform tests of independence between the two sides of the balance sheet for a more recent period. More importantly, we would like to extend our analysis to an international sample of both large and small firms. Such a sample would permit a better test of our theory of asset and liability matching and help to determine whether broad measures of debt are more accurate than the narrow definition used in most of the capital structure literature.

APPENDIX

An estimate of the actual number of credit days for a firm is given by:

$$Credit\ days = \frac{trade\ credits}{cost\ of\ goods\ sold/365}.$$

We use trade credits listed on the balance sheet at the end of each fiscal year and cost of goods sold from the income statement to calculate credit days. It is a point estimate of the value of trade credits at the end of the fiscal year. Depending upon the degree of seasonality in purchases, this number may or may not be a good estimate of average trade credits throughout the year. Consider an extreme example of a toy store that pays for purchases of its Christmas stock in November at the due date, of say 90 days. If the fiscal year ends in November, then the amount of trade credits is very large and the estimate of credit days will be correspondingly large. If the fiscal year ends in February, then the estimate of trade credits will be very small. Even in a sample where all firms pay at the due date, the point estimate is affected by random and seasonal variation and on the date chosen for measurement.

To distinguish between cheap and expensive trade credits, we need to determine the standard contract terms in the industry to compare with our estimate of the number of credit days for each firm. We have only a point estimate of the actual credit days at the end of the fiscal year for each company. Two factors affect the calculation of this number. The average number of actual credit days for each industry as an estimate is a good first approximation of the normal contract in that industry. Seasonality and random fluctuations should have little impact on calculating credit days, but the sample distribution contains firms that delay payments on the trade credit. This complication affects the right-hand side of the distribution of credit days and makes the distribution appear somewhat log-normal. Since the values of the mean and median number of credit days are influenced by the number of firms that delay payment, the mean may not be a good estimate of the terms of the contract. If we simply assume a log-normal distribution, we could obtain an estimate of the first moment of the distribution from the average. However, in the discussion that follows, we adopt a simpler method that does not rely on the properties of the distribution.

Assume that most firms choose to pay on time at the end of the contract so they can claim the discount. Then, further assume that the most common number of actual credit days is an estimate of the number of credit days written into the contract for a given industry. The problem of seasonality and randomness in the estimate of actual credit days still exists. It should be removed to isolate the firms with late trade credit payments. Since the right hand of the distribution is influenced by the number of firms with late payment, it is not possible to use the entire distribution to estimate the variance of the number of actual credit days for firms that pay on time. However, it is possible to use the left-hand side of the distribution which contains no late payment firms.

The semi-variance is estimated using the left-hand side of the distribution. It is converted to the variance for the distribution by multiplying by 2. Estimated standard deviation for credit days for each industry is:

$$\sigma = \sqrt{\frac{2}{T^-}\left(\sum_{i=1}^{T^-} Min(0; actual\ credit\ days - mean\ contract\ days)^2\right)},$$

where T^- is the number of firms in the industry that pay on time.

It is now possible to estimate cheap and expensive trade credit for each firm in the sample on an industry-by-industry basis, as listed in the main text as equations (1) and (2):

Cheap Trade Credits: *If actual credit days < contract credit days +1.96σ* (1)
Expensive Trade Credits: *If actual credit days > contract credit days +1.96σ* (2)

Figure 1 of the text provides details about the distribution of actual credit days for the entire sample. The median number of credit days is 92 and the average is 106. The mean is larger than the median, reflecting the rightward skewness of distribution due to late payments. Eurofactor (2006) reports an average number of credit days of 83 days for 2005, showing that the number of credit days have declined over time. A priori, we would expect most firms to exploit the discount and pay on time. Thus, an estimate of the due date can be obtained by looking at the mode, or the most common number of credit days (the tallest column in Figure 1). For the entire sample, the mode is between 75 and 85 days. For 2005, Eurofactor (2006) reports an average number of credit days from contracts of 53—so there has been a decrease in actual and contract credit days over time.

The estimate of contract days for each industry is provided in Table 1A and is based on the most common number rounded to a unit of 10s (e.g., 30, 40, etc.). Ng, Smith and Smith (1999) report that the normal contract issued by listed firms (Compustat firms) in the US is 2/10 net 30. That is, a 2% discount is received if paid within 10 days; otherwise payment has to be made within 30 days.

The standard deviation of credit days ranges from 13 to 52 days. The cut-off days for cheap credit calculated using equations (1) and (2), as shown in Table 1A ranges from 67 to 212 days. For each firm, if the actual number of credit days is below the cut-off for the industry, then all of its trade credits are classified as Cheap Trade Credits. If the actual number of days is above the estimated industry norm, then all the firm's trade credits are classified as Expensive Trade Credits.

Table 1A: Estimation of Credit Days

Industry	Sample data		Estimate of number of credit days in a standard contract	Estimate of standard deviation of credit days	Cut-off number of credit days defining cheap and expensive credit
	Median number of days	Most common number of days			
Food and drinks	60	35-45	40	13.61	66.68
Textiles and clothes	86	66-75	70	28.54	125.94
Wood and paper paste	95	85-95	90	34.54	157.69
Chemical products	116	85-95	90	28.85	146.55
Heavy machinery	108	75-85	80	18.66	116.57
Machinery production and equipment	106	105-115	110	52.20	212.31

This table shows our estimates for the number of days in a standard trade credit contract for each industry in the third column. The first two columns show the estimates for the median and mode number of credit days for the sample. The fourth column is the standard deviation of estimated credit days in each industry and the fifth column show the number of days for the cutoff between cheap and expensive trade credits for each industry. Firms paying trade credits after the industry cut-off number of days are classified as using Expensive Trade Credits.

REFERENCES

Aivazian, V.A., Ge, Y. and Qui, J. (2005) "Debt Maturity Structure and Firm Investment," *Financial Management*, vol. 34, p. 107-119.

Berger, A.N. and Gregory F. Udell, G.F. (1998) "The Economics of Small Business Finance: The Roles of Private Equity and Debt Markets in the Financial Growth Cycle," *Journal of Banking & Finance*, vol. 22, p. 613-673.

Bolton, P. and Freixas, X. (2000) "Equity, Bonds, and Bank Debt: Capital Structure and Financial Market Equilibrium under Asymmetric Information," *The Journal of Political Economy*, vol. 108, p. 324-351.

Bolton, P. and Scharfstein, D.S. (1996) "Optimal Debt Structure and the Number of Creditors," *The Journal of Political Economy*, vol. 104, p. 1-25.

Booth, L., Aivazian, V., Demirguc-Kunt, A. and Maksimovic, V. (2001) "Capital Structures in Developing Countries," *The Journal of Finance*, vol. 56, p. 87-130.

Carey, M., Post, M. and Sharpe, S.A. (1998) "Does Corporate Lending by Banks and Finance Companies Differ? Evidence on Specialization in Private Debt Contracting," *The Journal of Finance*, vol. 53, p. 845-878.

Cassar, G. and Holmes, S. (2003) "Capital Structure and Financing of SMEs: Australian Evidence," *Accounting and Finance*, vol. 43, p. 123-123.

Daskalakis, N. and Psillaki, M. (2008) "Do Country or Firm Factors Explain Capital Structure? Evidence from SMEs in France and Greece," *Applied Financial Economics*, vol. 18, p. 87-97.

Diamond, D.W. (1984) "Financial Intermediation and Delegated Monitoring," *The Review of Economic Studies*, vol. 51, p. 393-414.

Diamond, D.W. (1991) "Monitoring and Reputation: The Choice between Bank Loans and Directly Placed Debt," *The Journal of Political Economy*, vol. 99, p. 689-721.

Eurofactor (2006), 4th Survey of the Management Customer Accounts in Europe.

Fama, E. F. (1985) "What's Different about Banks?" *Journal of Monetary Economics*, vol. 15, p. 29-39.

Faulkender, M. and Petersen, M.A. (2006) "Does the Source of Capital Affect Capital Structure?" *Review of Financial Studies*, vol. 19, p. 45-79.

Garcia-Teruel, P.J. and Martinez-Solano, P. (2007) "Short-Term Debt in Spanish SMEs," *International Small Business Journal*, vol. 25, p. 579-602.

Garcia-Teruel, P.J. and Martinez-Solano, P. (2010) "Determinants of Trade Credit: A Comparative Study of European SMEs," *International Small Business Journal*, vol. 28, p. 215-233.

Haubrich, J.G. (1989) "Financial Intermediation: Delegated Monitoring and Long-Term Relationships," *Journal of Banking & Finance*, vol. 13, p. 9-20.

Hoshi, T., Kashyap, A. and Scharfstein, D. (1990a) "Bank Monitoring and Investment: Evidence from the Changing Structure of Japanese Corporate Banking Relationships," in Hubbard, R.G, (ed.), *Asymmetric Information, Corporate Finance and Investment*, Chicago, IL: University of Chicago Press.

Hoshi, T., Kashyap, A. and Scharfstein, D. (1990b) "The Role of Banks in Reducing the Costs of Financial Distress in Japan," *Journal of Financial Economics*, vol. 27, p. 67-88.

Howorth, C. and Reber, B. (2003) "Habitual Late Payment of Trade Credit: An Empirical Examination of UK Small Firms," *Managerial and Decision Economics*, vol. 24, p. 471-482.

Iturralde, T., Maseda, A. and San-Jose, L. (2010) "Empirical Evidence of Banking Relationships for Spanish SMEs," *International Small Business Journal*, vol. 28, p. 274-295.

James, C. (1987) "Some Evidence on the Uniqueness of Bank Loans," *Journal of Financial Economics*, vol. 19, p. 217-235.

Leland, H.E. and Pyle, D.H. (1977) "Informational Asymmetries, Financial Structure, and Financial Intermediation," *The Journal of Finance*, vol. 32, p. 371-387.

Mester, L.J., Nakamura, L.I. and Renault, M. (2001) "Checking Accounts and Bank Monitoring," Federal Reserve Bank of Philadelphia, Working Paper No. 01-3.

Michaelas, N., Chittenden, F. and Poutziouris, P. (1999) "Financial Policy and Capital Structure Choice in U.K. SMEs: Empirical Evidence from Company Panel Data," *Small Business Economics*, vol. 12, p. 113-131.

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

Ng, C.K., Smith, J.K. and Smith, R.L. (1999) "Evidence on the Determinants of Credit Terms Used in Interfirm Trade," *The Journal of Finance*, vol. 54, p. 1109-1129.

Petersen, M.A. and Rajan, R.G. (1994) "The Benefits of Lending Relationships: Evidence from Small Business Data," *The Journal of Finance*, vol. 49, p. 3-37.

Petersen, M.A. and Rajan, R.G. (1995) "The Effect of Credit Market Competition on Lending Relationships," *The Quarterly Journal of Economics*, vol. 110, p. 407-443.

Petersen, M.A. and Rajan, R.G. (1997) "Trade Credit: Theories and Evidence," *The Review of Financial Studies*, vol. 10, p. 661-691.

Poutziouris, P., Michaelas, N. and Soufani, K. (2005) "Financial Management of Trade Credits in Small-Medium Sized Enterprises," working paper, Concordia University, and Presentation at the 2005 Meetings of the European Financial Management Association.

Rajan, R.G. (1992) "Insiders and Outsiders: The Choice between Informed and Arm's-Length Debt, *The Journal of Finance*, vol. 47, p. 1367-1400.

Rajan, R.G. and Zingales, L. (1995) "What Do We Know about Capital Structure? Some Evidence from International Data," *The Journal of Finance*, vol. 50, p. 1421-1460.

Ramakrishnan, R.T.S. and Thakor, A.V. (1984) "Information Reliability and a Theory of Financial Intermediation," *The Review of Economic Studies*, vol. 51, p. 415-432.

Scherr, F.C., and Hulbert, H.M. (2001) "The Debt Maturity Structure of Small Firms," *Financial Management*, vol. 30, p. 85-111.

Shyam-Sunder, L. and Myers, S.C. (1999) "Testing Static Tradeoff Against Pecking Order Models of Capital Structure," *Journal of Financial Economics*, vol. 51, p. 219-244.

Smith, J.K. (1987) "Trade Credit and Informational Asymmetry," *The Journal of Finance*, vol. 42, p. 863-872.

Stowe, J.D., Watson, C.J. and Robertson, T.D. (1980) "Relationships between the Two Sides of the Balance Sheet: A Canonical Correlation Analysis," *The Journal of Finance*, vol. 35, p. 973-980.

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