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Macroeconomic and Institutional Determinants of Capital Structure Decisions

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Abstract

We investigate the capital structure of a large sample of corporations in 52 countries, focusing on the effects of macroeconomic and institutional characteristics on firms' dynamic behavior. We find that these characteristics affect both the optimal level of leverage and the adjustment process towards it. The speed of adjustment varies significantly with both macroeconomic and institutional conditions for financially unconstrained firms, while it is unaffected for constrained firms. Overall, our results support a complex view of capital structure decisions, where market timing and pecking order arguments affect the short-run, while dynamic trade-off with costly readjustment matters in the long-run.

Keywords: Capital Structure Dynamics, Debt Readjustments, Dynamic Adjustment Models, Macroeconomic Conditions, Speed of Adjustment
JEL Classification: C23, E44, G32
EFM Classification: 140

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1 Introduction

Following Modigliani and Miller's (1958) irrelevance proposition, a large body of literature has investigated firms' financial structure, both theoretically and empirically. Several factors – such as taxes, bankruptcy costs, transaction costs and asymmetric information – have been shown to affect financing choices, making the irrelevance proposition fail. Two theories are typically invoked to explain firm capital structure decisions. First, the trade-off theory (Kraus and Litzenberger (1973)), according to which firms balance the costs and benefits of issuing debt and equity, and choose the optimal level of leverage that maximizes their value. Second, the pecking order theory (Myers and Majluf (1984)), according to which – as a consequence of asymmetric information – firms have a strict hierarchy of financing sources. Internal funds are used first, followed by debt (when external funds are needed and until debt capacity is exhausted), and finally by equity. The empirical literature has long attempted at identifying the theory that better explains firms' behavior, but no conclusive evidence has emerged yet. Some empirical findings – like the negative relationship between growth opportunities and leverage, or the positive link between tangible assets and leverage – support the trade-off theory, while others – like the negative relationship between firms' profitability and leverage – support the pecking order view.

We argue that a reason why the empirical literature has been unable to find conclusive evidence is that it largely underweights the importance of the macroeconomic and institutional environment in which firms operate. Indeed, macroeconomic and institutional conditions are likely to affect the *level* of optimal leverage both directly and indirectly through their effects on firm level variables such as the default probabilities or the agency costs that make the Modigliani-Miller irrelevance proposition fail[1]. Even more important, the changes in macroeconomic and institutional conditions are likely to affect the *dynamics* of debt ratios. The partial adjustment models that are commonly used to study this dynamics, by assuming a constant speed of adjustment, are however inadequate to account for the effects of *changing* macroeconomic and institutional conditions on the dynamic adjustment of debt.

In this paper, we show how firms behave in different economic environments, by explicitly focusing on the implications for firms' capital structure decisions and their dynamics over time of a set of macroeconomic and institutional indicators. We find that these indicators are indeed significant predictors of firms' observed capital structure, especially through the interaction between firm level and macroeconomic/institutional variables. When also allowing for asymmetric speeds of adjustment as a function of macroeconomic conditions, our results indicate that firms do not always engage in active rebalancing of their capital structure. Both firm-level and macroeconomic variables are relevant in explaining why. Indeed, the adjustment process of the debt-equity ratio turns out to be significantly affected by the availability of internal funds, the fact that the firm is over or under levered, the level of credit risk, as well as by the changes in institutional and macroeconomic scenarios. In the short run, firms holding sufficient internal funds to finance their investments do not appear to systematically adjust external debt or equity in order to rebalance their capital structure. Therefore, their behavior appears to be more in line with the traditional pecking order view. If sufficient internal funds are available

[1]It is easy to see that institutional factors (such as the protection of property rights, the efficiency of bankruptcy procedures, the ability to move capital between investments, the transparency of financial markets), and macroeconomic conditions (such as inflation and economic growth rates) may influence firms' behavior along several dimensions, by affecting the costs and benefits of their decisions. See, among others, Korajczyk et al. (1992), Demirgüç-Kunt and Maksimovic (1999), Booth et al. (2001), Korajczyk and Levy (2003), Bancel and Mittoo (2004), Erel et al. (2012).

to cover financing needs, then firms may avoid accessing external capital markets altogether. Furthermore, even when external funds are needed, in the short run firms do not always take decisions consistent with the trade-off theory. In fact, during bad market conditions, over-levered firms with low credit risk avoid issuing equity, postponing the adjustment until better market conditions are met, or the level of credit risk becomes too high. Conversely, over-levered firms with high credit risk appear to issue equity regardless of market conditions (possibly as a consequence of having exhausted their debt capacity)[2]. Hence, overall, our results support a complex view of dynamic financing decisions. In the short run (i.e. within a specific recessionary or expansionary phase of the cycle), time-contingent firm and country specific variables have a dominant effect, and firms' behavior appears to be in line with the predictions of the pecking order theory. Over a longer time horizon, instead, firms tend to converge to their target level of leverage (although with a low adjustment speed), consistently with the trade-off theory of capital structure.

Our work is related to a number of contributions in the pertinent literature. In recent years, a growing body of empirical research has investigated the dynamics of firms' capital structure measuring the speed at which firms readjust their leverage ratios towards the optimal level following a shock. A theoretical justification for this approach is provided by Strebulaev (2007), who argues that firms may want to deviate from optimal leverage if adjustments are costly, documenting the effects of a deviation on capital structure. On the one hand, the presence of adjustment costs justifies a speed of adjustment significantly lower than one, since firms may decide to readjust only when they perceive that benefits are greater than costs. On the other hand it requires to investigate capital structure decisions dynamically, allowing for temporary deviations from target leverage. The key point of Strebulaev's approach is to estimate the speed of the adjustment towards target leverage as a way of testing the validity of the trade-off theory. In principle, if an optimal leverage exists, firms should converge to it quickly, in order to avoid the costs of sub-optimal financial policies (obviously, as long as the deviation is large enough to make the benefits of rebalancing larger than the costs). Notwithstanding, a wide range of speeds of adjustment towards the target is found in the literature, depending on the estimation approach used. Fama and French (2002) adopt the Fama and MacBeth (1973) method and estimate a speed of adjustment for US firms in the 7%-18% range depending on the type of firms (dividend payers or non dividend payers) and on the debt measure (book or market value), concluding that firms adjust "at a snail's pace". Flannery and Rangan (2006) find instead a yearly speed of adjustment of more than 30%, using a level panel regression with the lagged book debt ratio as instrument for the lagged market debt ratio in the adjustment equation. Byoun (2008) investigates financing decisions conditional on firms' need to raise external capital, using a two-step procedure that first estimates target leverage and then the dynamic adjustment towards it. He finds that most adjustments occur when firms are over-levered and with a financial surplus, or under-levered with a financial deficit, overall lending support to a model where adverse selection costs associated with information asymmetry play a key role in adjustment decisions. Lemmon et al. (2008) show that firms' capital structures are extremely stable even over long periods of time: firms with high or low leverage tend to remain as such even after 20 years. Hence, they argue that most of the cross-sectional variation in observed leverage is determined by some yet unidentified time-invariant characteristics. By using a Blundell and Bond (1998) system-GMM estimator, they find a yearly speed of adjustment between 22% and 25%, implying an half-life

[2]It is interesting to note that these asymmetric results are stronger in countries with more 'market-friendly' institutions.

of deviations from the target of around two years. Huang and Ritter (2009) account instead for the high persistence of leverage by estimating – through a long-differencing estimator – a speed of adjustment for market leverage of around 23%, which suggests that firms do move toward optimal debt ratios but at 'moderate' speed. Finally, Öztekin and Flannery (2012) – looking at a large international sample – find that legal and financial institutions influence financing decisions by affecting both the benefits and the costs of adjusting to the optimal leverage ratio. However, differently from our paper that introduces a set of institutional variables with both a cross-sectional and a time dimension, their institutional measures are time-invariant, implying that there is no within-country variance in the institutional setting.

Several results in the literature suggest that pooling firms irrespective of changing individual or macroeconomic conditions is too simplistic, and that a dynamic model of partial adjustment towards the target should allow for changing speeds of adjustment as a function of both firm and macroeconomic factors. Korajczyk et al. (1992) develop a model of time-varying asymmetric information that affects the timing and pricing of equity issues. Firms have specific preferences on the timing of new equity issues, because managers may somehow be able to control the effects of asymmetric information by choosing to issue when they expect to have lower information asymmetry. Bayless and Chaplinsky (1996) show how the price drop that follows a seasoned equity offering announcement is significantly smaller in hot vs. cold markets. Korajczyk and Levy (2003) find that target leverage is pro-cyclical for the financially constrained firms and counter-cyclical for the unconstrained ones, and that macroeconomic conditions significantly affect the choice of issuing equity for unconstrained but not for constrained firms. Erel et al. (2012) document how macroeconomic conditions affect firms' ability to raise capital, and conclude that supply-side effects are also relevant in determining firms' financing decisions. Becker and Ivashina (2014) study firms' substitution between loans and bonds over the business cycle, finding a strong shift from loans to bonds during recessions, which is attributed to a contraction in bank-credit supply. In a different perspective, Leary and Roberts (2005) discuss the issue of market timing together with that of how adjustment costs may alter firms' decisions, and find support for a dynamic version of the trade-off theory with costly readjustment. Using a duration model, they find that firms appear to react to shocks or changes in stock prices by appropriately rebalancing their capital structure in the following two to four years, a result in favor of the trade-off view. However, they also find support for a modified pecking order theory, in that firms tend to avoid using external funds when they have sufficient internal funds to support their investments. They suggest that firms may both have a target debt ratio – in line with the trade-off theory – and a preference for internal funds – a typical pecking-order behavior. This may imply that firms have different propensities to adjust towards the target depending on whether they have enough internal funds, or they need to raise external funds to finance their investment projects. As a consequence, the availability of financial slack may induce under-levered firms to move further away from their target, and over-levered firms to use excess cash to reduce leverage, generating an asymmetric behavior as a function of the sign of the deviation from optimal debt.

In a methodological perspective, a variety of approaches have been proposed to properly estimate the optimal level of leverage and the speed of adjustment towards it through partial adjustment models. Flannery and Hankins (2013) test the reliability of a number of estimators including standard ordinary least squares (OLS), panel fixed effects (FE), the Arellano and Bond (1991) GMM estimator (AB), the Blundell and Bond (1998) system-GMM estimator (BB), and Bruno (2005) least squares dummy variable corrected estimator (LSDVC), finding that the LSDVC is the most accurate estimator when endogeneity and second order serial correlations are not found in the data, while BB and FE are to be used in the presence of endogeneity and serial correlation. However, the BB estimator suffers from dependent variables clustering at zero and second order serial correlation, while the FE estimator performs poorly in short or unbalanced panels and with highly persistent dependent variables. Dang et al. (2015) note that serially correlated errors are prevalent in corporate finance data, so that instrumental variables, GMM, and system-GMM estimators may give unreliable results. To deal with serial correlation, they propose the usage of the LSDVC estimator, or – if the dependent variable has a fractional nature, as is the case of debt ratios – of the Dynamic Fractional Panel estimator (DFP) introduced by Elsas and Florysiak (2015)[3].

Hovakimian and Li (2011) observe that using future data to estimate target debt ratios produces significantly higher estimates for the speed of adjustment of leverage, due to a look-ahead bias. Such a bias stems from the fact that target leverage is estimated based on information from the entire sample period, implying that also future debt ratios are used to estimate past targets. The look-ahead bias is certainly an issue when adopting one-step procedures – like those discussed above – that jointly estimate the target level of leverage and the speed of adjustment. To properly deal with this issue one must design a two-step procedure that first estimates year-by-year specific target leverage equations, and then uses the obtained results to derive out-of-sample predictions for leverage in each year, using them as target proxies in the partial adjustment equation. In this paper, we do so by relying on the two-step approach adopted by Byoun (2008), which estimates first the target leverage and then the dynamic speed of adjustment towards it. Following Hovakimian and Li (2011), we estimate the target leverage with panel fixed effects, using only past information for predicting each year's optimal leverage in order to avoid the distortions due to the look-ahead bias.

The paper proceeds as follows. Section 2 introduces our dataset and illustrates the descriptive statistics of our covariates. Our empirical analysis is developed in the subsequent sections. We provide a variance decomposition of leverage ratios in Section 3 and we investigate the determinants of optimal leverage and a pooling model of dynamic adjustment (through a two-steps procedure) in Section 4. Finally, in Section 5 we remove the pooling assumption, by allowing for a variety of non-linearities in debt adjustments, focusing on the role of firm, macroeconomic, and institutional variables. Section 6 concludes. Three appendixes complete the analysis. Appendix A investigates the behavior of average annual market and book debt ratios over time. Appendix B estimates a partial adjustment model on our full dataset by means of a one-step procedure, finding results entirely consistent with those highlighted in the pertinent literature. Finally, Appendix C checks for the robustness of our results when replicating the empirical analysis of Sections 4 and 5 measuring leverage ratios at book values of both equity and debt, rather than at market values.

2 Dataset and descriptive statistics

Our dataset includes listed firms from 52 different countries for which accounting data are available in the Worldscope database over the period 1996-2012. The sample includes a total of 267.787 firm-year observations, whose distribution across countries is illustrated in Table 1. Our panel is strongly unbalanced, as firms enter and leave the market, merge, are taken over, default, or cease operations. Considering that our regression models include lagged variables, and we

[3]The DFP estimator corrects for the bias due to the censored nature of the dependent variable, which may determine statistically significant speeds of adjustment exclusively due to mechanical mean reversion.

are interested in both within-firm time variation and between-firms cross-sectional variation, we require that firms have at least three consecutive years of available data in order to be included in the sample. As usual in the capital structure literature, financial companies and utilities are not considered because their financing behavior is strongly affected by capital requirements and regulation. We use Fama and French industry classification and the SIC codes provided by Worldscope to sort companies within industries, and the country of incorporation to assign companies to a specific country.

[Table 1 about here.]

We use two alternative measures of leverage, in line with the pertinent literature: market leverage – defined as the ratio between total financial debt divided by the sum of total financial debt and market cap[4] – and book leverage – defined as the ratio between total financial debt and the sum of total financial debt and book equity.

The set of individual firms' characteristics includes profitability (*profitability*), growth opportunities (*growth*), firm size (*size*), asset tangibility (*tangible*), and inventories (*inventories*)[5]. As for profitability, we rely on earnings before interests and taxes divided by total assets. On the one hand, according to the pecking order theory, more profitable firms should rely mainly on internal funds, hence having less debt. On the other hand, more profitable firms should hold more debt, as noted in Jensen (1986), to reduce the agency costs associated with high levels of free cash flow. In line with the literature, we measure growth opportunities as the ratio between the sum of market capitalization and total financial debt divided by the sum between the book value of equity and total financial debt. We expect firms with higher growth opportunities to issue less debt, in order to avoid the agency costs associated with high leverage, as in the case of risk-shifting and debt overhang. We define asset tangibility as the ratio of total tangible fixed assets over total assets. Tangible assets can act as an explicit or implicit collateral for debt, so we expect firms with higher levels of tangible assets to issue more debt. Firm size is measured as the log of total reported firm sales, converted in 2005 units of local currency using the price index for the country where the firm is incorporated, and then converted into US dollars at the 2005 fiscal year end market exchange rate to make it comparable across countries. A consolidated result in the empirical literature on capital structure is the positive relationship between leverage and firm size: asymmetric information may be less of a concern for larger firms because they are better known by investors and are required (by law or market practices) to provide more information. Moreover, bigger firms may be able to face downturns better than smaller firms (due to their geographic or product diversification), hence facing a lower default probability and lower expected bankruptcy costs. This, in turn, allows them to cope with higher levels of leverage. Therefore, consistently with the literature, we expect to find a positive relationship between firm size and leverage. Finally, we measure inventories as the ratio between the accounting value of inventories and total assets. Inventories, like tangible fixed assets, can act as a form of debt collateral, hence expanding a firm's debt capacity. Accordingly, we expect a positive and significant relationship between inventories and debt ratios.

[4] Since we are using book values of debt, we should define the leverage ratio at quasi-market values, rather than at full market values. We use the traditional definition of market debt ratio in the remainder of the paper for simplicity. Note that total financial debt includes capitalized lease obligations.

[5] These covariates are commonly used in the literature as determinants of the capital structure. An additional variable that is often used is R&D expenditure that, however, is not available for a large number of firms in our sample. Therefore, we exclude it from the analysis in order to preserve the sample size. All firm-level variables, with the exception of market and book debt ratios, are winsorized at the first and ninety-ninth percentile in order to limit the effects of small or large outliers.

As we mainly focus on the role of macroeconomic and institutional variables on capital structure decisions, we use a conservative set of firm-level determinants. Despite this, our results are in line with those reported in the literature. It is important to note that we do not explicitly include taxes among our regressors, even if the usage of debt may be an effective way to reduce the tax burden, so that the level of taxation faced by a firm might well be a potential determinant of its capital structure decisions. We account for taxes only indirectly through an indicator of *freedom from taxation* at the country level, which embeds statutory corporate income tax rates. We are well aware that this is just a rough proxy for tax structures. In order to fully account for the effects of taxation, one would in fact need an appropriate measure of the tax benefits of debt at the firm level. Using effective tax rates (i.e. reported income taxes divided by pre-tax income) may convey little information on the true marginal tax benefit a firm would face on an additional unit of interest expenses, since in most legislations the effective taxable income differs from the reported pre-tax income[6]. Moreover, in a globalized economy firms may design their legal structures and global operations in order to reduce taxable income, by generating (whenever possible) their profits in countries characterized by lower tax rates. On the one hand, this implies that simply using the statutory rate of the country of incorporation tells little about the true tax burden of a company. On the other hand, even estimating prospective marginal tax rates (as in Graham (1996)), can be problematic, because of the strong assumptions needed on where (i.e. under which legislation) a firm produces its taxable income and pays interests on debt[7]. All this goes well beyond the scope of this paper.

Macroeconomic and institutional data are obtained from various sources. We use the national Consumer Price Index and exchange rates between national currencies and the US dollar, both taken from Datastream, in order to adjust accounting values for the effect of inflation and currency differences, and make them comparable both across countries and over time[8]. In order to measure international financial markets conditions, we create an indicator that we label Global Financial Condition Index (GFCI). Such indicator is computed as the first principal component on the following set of variables: the spread between Baa and Aaa rated corporate bonds (*Rating Spread*); the spread between Aaa rated corporate bonds and US government 3-month T-bills (*Corporate Spread*); the 50-day moving average over the 200-day moving average in the levels of the S&P500 index (*S&P500-ma*), the DJ Eurostoxx index (*Eurostoxx-ma*), the Nikkei 225 Index (*Nikkei-ma*), and the Gold Bullion price on the London Bullion Market (*Gold-ma)*; the 20-day volatility on the same four price indices (*S&P500-var*, *Eurostoxx-var*, *Nikkei-var*, *Gold-var*). The first principal component explains 49.38% of total variance. All variables used for creating the Global Financial Condition Index are obtained from Datastream. We also compute a four-quarter moving average of the index (GFCIa), in order to have a smoother indicator and an average measure of the index over the entire financial year for each firm[9]. Figure 1

[6]This may depend on the fact that there are differences between what is included as costs (and revenues) in financial statements and the costs that can be deducted (or revenues that have to be taxed) in the tax return.

[7]In fact, a firm may simultaneously have an extremely low effective tax rate, because of being structured in order to generate profits in countries with low tax rates, and a large debt tax shield, by paying interest expenses – and locating part of its profits – in a country with higher tax rates. In order to properly estimate a prospective marginal tax rate one would have to make assumptions about where a country would generate taxable profits to be offset with interest expenses.

[8]Values for all firms in all countries are converted to US dollars using 2005 as the base year.

[9]An alternative version of the GFCI, called GFCI3, is obtained by first fixing a threshold for the share of total variance explained at 70%, and then choosing enough principal components to reach the threshold, as in Angelopoulou et al. (2014). The first three principal components jointly explain 70.83% of total variance; GFCI3 is then obtained by summing the three selected principal components weighted by the share of variance each of them explains divided by the total variance jointly explained. As shown in Table 4, this refinement reduces the

shows the evolution over time of GFCI and GFCIa: higher values of the index correspond to periods of financial tensions, while lower values indicate periods of financial ease. The index is calculated from the first quarter of 1989 until the fourth quarter of 2013, a longer period than the one considered in our estimates in order to reduce the drawbacks of the principal component analysis at the two ends of the estimation window.

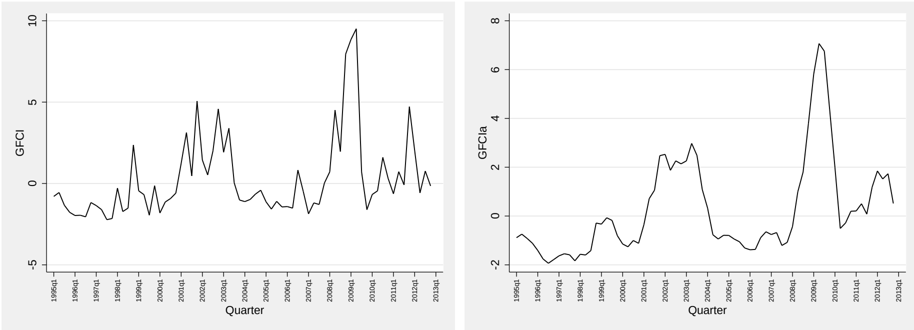

Figure 1: GFCI and GFCIa

Table 2 shows the contribution of the different variables to each of the first three principal components, as well as the share of total variance each component explains.

[Table 2 about here.]

We use the Index of Economic Freedom, published annually by The Wall Street Journal and The Heritage Foundation, as an indicator of the market-friendliness of each of the countries in our sample. The index measures if and to what extent countries refrain from coercion or constraint of individual liberty along four dimensions: rule of law, limited government, regulatory efficiency, and market openness. All countries are ranked on a scale from 0 to 100 (where a score of 100 indicates an economic environment that is most conducive to economic freedom) for each of the following indicators: business freedom, trade freedom, monetary freedom, government spending, fiscal freedom, property rights, investment freedom, financial freedom, freedom from corruption, and labor freedom[10]. The scores for each indicator are then averaged equally in order to get the overall index. In our empirical analysis we use both the overall index and its components (but for *Labor Freedom*, which is available only from 2007 onward), referring to them with a slight terminological abuse as institutional variables, based on the idea that they proxy the quality of 'institutions'.

correlation between debt and the index, so we simply rely on GFCIa as indicator of financial conditions.

[10] *Business Freedom* is a quantitative measure of the ability to start, operate, and close a business that represents the overall burden of regulation as well as the efficiency of government in the regulatory process. *Trade Freedom* is a composite measure of the absence of tariff and non-tariff barriers that affect imports and exports of goods and services. *Monetary Freedom* is a combined measure of price stability and an assessment of price control. *Government Spending* measures the level of government expenditures as a percentage of GDP. *Fiscal Freedom* is a measure of the overall tax burden imposed by government. *Property Rights* is an assessment of the ability of individuals to accumulate private property, secured by clear laws that are fully enforced by the state. *Investment Freedom* is an indicator of the ability to move capital and resources into and out of specific activities internally and across the country's borders without restriction. *Financial Freedom* is a measure of banking efficiency and of the lack of government intervention in the financial sector. *Freedom from Corruption* is an index of the lack of corruption and bribery by public officials in the country. *Labor Freedom* is a quantitative measure of the regulatory environment in a country's labor market.

It is important to note that we also considered alternative indicators such as the 'Ease of Doing Business' index published by the World Bank, which is only available from 2005 onward, and the 'Corruption Perception Index' published by Transparency International, which is comparable over time since 2012 only[11]. The level of correlation between these indexes and the Heritage economic freedom indicators is very close to one. We ultimately decided to rely on the Index of Economic Freedom because it is, to the best of our knowledge, the only one that is available for a large number of countries and for a sufficiently long time frame, that is comparable both across countries and over time, and that is updated annually, hence providing both cross-sectional and time-series variation. Other indexes, like those proposed by the literature on law and economics[12], and used for example in Gungoraydinoglu and Öztekin (2011) or Öztekin and Flannery (2012), depict only cross-sectional variation, implying that they cannot be used to analyze variance over time.

In order to account for the role of the business cycle in each of the countries included in our sample, we rely on the IFO World Economic Survey, a commonly used leading indicator for economic activity published quarterly by the IFO Institute and taken from Datastream. An higher value of the IFO index signals higher confidence in the current and future prospects of the national economy[13]. We chose not to use business cycle indicators issued by national statistical agencies or central banks because they are not homogeneous and hence are hardly comparable, while indicators issued by international agencies such as the OECD are not available for all the countries included in the dataset. The IFO World Economic Survey is instead available for a large number of countries over the entire sample period and its calculation method is uniform across them. Finally, we use annual rates of inflation and annual growth rates of real GDP from Datastream for each individual country.

Table 3 reports the annual mean, standard deviation, bottom and top quartiles, the interquartile range, bottom and top deciles, and the inter-decile range for both market leverage and book leverage over the entire sample. The average debt ratio (both at market and book values) tends to fluctuate with the financial conditions index: periods of financial turbulence are associated with higher leverage ratios, higher standard deviation, and higher interquartile range, indicating that both the average debt ratio and the dispersion in the distribution move with the business cycle and that highly indebted firms may behave differently from less indebted ones. Both the interquartile and interdecile range are influenced by the business cycle. These movements are mostly connected with changes in the upper part of the distribution, with the debt ratios of highly indebted firms being positively correlated to the business cycle, while firms in the lower part of the distribution tend to have more stable debt ratios.

[Table 3 about here.]

Figure 2 illustrates the dynamic behavior of the summary statistics over the entire sample of market and book debt ratios (left axis) compared with the financial conditions index GFCIa (right axis). The mean, standard deviation, percentiles, and inter-quantile ranges of market debt ratios appear to follow the movements in the financial conditions index quite closely, while book debt ratios tend to be more stable over time and their fluctuations much less pronounced than those of market values. In both cases, the 10^{th} percentile is stable at zero, the 25^{th} percentile has small variations, while the right tail of the distribution is much more volatile, with both the 75^{th} and 90^{th} percentile displaying large variations over time. While we cannot

[11]See Transparency International (2012) for more details.

[12]See, among others, La Porta et al. (1997, 1998, 1999, 2000), Djankov et al. (2008).

[13]Recall that firms are sorted by their country of incorporation.

draw conclusions from a simple aggregation of debt ratios from firms in different sectors and countries, these observations already suggest that the distribution of debt ratios does not move jointly over time, but rather is the result of different types of behavior in the two tails. This may in turn indicate that the level of debt, firms' characteristics, and macroeconomic conditions interact in shaping debt dynamics.

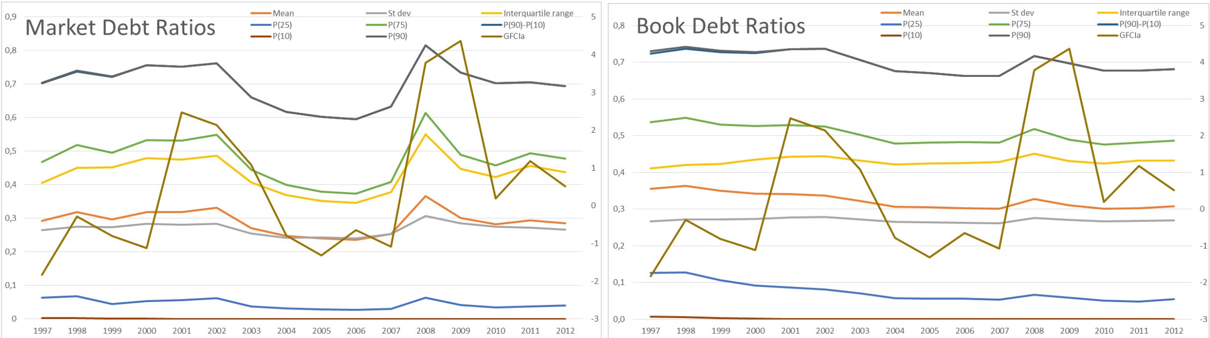

Figure 2: Summary statistics of market and book debt ratios over time

While this purely descriptive argument cannot be taken as evidence in favor of any of the alternative theories of capital structure, nonetheless it suggests that there exist common factors simultaneously affecting all firms, which might be linked to the business cycle. If this conjecture is correct (as it will be shown to be the case later in the paper), a meaningful investigation of capital structure decisions cannot be based on firm-level variables only, but it needs to carefully scrutinize the role of macroeconomic indicators as well. Indeed, a disaggregation of average annual debt ratios by industry suggests (see Appendix A) that both economy wide and industry specific characteristics matter in determining firms' observed leverage ratios[14].

Table 4 reports the aggregate correlation matrix for all relevant variables. Market and book debt ratios are strongly and positively correlated, indicating that the two measures of leverage tend to follow similar paths across firms and over time. We find that the levels of correlation among explanatory variables are not too large, with the exception of some of the market friendliness indicators.

[Table 4 about here.]

3 A variance decomposition of leverage ratios

As previously discussed, a novelty of our approach lies in the explicit addition of macroeconomic and institutional variables (with both cross-sectional and time variation) among the determinants of target leverage and leverage adjustments. In this section we study – by means of One-way Anova and Ancova analyses, the results of which are reported in Table 5 – whether macroeconomic and institutional indicators have a direct impact on firms' financing decisions, or an indirect one passing through the firm-level determinants of capital structure decisions.

[Table 5 about here.]

[14]Interestingly, a disaggregation of average annual debt ratios by country (see again Appendix A) qualitatively reveals that they are influenced by common factors in the short run, while following different trends over a longer time horizon.

Panel a) of Table 5 reports the results of a one-way Anova analysis for firm, country, time and industry effects, respectively, when leverage is measured using market debt ratios, as defined in Section 2. As expected, we find firm effects to provide the highest R-squared (or between portion of observed variance), followed by industry and country effects, while time effects have little predictive power. With country and industry effects, the between variance is around 10%, indicating that both the geographical location and the sector of activity can explain a small but not negligible portion of variance. With time-effects, the between proportion of variance is below 2%.

We then move to an Ancova analysis in order to decompose the variation in market debt ratios into different factors, using a number of variations of the following baseline model

$$\frac{D_{i,t}}{A_{i,t}} = \alpha + \beta X_{i,t-1} + \gamma Z_{j,t} + \delta X_{i,t-1} Z_{j,t} + \nu_t + \epsilon_{it}, \tag{1}$$

where i indexes firms, j indexes country and t indexes years, X is a vector of firm level characteristics, Z is a vector of macroeconomic and institutional factors, ν is an industry effect, and ϵ is an error term[15]. The variables included in the vector Z are defined at the national level, but for GFCIa that is defined at the global level (hence varying only over time, while being constant across countries). We divide the partial sum of squares for each effect by the aggregate partial sum of squares across all effects in the model, thus forcing all columns to sum up to one, in order to normalize the results and make them more immediate to read. We first run an Ancova analysis without interactions, testing only for the direct effect of macroeconomic and institutional variables. We then repeat our analysis with interaction terms to test for the presence of indirect effects.

Panel b) of Table 5 reports the results we obtain using the market debt ratio as dependent variable for a number of specifications of Equation (1). In our first specification (column (1)), we include just country (*country*), industry (*industry*) and time (*year*) fixed effects. In column (2) we replace the industry dummy with the annual average debt ratio in the industry. We then expand the model by gradually adding firm level characteristics, macroeconomic conditions and institutional variables. Finally, we remove firm level variables and only use macroeconomic and institutional factors. Our set of firm-level variables produces an adjusted R-squared of 19.6% (column (3)). *Growth* is the most important source of leverage variation (39%), followed by *tangible* (29%) and *inventories* (13%). When we also consider the annual mean debt ratio in the industry (*industry*, column (4)), we find it to be the largest determinant of explained leverage variation. Looking at firm-level determinants, we see that the inclusion of the mean industry debt ratio affects their relative importance (columns (3)-(4)). In fact, the proportion explained by *growth*, *tangible*, *inventories* and *size* decreases significantly. On the contrary, the weight of *profitability* increases. This suggests that the differences in leverage explained by firm-level factors – such as growth opportunities, the availability of potential collateral assets (*tangible* and *inventories*), or firm size – may at least partly reflect specific industry characteristics. Column

[15] We choose to estimate Type III partial sum of squares for each model because our panel dataset is strongly unbalanced and it is known that Type I "sequential" sum of squares yield different results for unbalanced data depending on which main effect is considered first, so that our results would depend on how we choose to order the variables. We choose Type III over Type II because Type II assumes no interaction between variables, while Type III tests for the presence of a main effect while taking into account all the other main effects and all the interactions. Indeed, based on the available empirical evidence, we know that there are significant interactions between institutional variables and firm-level characteristics. See for example Öztekin and Flannery (2012), who use a set of time-invariant institutional variables and find that they have a significant direct and indirect effect on leverage.

(5) adds also country and time effects, and we find that *country* becomes the largest determinant of leverage variation, followed by *growth*, *tangible* and *profitability*; *industry* now only comes in fifth place. This implies that, under this specification, and correcting for individual firm characteristics, cross-country differences prevail over cross-sectoral ones.

In columns (6)-(14) we add macroeconomic variables (first without and then with the mean industry debt ratio, and country and time effects), the overall Index of Economic Freedom, and finally the individual components of the index. Columns (15)-(17) show what happens when disposing of all firm level variables and sequentially removing country, time and industry effects so that all variation in leverage is attributed to macroeconomic and institutional factors. Column (12) shows the results of a model with all firm and country-level variables, which is further expanded in Column (13) by adding the annual mean industry debt ratio, and in Column (14) by adding also country and time effects (column (14)). If we do not consider industry, country and time effects, we find that firm-level variables account for 87% of the explained variation in leverage ratios, macroeconomic factors for around 4% and institutional variables for around 9%[16]. The inclusion of the mean industry debt ratio increases the adjusted R-squared from 24% (column (12)) to 27% (column (13)). The annual industry mean debt ratio accounts for around 22% of leverage variation; firm-level characteristics now account for 69% of the explained variation, macroeconomic conditions for just below 2%, and institutional factors for around 8%. Looking at the full model in column (14), we find that firm-level characteristics capture around two-thirds of the explained variation in leverage (69%), macroeconomic indicators and institutional characteristics just above 1% each, the mean debt ratio in the industry 15%, country effects 10.8%, and time effects 2.9%. This suggests that our country-level variables account only for a part of the differences that are due to aggregate changes in leverage ratios, with other unidentified country level factors also playing a role.

The next step is to test for the indirect effects of macroeconomic and institutional environments on market leverage ratios, in order to understand if the importance of these factors increases when considering the possibility that they may indirectly affect firm behavior by influencing how firms react to changes in firm-level variables. Our results are reported in Table 6.

[Table 6 about here.]

Firm-level variables now directly account for only 6.4% of the variation in market debt ratios; direct macroeconomic effects explain 5.35%, and institutional variables 6.7%; the indirect effect of macroeconomic factors accounts for just below 21% of the explained variation, while institutional characteristics for 60.5%. The overall effect of macroeconomic variables is 26.3%, while the total effect of institutional factors is 67.2%. These results clearly illustrate the importance of properly accounting for the indirect effects of macroeconomic and institutional indicators on internationally observed leverage ratios when investigating capital structure. In fact, not only they appear to directly affect capital structure decisions, but also, and more importantly, they significantly influence the effects of firm-specific factors. This means that any empirical analysis of capital structure should take into account both the macroeconomic and the institutional context in which firms operate, since they bear a direct effect on capital structure decisions and on the way in which firms' financing behaviors are influenced by their own characteristics.

Focusing on economic freedom indicators, we find that financial freedom is the most relevant one (21.8%), mainly due to its interaction with the two measures of implicit tangible collateral

[16]The aggregate figures for firm and country-level variables are obtained by summing up the contributions of all individual firm characteristics, macroeconomic indicators, and institutional variables, respectively.

(*tangible* and *inventories*). As for macroeconomic variables, the GFCIa index has the largest direct effect on debt ratios (2.31%), followed by inflation (2.1%). Given that the latter erodes the real cost of debt for the borrower and the real return for the lender, it should not come as a surprise that inflation – which also has an indirect effect of around 2.6% – plays an important role in the variation of leverage ratios across countries. The importance of the GFCIa index may instead underline the fact that firms can alter their behavior as a function of current financial conditions, perhaps in order to 'time' the market, or simply adapt their responses to varying market conditions and costs of financing. Looking at the sum of direct and indirect effects, the GFCIa index accounts for 9.2% and the IFO index for 10.2% of the explained variation in leverage, mostly due to their indirect effects of 6.9% and 9.5%, respectively. This suggests that firms tend to adjust their behaviors depending on the macroeconomic prospects they face at the time of their decisions. When examining which firm-level factors are most affected by macroeconomic and institutional variables, it turns out that *tangible* has the strongest indirect effect (20.8%)[17], followed by *size* (15%), the industry mean (13.5%), and *inventories* (13.4%). If we only look at macroeconomic variables, the industry mean (5.9%) is the most affected, followed by *profitability* (4.8%) and *tangible* (4.2%), while *tangible* (16.6%), *size* (13.3%) and *inventories* (11.3%) are the three covariates most affected by institutional characteristics.

Summing up the results from the variance decomposition analysis above, four observations can be made. First, firm-level variables have only a moderate direct impact on leverage when looking at our international sample of firms: most of their effect comes in connection with macroeconomic and institutional variables. Second, institutional factors (i.e. economic freedom indicators) play a significant role both by directly affecting the variation in leverage and, more important, by influencing the effects of firm-level determinants. Third, macroeconomic factors also play a role, both directly and indirectly, albeit smaller than that of institutional variables. As we show in the following sections, however, macroeconomic conditions become more relevant when investigating the dynamic adjustment process (rather than the cross-section determinants) of debt ratios. Fourth, in our sample most of the variation in leverage is cross-sectional (69%), while time-series within-firm variation is much smaller, and all our determinants (firm-level, macroeconomic and institutional variables) still explain much less than firm fixed effects, with an adjusted R-squared of 30% compared with 69% of firm fixed effects.

4 Optimal leverage and debt dynamics: A Linear Partial Adjustment Model

This section investigates the determinants of optimal debt ratios and their dynamics over time by means of a *linear* partial adjustment model. As discussed in the Introduction, our empirical analysis relies on a two-step procedure by which we first estimate optimal leverage and then a partial adjustment equation to account for its dynamics[18]. More specifically, in order to evaluate the target leverage for each year (starting in 2000), we estimate a fixed effect regression of Equation (5) using information from past periods[19]; i.e.

[17]The value is obtained as the sum of all the interaction effects between the firm-level variable and each of the country-level determinants reported in Table 6.

[18]To check the consistency of our results with those obtained in the pertinent literature, in Appendix B we adopt a one-step procedure jointly estimating (in a variety of ways) the optimal level of leverage and the speed of adjustment towards it. The results we obtain are fully consistent with those in the literature.

[19]Note that we have a panel with T=3 for the first year, as we use leverage ratios from the period 1997-1999 to estimate the target for the year 2000. We then simply add additional years as we move forward, so that the time

$$\frac{D_{i,t}}{A_{i,t}} = \beta X_{i,t-1} + \gamma Z_{j,t} + \delta X_{i,t-1} Z_{j,t} + \alpha_i + u_{i,t}, \quad (2)$$

where i, j and t indicate firm, country and time, respectively; X is a vector of firm-level variables; Z is a vector of macroeconomic and institutional indicators; and α indicates firms' fixed effects. As in the previous section, the variables included in the vector Z are all defined at national level, with the exception of the GFCIa indicator which is defined at a global level, hence is constant across countries and only varies over time.

Once we obtain the out-of-sample forecasts for target leverage, we estimate the speed of adjustment towards it by means of the following equation

$$\frac{D_{i,t}}{A_{i,t}} - \frac{D_{i,t-1}}{A_{i,t-1}} = \alpha + \lambda \left(\left(\frac{D_{i,t}}{A_{i,t}} \right)^* - \frac{D_{i,t-1}}{A_{i,t-1}} \right) + \epsilon_{i,t}, \quad (3)$$

where $\left(\frac{D_{i,t}}{A_{i,t}} \right)^*$ denotes the target debt ratio and all other symbols have been defined above. As already noted, the estimates of Equation (3) may be biased because of the fractional nature of the debt ratio, which may induce mechanical mean reversion. To solve the problem, we include the target leverage and the lagged debt ratio separately into the partial adjustment regression through the following equation:

$$\frac{D_{i,t}}{A_{i,t}} - \frac{D_{i,t-1}}{A_{i,t-1}} = \alpha + \lambda_1 \left(\frac{D_{i,t}}{A_{i,t}} \right)^* + \lambda_2 \frac{D_{i,t-1}}{A_{i,t-1}} + \epsilon_{i,t}. \quad (4)$$

In line with the pertinent literature, we measure firms' leverage using market debt ratios, as defined in Section 2 above[20]. As a first exercise, to allow for a comparison of the results of our two-step procedure with those of the one-step procedure commonly adopted in the literature, we consider a simpler version of Equation (2), using only firm level variables as covariates (as it is done in the vast majority of the relevant literature); i.e.

$$\frac{D_{i,t}}{A_{i,t}} = \beta X_{i,t-1} + \alpha_i + u_{i,t}, \quad (5)$$

where i and t indicate firm and time, respectively, X is a vector of firm-level variables, and α denotes firms' fixed effects. To be consistent with the specifications commonly adopted in previous work, as far as individual firms' characteristics X are concerned, here we only consider profitability, growth opportunities, firm size, and asset tangibility. These are in fact the four covariates most commonly used in the literature (e.g. Rajan and Zingales (1995)) as determinants of the capital structure.

Table 7 summarizes our findings, showing the estimated speeds of adjustment we obtain using historical or in-sample target leverages – both in the scenario in which the target leverage predicted by the first stage Equation (5) is censored at 0 and 1, and in that in which it is not.

[Table 7 about here.]

The two-step procedure using only historical information to estimate target debt ratios produces a speed of adjustment just below 9% both when target leverage is censored and when it is uncensored (see Columns (1) and (4) line B in Table 7, respectively). Therefore, censoring observations – in order to insure that the predicted targets fall in the [0,1] range over which

dimension of the dataset increases each year, replicating the procedure proposed in Hovakimian and Li (2011).

[20] Appendix C replicates the analysis using book debt ratios, in order to show the consistency of our results when adopting a different measure of leverage.

leverage ratios are defined – affects the results to a small extent only. The distortion induced by the look-ahead bias appears small in our sample, as the speed of adjustment increases only by around 0.6% when using in-sample rather than out-of-sample measures of the target (Column (5) line B), as long as fixed effects (i.e. unobserved individual factors) are not included in producing the target leverage. If we instead include also fixed effects when predicting target leverage, our results change dramatically, and we obtain an estimated speed of adjustment larger than 50% both when censoring and not censoring estimated targets (see Columns (3) and (6) in Table 7, respectively). Notwithstanding, the bias from mean-reversion is quite large. In fact, correcting for mean reversion reduces the estimate of the adjustment speed from 14% (Column (1) line A when looking at historical, censored targets) to 9% (Column (1) line B when looking at historical censored targets).

Interestingly, the adoption of a two-step procedure leads to an estimated speed of adjustment that is significantly smaller than that usually reported in the pertinent literature adopting one-step procedures[21].

A major drawback of the specification in Equation (5) is that the possible effects induced by the macroeconomic and institutional environment in which firms operate remain unaccounted for. To face this issue, we now explicitly control for the effects of macroeconomic and institutional conditions on target debt ratios by focusing on the full model in Equation (2). Table 8 reports our results for the estimation of this model excluding interactions between firm- and country-level variables (the vector δ).

[Table 8 about here.]

In all different specifications of the model, we always find estimates for firm-level characteristics that are in line with the existing literature on the cross-sectional determinants of leverage ratios. In particular, we find a negative and statistically significant coefficient for *profitability* and *growth*: more profitable firms, or firms having a broader range of growth opportunities, tend to be less indebted. *Tangible*, *size* and *inventories* always have a positive sign, indicating that an increase in tangible assets, inventories, or firm size is associated with an increase in leverage[22].

As for macroeconomic factors, we find that *inflation*, the *GFCIa* indicator, and the *IFO index* are all statistically significant. Inflation is positively correlated with leverage, suggesting that firms tend to use more debt when inflation is higher[23]. Conversely, leverage appears to be countercyclical with respect to financial conditions and expectations about the real economy: debt ratios are higher when financial conditions, or expectations, are worse. Focusing on national institutions (as proxied by the *Index of Economic Freedom* described in Section 2), freedom from corruption, business freedom, and trade freedom have a negative relationship with debt ratios, while higher protection of property rights, freedom from taxation, freedom from government spending, monetary freedom, and investment freedom have a positive relationship with leverage. The positive relationship between freedom from taxation (or from government spending) and

[21] As shown in Appendix B, adopting a one-step procedure based on a variety of estimators (including Blundell-Bond and Dynamic Fractional Panel estimators), our results are fully consistent with those obtained in the literature.

[22] The industry mean debt ratio has a positive coefficient when only firm-level variables are considered, and negative when we also include country-level variables. Unreported results show that a positive coefficient is obtained in the latter regression if we run the regression only on US companies, or on companies belonging to G7 countries. Similar results are obtained by replacing the industry mean with the industry median debt ratio.

[23] Note that inflation reduces the real burden of debt and it increases the value of leverage, as argued by Modigliani (1982). Hence, a positive relationship between inflation and debt is to be expected.

leverage is in stark contrast with the predictions of the trade-off theory. However, as shown in Graham et al. (2014) corporate and government debt may act as substitutes, so that in countries where the government issues large amounts of debt, everything else equal, firms may not be able to issue as much debt as matching firms in countries with more conservative governments[24].

Since discussing the magnitudes of the relevant coefficients can be both cumbersome and little informative, Table 8 (Part b) reports the results of a dominance analysis investigating the relative importance of the regressors included in our model[25]. Looking at the last column of the table, we find that around 50% of the explained within variation can be attributed to firm-level variables, and the other 50% to macroeconomic and economic freedom (institutional) indicators[26]. Around one third of the explained variation can be attributed to macroeconomic indicators, implying that approximately one third of the explained variation depends on the business cycle rather than on changing firms' characteristics. As for firm-level variables (Column 3 of Table 8), we find that *growth* and *profitability* are the two most important regressors, contributing around 29% and 23%, respectively, to the overall explained variance in the model without macroeconomic variables.

The variance decomposition analysis in Section 3 has shown that macroeconomic and institutional factors affect leverage ratios also indirectly through their effects on firm level variables. Accordingly, we now allow for the interaction between firm and country level variables, in order to account for the indirect effects in the estimation of the determinants of target leverage. We do so through the estimation of the full model of Equation (2), reporting our results in Table 9.

[Table 9 about here.]

The main findings from the variance decomposition analysis are confirmed. As shown in Table 9, the interactions between firm- and country-level variables are strongly significant in most cases. In the following, to avoid a lengthy exposition we only focus on the most relevant estimated coefficients. The interactions of *tangible*, *inventories* and *size* with *Financial Freedom* have negative coefficients. We take this as a sign that financial development and financial freedom can act as a form of 'economic democracy': the higher financial freedom, the lower the importance of collateral and firm size as determinants of leverage. This may indicate that firms are funded more because of their economic prospects rather than because of the potential collateral from assets in place. *Inflation* has the expected positive coefficient indicating that periods of higher inflation tend to be associated with higher leverage. Firms in countries with higher government spending display higher leverage, and more so when profitability increases. Growth opportunities and profitability are negatively correlated with leverage. These results hold even under changing macroeconomic and institutional conditions: when the interaction is significant, the sign of the combined effect still preserves the negative sign.

Finally, Table 9 also reports also the results of a dominance analysis, showing that 32.27% of the within variability of the fixed effect specification (the within R-squared of the regression is 13.37%) can be attributed to the interaction between economic freedom and firm-level variables,

[24]The coefficients for these two variables are quite small. Moreover, at least for multinational companies, the effective tax rate paid on consolidated income is different from the statutory rate of the country of origin, as shown by Huizinga et al. (2008).

[25]See Grömping (2007) for the technical details of dominance analysis. Note that the fit statistic (R^2-within) used in our dominance analysis and reported in the bottom line of the table does not consider the share of variance explained by firm fixed effects.

[26]Due to the large number of independent variables, the number of auxiliary regressions required for a complete variable-by-variable dominance analysis is computationally demanding, so we only report the results of dominance analysis for jointly considered sets of variables.

27.32% to the interaction between macroeconomic and firm-level variables, 18.63% to firm-level variables, 15.78% to macroeconomic indicators, and 6% to economic freedom (institutional) indicators.

Having estimated the determinants of target debt ratios, we can now focus on the dynamic adjustment of leverage towards the target. To do so, and in order to avoid the look-ahead bias, we derive a target leverage for each year, by estimating a fixed effect regression of Equation (2) using information from previous periods, starting in year 2000[27]. We then use each year out-of-sample forecasts as target leverage ratios, and we estimate Equations (3) and (4) in order to measure the speed of adjustment. Table 10 reports the results of these (second-step) regressions.

[Table 10 about here.]

As in Table 7, we obtain our estimates with different methods. The speed of adjustment ranges between 9% and 15%, implying an half-life of deviations from the target between 4.3 and 7.2 years, depending on whether we use historical or in-sample targets, we correct or not for mechanical mean reversion, and we include or not macroeconomic and institutional variables in the target leverage equation[28]. Our baseline model – in which we estimate the speed of adjustment using historical targets, including macroeconomic and institutional factors in the first-step regression and correcting for mechanical mean reversion in the adjustment equation – gives an estimated speed of adjustment of 9.95%, corresponding to an half-life of deviations of 6.9 years, indicating that the adjustment process is in fact quite slow.

Using censored or uncensored historical targets produces a minimal difference in the estimated speed of adjustment. More precisely, using censored historical targets with macroeconomic and institutional variables in the first-step regression we obtain a speed of adjustment of 9.95% (line (4) column (B) in Table 10), while with the uncensored estimate of the same targets we obtain a speed of 9.88% (line (2) column (B) in Table 10). Failing to account for mechanical mean reversion, instead, has a more pronounced effect on the estimated speed of adjustment. When using historical targets, the estimated speed of adjustment without correcting for mean reversion is around 5% higher than that obtained when correcting for mean reversion. Given that the estimated speed of adjustment (using historical targets, with macroeconomic and institutional variables in the optimal leverage equation) is just below 10%, failing to account for this bias inflates the estimated speed by around 50% of its value.

5 Non-linearities in debt adjustments

The approach outlined in the previous section – while improving upon one-step procedures – has the drawback of pooling all observations over the entire sample, independently of business cycle and institutional conditions, and of whether firms are over- or under-levered, with or without financial slack, with high or low credit risk. We now relax the 'pooling' assumption implicit in

[27] As already noted in Footnote 19, recall that we use leverage ratios from the period 1997-1999 in order to estimate the target for the year 2000.

[28] The half -life is calculated as $ln(0.5)/ln(1 - SOA)$. As already noted above, there is one exception in the estimated speeds, namely the model where we use all our variables and firm fixed effects in order to obtain in-sample predictions of the target leverage, where firms appear to adjust 50% of their deviation in one year. We can, however, disregard this model as it suffers from multiple biases. First, we are implicitly assuming that firms can not only predict their own future conditions but also macroeconomic and institutional ones. Second, by including fixed effects in fitted values we assume that firms are able to forecast their own firm-specific effects. We still report the results in order to display the size of the bias that may affect the estimation process.

the previous analysis and extend it by augmenting the specifications of Equations (3) and (4) to encompass various types of non-linearities, using both firm characteristics, macroeconomic conditions, and institutional indicators as potential determinants of non-linear behavior.

5.1 The role of firm conditions

We first relax the assumption that the sign of the deviation from the target (i.e. being above or below the target level of leverage) is irrelevant in determining firms' behavior, allowing the speed of adjustment to change when firms are either below or above the target. In order to do so, we estimate the equation

$$\frac{D_{i,t}}{A_{i,t}} - \frac{D_{i,t-1}}{A_{i,t-1}} = \alpha_1 D^b_{i,t} + \alpha_2 D^a_{i,t} + \lambda_b TDEV_{i,t} D^b_{i,t} + \lambda_a TDEV_{i,t} D^a_{i,t} + \epsilon_{i,t}, \tag{6}$$

in which we do not correct for the mean reversion bias, and

$$\frac{D_{i,t}}{A_{i,t}} - \frac{D_{i,t-1}}{A_{i,t-1}} = \alpha_1 D^b_{i,t} + \alpha_2 D^a_{i,t} + \lambda_{1b} \overline{TD}_{i,t} D^b_{i,t} + \lambda_{1a} \overline{TD}_{i,t} D^a_{i,t} + \lambda_{2b} \frac{D_{i,t-1}}{A_{i,t-1}} D^b_{i,t} + \lambda_{2a} \frac{D_{i,t-1}}{A_{i,t-1}} D^a_{i,t} + \epsilon_{i,t}, \tag{7}$$

where we do correct for mean reversion. $TDEV_{i,t}$ is defined as $\left(\left(\frac{D_{i,t}}{A_{i,t}}\right)^* - \frac{D_{i,t-1}}{A_{i,t-1}}\right)$, $\overline{TD}_{i,t}$ is the target debt ratio for firm i at time t, $D^a_{i,t}$ is a dummy variable that takes value one if firm i debt at $t-1$ is above the target at time t and zero if it is below, and $D^b_{i,t}$ is a dummy variable equal to one if firm i debt at $t-1$ is below the target at time t and zero if it is above[29]. In what follows, we measure target leverage based on the fitted values of the historical rolling fixed effects estimation of Equation (2), censoring them at zero and one, respectively.

Part a) of Table 11 reports the estimated speeds of adjustment from regressing Equations (6) and (7) with the Fama-MacBeth method. We find that firms above target tend to adjust at a speed of around 22% (resp. 24%), when correcting (resp. not correcting) for mechanical mean reversion, while firms below target have a speed of adjustment not significantly different from zero. Our findings suggest that not only firms partially adjust to target leverage and do so at a somewhat slow speed, but they also behave asymmetrically depending on the sign of the deviation[30].

[Table 11 about here.]

In order to further investigate this issue, we augment our specification using the dummy variable *slack* that measures the financial slackness of the firm, hence taking value one if capital expenditures in the year are lower than the operating cash flow of the period plus cash holdings at the beginning of the year (surplus), and zero if they are bigger (deficit)[31]. A key argument of the pecking order theory is that firms with enough internal funds are less likely to raise new funds from external financing, which may prevent them from adjusting towards the target. In panel b) of Table 11 we illustrate the results obtained by adding this dummy variable to

[29] The resulting coefficients are equivalent to those obtained by separately estimating a linear model on each of the sub-samples. Our formulation implies that we are excluding from the estimates of these equations all firms that have a distance from the target exactly equal to zero.

[30] This asymmetric behavior appears to be much stronger than estimated by Byoun (2008) for U.S. firms.

[31] We do not include dividends when calculating financial slack, since we consider them as a voluntary decision of reducing equity and not as an operating cash outflow. In this perspective, they can be considered as a form of capital structure decision and not as a component of the ability to generate enough internal funds to pay for investments.

Equations (6) and (7), and interacting it with the regressors in order to examine whether under- and over-levered firms behave differently depending on their financial slackness. The bias from mean reversion is again quite large. In fact, failing to correct for it inflates the estimated speed of adjustment for firms with a financial surplus, both when above and below the target, while the opposite happens with firms facing a financial deficit. We find that the adjustment speed changes significantly both between under- and over-levered firms, and between firms with financing deficits and surpluses. Limiting our attention to the estimates of Equation (7) in which we correct for mechanical mean reversion, it turns out that firms adjust at a speed of around 21% when they are below target and have a financing deficit, indicating that they tend to cover financing deficits relying more on debt than on equity (so that their leverage increases). Conversely, firms below target with a financial surplus display a negative adjustment speed (-0.01%), indicating that they use internal funds to pay for investment and reduce leverage, not converging towards the target. Overall, these results suggest that under-levered firms behave as predicted by the pecking order. When firms are above target (i.e. over-levered), the speed of adjustment appears to be significantly higher in the presence of a financial deficit than of a financial surplus (46.84% vs. 16.05%): firms that need to raise funds from external sources rely more on equity than on debt, so that their leverage decreases. This behavior suggests that firms are not entirely active in adjusting their capital structure towards the target. When in need of external funds, they move towards the target quite fast, particularly if over-levered. Conversely, if firms can rely on internal funds to support investments, they tend to use the available cash to pay for capital expenditures, and they adjust towards the target leverage at a much slower speed. Despite the observed heterogeneity in firms' behavior, when focusing specifically on the effects of financial slack for over- and under-levered firms, our results are overall more in line with the pecking order than with the trade-off view.

The two theories can be evaluated also along another dimension. According to the pecking order hypothesis, firms should use debt as a source of external funds until their debt capacity is fully exploited, while according to the trade-off view they should choose debt or equity depending on their position with respect to the target. Following de Jong et al. (2011), we set the level of debt capacity at the maximum level of debt that a firm can bear without falling below investment grade. To the extent that debt capacity and target debt are different, we should be able to test whether firms follow a pecking order or a trade-off behavior by looking at their decisions around the optimal target and the *investment grade* threshold. Unfortunately, credit rating data are available for a small sub-portion of our sample only. Hence, we rely on a credit scoring methodology to derive a measure of credit risk. In particular, we estimate the Ohlson's O-score for each firm in the sample[32]. As it is commonly assumed, we classify firms with a value of the score below 0.038 as *investment grade*, firms with a value above 0.5 as *junk*, and firms between 0.038 and 0.5 as issuers of near-investment grade speculative debt (or simply *risky*, in what follows). We can then further divide our sample in three subgroups depending on their estimated credit risk, so that we now have 12 subgroups as a function of financial

[32]Ohlson (1980) selected nine independent variables for predicting bankruptcy with what is known as the O-score, calculated as: $O-score = -1.32 - 0.407ln(TA_t) + 6.03\frac{TL_t}{TA_t} - 1.43\frac{WC_t}{TA_t} + 0.757\frac{CL_t}{CA_t} - 1.72X - 2.37\frac{NI_t}{TA_t} - 1.83\frac{FFO_t}{TL_t} + 0.285Y - 0.521\frac{NI_t - NI_{t-1}}{|NI_t| + |NI_{t-1}|}$, where TA is total assets, TL is total liabilities, WC is working capital, CL is current liabilities, CA is current assets, X is a dummy equal to 1 if TL >TA and 0 otherwise, NI is net income, FFO is funds from operations, Y is a dummy equal to 1 if the company had a net loss for the last two years, and 0 otherwise. We use the O-score instead of the better known Z-score from Altman et al. (1977) because according to Begley et al. (1996) the O-score has higher predicting ability. We do not produce results using the Z-score because, due to lack of data, the analysis would rely on a much smaller sample.

slack, the sign of the deviation of debt from the target level, and credit risk. We estimate the speed of adjustment for each of these twelve groups, reporting the results in Panel c) of Table 11[33]. We still find that firms below target with positive financial slack tend not to converge towards the target debt ratio, with the sole exception of the *junk* group that has a positive and statistically significant speed of adjustment, although very small. Conversely, under-levered firms with negative financial slack tend to adjust towards the target. Once more, this occurs at a faster speed for the riskiest firms[34]. When over-levered, instead, firms with positive financial slack adjust towards the target at a much lower speed than firms with negative financial slack. Moreover, the latter adjust at a speed that is almost twice as large for 'junk' firms than for investment grade ones. This reinforces our previous finding that firms are not entirely active in rebalancing debt, but rather tend to do so only if they need to raise external funds, and more so if their credit risk is higher.

Overall, our results lend support to the pecking order theory: firms reduce leverage when internal funds exceed financial needs, regardless of whether they are over- or under-levered. When external funds are needed, instead, under-levered firms seem to cover their financing deficits by increasing leverage, while over-levered firms fund financing deficits by issuing equity and reducing leverage (to a larger extent when credit risk is high).

5.2 The role of macroeconomic conditions

We now enrich our analysis by investigating how the speed of adjustment of firm's debt towards the target changes under different macroeconomic scenarios. Firms may have strong incentives to avoid issuing equity during financial crises because the conditions at which they could do so are perceived as too penalizing for existing shareholders. If this is the case, we expect over-levered firms to adjust faster when market conditions are more favorable, and at a slower pace when market conditions are less favorable.

In order to assess the effects of macroeconomic conditions on the adjustment process, we first divide our sample in three sub-groups using the financial conditions index GFCIa. In particular, we use the 33^{rd} and 66^{th} percentiles of the index as dividing thresholds. Panel a) of Table 12 reports the results of our analysis.

[Table 12 about here.]

In hot markets, firms above the target and without financial slack tend to reduce leverage whatever their credit risk level (the estimated speed of adjustment is 41.26% for the *investment grade* group, and 52.57% for the *junk* group)[35]. Conversely, in cold markets riskier firms reduce leverage at relatively high speed (54.94%), while low-risk firms do not appear to adjust their debt ratios (more precisely, their speed of adjustment towards the target is not statistically significant). Somewhat surprisingly, firms below the target and without financial slack tend to increase leverage regardless of market conditions when their credit risk is already high, a behavior that looks like a form of 'betting for resurrection'. When credit risk is low, instead, firms

[33]Observe that the table only reports the results obtained by using historical targets, censored at zero and one, and by estimating the speed of adjustment accounting for mechanical mean reversion. This is done throughout the remainder of the paper unless otherwise noted. All other results are consistent with those reported in the main text and available upon request.

[34]The *risky* group has a total of just 233 firm-year observations for the below-target, negative financial slack sub-sample, and this may justify the lack of statistical significance of the estimated speed of adjustment.

[35]We do not focus on the results for the *risky* group, given its small sample size (the average number of observations is 110 per year).

appear to increase leverage more during hot rather than cold markets, although in both cases the speed of adjustment is not statistically significant. Furthermore, firms with financial slack and above-target leverage tend to reduce debt at a low speed regardless of market conditions and credit rating, while those below-target do not seem to adjust their leverage at all. Overall, these findings suggest that firms actively engage in capital structure rebalancing only when they need to raise external funds. Moreover, during cold markets over-levered firms with low credit risk tend to avoid rebalancing (their estimated speed is low – 12.76% – and not statistically significant), while riskier firms rebalance debt at high speed even when financial markets conditions are bad (the estimated speed is 54.94%). This suggests that firms may want to preserve debt capacity (not increasing debt even if under-levered) in order to avoid rebalancing under bad market conditions.

Panel b) of Table 12 shows the results we obtain when splitting the sample by means of the three quantiles of GDP growth rates. Also under this decomposition, above-target low credit risk firms with negative financial slack do not seem to adjust debt in low-growth periods ('Recession' in the table), while they have a positive speed of adjustment during high-growth periods ('Expansion' in the table). Conversely, high credit risk companies have a positive adjustment speed in all macroeconomic environments, with a minimum of 39% during recessions and a maximum of 54% in periods with growth rates in the intermediate quantile ('Normal' in the table). Similar results are obtained when splitting the sample based on the three quantiles of the IFO index, both calculating quantiles on the overall sample (Panel c) of Table 12) and country-by-country (Panel d) of Table 12), although with lower statistical significance in the latter case[36].

We show the existence of common patterns on how the combination of financial slack, credit risk, and macroeconomic conditions affects the speed at which firms adjust their capital structure towards the optimum. First, we find that firms are keener to adjust when they need accessing markets to raise external capital, while the adjustment process is much slower when they instead have sufficient internal resources to fund investments. Second, differences in credit risk affect the dynamic behavior of firms in the rebalancing process, especially for above-target firms during recessionary periods, or in periods with negative financial markets conditions. While above-target low-risk firms may defer the adjustment and avoid issuing equity under unfavorable conditions (thus slowing the speed of the adjustment process), high credit risk firms adjust towards the target at a similar speed regardless of market conditions. Overall, our results point to a complex view of capital structure decisions. The short-run dynamics seems to be guided by pecking order and market timing considerations: external funds are raised only if internal resources are not sufficient, and debt is preferred until credit risk becomes too high. Moreover, this behavior is stronger when financial conditions are not favorable for equity issues. Looking at a longer time horizon (i.e. at periods spanning different phases of the business cycle), however, our results support the trade-off theory with costly rebalancing. In particular, over-levered firms needing external funds tend to reduce leverage – moving towards the target independently of their credit risk – when facing good macroeconomic conditions. Conversely, when macroeconomic conditions worsen, high credit risk firms still tend to reduce leverage, while firms with lower credit risk avoid the costs of rebalancing waiting for an improvement of the macroeconomic scenario. The fact that firms behave differently depending

[36]We also estimate a fixed plus random effects (or mixed effects) version of the model, finding no statistical significance for the random part. We allow slopes to vary randomly at different levels: macroeconomic conditions, credit risk, financial slack and the sign of deviation from target leverage. The variance of the random slopes has no statistical significance at any of those levels. The results are available from the authors upon request.

on their characteristics (e.g. being over-levered vs. under-levered, high risk vs. low risk) in different macroeconomic scenarios suggests that pure market timing arguments cannot be taken as entirely convincing alternatives to the trade-off view.

5.3 The role of economic freedom indicators

We finally condition debt adjustment towards the target on differences in the quality of institutions (as proxied by economic freedom indicators), dividing our sample in three sub-groups and looking at differences between the bottom, middle and top third of the distribution of each of the institutional variables, thus allowing the adjustment dynamics to change depending on the level of market friendliness of national institutions.

The results in Panel a) of Table 13 illustrate the relationship between the adjustment process and the overall Heritage index. Group '1' is the lowest quantile (least market-friendly institutions), while group '3' is the top quantile (highest market-friendliness). As shown in the table, the dynamics of the three sub-groups differ, indicating that institutions may affect firms' behavior both in defining target debt ratios and in determining the adjustment process towards these targets. We find that in countries with more market-oriented institutions the speeds of adjustment are higher than in countries with less market-oriented institutions when firms are below target. The results for over-levered firms depend instead on the level of credit risk. For low credit risk, firms in less market-friendly countries adjust faster when facing a financing deficit, while the speed of adjustment is similar in the presence of a financing surplus. With high credit risk instead, when facing a financing deficit the adjustment is quicker in pro-market countries, while in the presence of a financing surplus the speed of adjustment is similar. Interestingly, in less market-friendly countries the speed of adjustment for over-levered firms facing a financing deficit is not affected by credit risk, while in more market-friendly countries high credit risk firms adjust more quickly than low credit risk ones. This may indicate a larger flexibility in managing debt for firms in countries with more market-friendly institutions. We further investigate this issue below by simultaneously accounting for both macroeconomic and institutional conditions.

[Table 13 about here.]

Panel b) of Table 13 reports findings on the relationship between each of the components of the Heritage index and the adjustment speed, showing that the estimated speeds of adjustment vary with the quality of institutions. Corruption, fiscal policies, business freedom, property rights protection, financial freedom all generate varying speeds of adjustment between subgroups, especially when we look at firms facing financial deficits that need to raise external capital in order to finance investments. For instance, firms in countries characterized by lower fiscal freedom are quicker in adjusting to target leverage when starting below it (and slower when above) than firms in countries with larger fiscal freedom, an indication that debt may be attractive because of the tax shield it offers. Results are similar when grouping firms based on freedom from government spending. Corruption, instead, seems to reduce the financial flexibility of firms: in countries with higher freedom from corruption, the speed of adjustment is higher than in countries with lower freedom[37]. Similar results hold true when looking at the level of property rights protection.

[37] As shown in Table 9, optimal leverage is negatively correlated with freedom from corruption; a finding that is consistent with the literature indicating that firms may use debt to increase the risk of bankruptcy, and thus reduce the possibility of expropriation from corrupt officials (see e.g. Caprio et al. (2013) and Smith (2015)).

Finally, it is interesting to consider the effects of the interaction between macroeconomic and institutional variables, in order to allow for asymmetries in the adjustment process to be contemporaneously affected by firm, macroeconomic, and institutional characteristics. We extend the analysis in this direction summarizing our results in Table 14. Note that this additional decomposition of our sample sensibly reduces the number of observations in each sub-group, negatively affecting the statistical inference on our results[38].

[Table 14 about here.]

As a consequence of the limited sample size of the sub-groups we find little statistical significance for the estimated speeds of adjustment. However, looking at the estimated coefficients it is apparent that in countries with more market-oriented institutions the effect of the business cycle on the adjustment dynamics is stronger than that reported for the overall sample. Focusing in particular on over-levered firms with financial deficits, those with low credit risk show different speeds of adjustment depending on the conditions prevailing in financial markets, while those with high credit risk tend to adjust towards target leverage regardless of macroeconomic conditions. This type of asymmetric behavior is not found when looking instead at firms in countries characterized by less market-friendly institutions.

Although our findings are to be taken with great caution given the limited sample size in the sub-groups, they suggest that the interaction between macroeconomic conditions and the quality of institutions significantly affects the dynamics of leverage ratios.

6 Conclusions

A vast literature has investigated the dynamics of capital structure decisions by means of partial adjustment models of leverage, building on the idea that asymmetric information and market frictions make the adjustment towards optimal leverage costly, leading firms to only partially – if at all – reduce the distance from their target. In general, the speed at which firms rebalance their capital structure can be endogenous, being affected by both firm and macroeconomic conditions. If this is the case, then simply estimating one speed of adjustment over a number of years and a large sample of companies entails an oversimplifying assumption. A more realistic approach needs to allow for changing speeds of adjustment as a function of firm or macroeconomic variables. Moreover, changing costs of financing may also affect the level of optimal leverage, which should therefore be analyzed accounting for the changes in both firm characteristics and country-level variables.

In this paper, we collect firms' accounting data, macroeconomic variables and institutional indicators (proxied by the Heritage Foundation indicators of economic freedom) in 52 countries from 1996 to 2012, covering developed, developing and transition economies. The institutional indicators we rely on change over time, allowing for the investigation of the effects on leverage of the variability in the quality of institutions within a country. By decomposing the variance of debt ratios between firm and country-level variables, we find that around 80% of the variation in leverage is explained by the interaction between firm-level characteristics and macroeconomic or institutional variables. This supports the hypothesis that capital structure decisions are strongly affected by country-level indicators. Estimating a simple partial adjustment model over the entire sample, we find a speed of adjustment of around 10% that implies an half-life

[38] We only report results concerning the interaction between the overall Heritage index and the GFCIa index. All other combinations are available from the authors upon request.

of deviations from optimal debt ratios of slightly more than 6.5 years. This indicates that the convergence towards target leverage is on average very slow and deviations from the optimum require a number of years before dying out.

By analyzing the effects of both the availability of financial slack and credit risk (as a proxy of debt capacity) on the debt adjustment process, we show that the capital structure dynamics may reflect a combination of two competing theories. While having a long-run target leverage ratio, firms seem to take short-run financing decisions that are in good accordance with the predictions of the pecking order theory. We find that financial slack has a strong effect on debt dynamics: firms show a much higher speed of adjustment when they need to raise external funds in order to finance investments, compared to situations in which they can rely on sufficient internal funds. This means that firms are not always actively engaging in reducing the distance from the optimal debt-equity ratio. When firms need to access financial markets to raise new capital, they take decisions in line with the trade-off view, while if they don't need external capital they do not seem concerned about accessing financial markets simply for rebalancing their capital structure. When we allow for different adjustment speeds under different market conditions, we find that firms with low credit risk and above-target debt ratios do not align their debt with the target level during bad macroeconomic conditions, reinforcing the view that the convergence to optimal debt ratios is not firms' top priority when taking financing decisions. Given that issuing equity seems to be significantly costlier during bad market conditions, this result implies that firms may prefer deferring leverage adjustment until market conditions become more favorable. This type of behavior suggests that for firms with 'spare' debt capacity (proxied by low credit risk) the convergence towards the target is a long-run phenomenon, while in the short run their decisions seem to be guided more by pecking order arguments. To complicate things further, we find that the quality of institutions also affect the dynamic behavior of firms, with the degree of market friendliness not only affecting target leverage but also the speed of adjustment towards it.

Overall, our findings show that a systematic analysis of capital structure decisions needs to allow for a complex dynamics, where the optimal level of the leverage ratio and the dynamic adjustment process towards it are affected both by microeconomic and macroeconomic factors. The trade-off and pecking order theories seem to act contemporaneously, with trade-off arguments affecting the long-term objectives of firms, and the pecking order influencing their short run behavior.

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Table 1: Firm-year observations by country

Distribution across countries of firm-year observations. The sample includes firms incorporated in both developed, developing and transition economies.

Country	Observations	%	Country	Observations	%
Argentina	674	0,25%	**Latvia**	34	0,01%
Australia	13.415	5,01%	**Lithuania**	109	0,04%
Austria	949	0,35%	**Malaysia**	10.269	3,83%
Belgium	1.426	0,53%	**Mexico**	1.250	0,47%
Brazil	1.157	0,43%	**Netherlands**	1.886	0,70%
Bulgaria	489	0,18%	**New Zealand**	1.161	0,43%
Canada	9.371	3,50%	**Norway**	1.900	0,71%
Chile	1.523	0,57%	**Peru**	634	0,24%
Colombia	265	0,10%	**Philippines**	1.485	0,55%
Croatia	91	0,03%	**Poland**	2.285	0,85%
Czech Republic	202	0,08%	**Portugal**	785	0,29%
Denmark	1.658	0,62%	**Romania**	95	0,04%
Estonia	56	0,02%	**Russian Federation**	1.559	0,58%
Finland	1.556	0,58%	**Singapore**	6.223	2,32%
France	8.113	3,03%	**Slovakia**	90	0,03%
Germany	7.914	2,96%	**Slovenia**	228	0,09%
Greece	2.970	1,11%	**South Africa**	3.360	1,25%
Hong Kong	9.662	3,61%	**Spain**	1.540	0,58%
Hungary	345	0,13%	**Sweden**	3.826	1,43%
India	15.237	5,69%	**Switzerland**	2.424	0,91%
Indonesia	3.329	1,24%	**Taiwan**	14.720	5,50%
Ireland	639	0,24%	**Thailand**	4.854	1,81%
Israel	2.050	0,77%	**Turkey**	2.501	0,93%
Italy	2.604	0,97%	**Ukraine**	53	0,02%
Japan	48.404	18,08%	**United Kingdom**	16.879	6,30%
Korea (South)	14.048	5,25%	**United States**	39.490	14,75%
			Total	267.787	100,00%

Table 2: GFCIa components

Contribution to each principal component of the different variables included in the computation of the GFCIa index, and variance explained by each principal component.

Variable	Component 1	Component 2	Component 3
S&P500-ma	-.3851198	.0156439	.2842607
Eurostoxx-ma	-.3825586	.0620799	.3622999
Nikkei-ma	-.2801018	.3639518	.5147229
Gold-ma	.0760791	.8100975	-.1722593
S&P500-var	.3724271	-.066108	.3879761
Eurostoxx-var	.3703601	-.0213691	.2197679
Nikkei-var	.2628096	-.2819361	.31918
Gold-var	.3241057	.2032617	.4073502
Rating spread	.3503994	.1744952	-.0015058
Corporate spread	.2198294	.2260615	-.1633584
Share of variance	.4938	.1137	.1007

Table 3: Summary statistics, by year

Annual summary statistics for both market and book debt ratios. μ indicates the arithmetic mean, and σ the standard deviation; *IQ range* denotes the interquartile range, and *ID range* the interdecile range. P(#) indicates the corresponding percentile of the distribution. *GFCIa* is an index of global financial conditions.

Market debt ratios

Year	μ	σ	**IQ range**	**P(25)**	**P(75)**	**ID range**	**P(10)**	**P(90)**	**GFCIa**
1997	0,2925	0,2648	0,4052	0,0632	0,4684	0,7022	0,0025	0,7047	-1,834
1998	0,3178	0,2746	0,4503	0,0683	0,5187	0,7378	0,0023	0,7401	-0,288
1999	0,2971	0,2734	0,4513	0,0447	0,4960	0,7219	0,0008	0,7227	-0,805
2000	0,3191	0,2834	0,4796	0,0538	0,5334	0,7563	0,0006	0,7569	-1,117
2001	0,3188	0,2811	0,4756	0,0563	0,5319	0,7520	0,0002	0,7522	2,473
2002	0,3312	0,2843	0,4866	0,0617	0,5483	0,7620	0,0000	0,7620	2,139
2003	0,2704	0,2544	0,4065	0,0380	0,4444	0,6612	0,0000	0,6612	1,084
2004	0,2481	0,2412	0,3685	0,0309	0,3994	0,6174	0,0000	0,6174	-0,790
2005	0,2398	0,2426	0,3514	0,0279	0,3794	0,6021	0,0000	0,6021	-1,310
2006	0,2364	0,2407	0,3458	0,0277	0,3735	0,5958	0,0000	0,5958	-0,645
2007	0,2537	0,2534	0,3785	0,0299	0,4083	0,6332	0,0000	0,6332	-1,079
2008	0,3664	0,3065	0,5508	0,0640	0,6148	0,8160	0,0000	0,8160	3,785
2009	0,3014	0,2849	0,4481	0,0413	0,4895	0,7349	0,0000	0,7349	4,364
2010	0,2824	0,2757	0,4235	0,0345	0,4580	0,7023	0,0000	0,7023	0,196
2011	0,2937	0,2716	0,4563	0,0373	0,4936	0,7056	0,0000	0,7056	1,182
2012	0,2858	0,2660	0,4380	0,0395	0,4775	0,6935	0,0000	0,6935	0,515

Book debt ratios

Year	μ	σ	**IQ range**	**P(25)**	**P(75)**	**ID range**	**P(10)**	**P(90)**	**GFCIa**
1997	0,3553	0,2672	0,4108	0,1260	0,5368	0,7230	0,0070	0,7300	-1,834
1998	0,3630	0,2720	0,4204	0,1275	0,5480	0,7362	0,0062	0,7424	-0,288
1999	0,3497	0,2719	0,4233	0,1062	0,5295	0,7271	0,0037	0,7308	-0,805
2000	0,3423	0,2736	0,4351	0,0912	0,5263	0,7253	0,0015	0,7268	-1,117
2001	0,3411	0,2770	0,4420	0,0866	0,5287	0,7348	0,0004	0,7352	2,473
2002	0,3374	0,2784	0,4437	0,0815	0,5252	0,7364	0,0000	0,7364	2,139
2003	0,3216	0,2713	0,4321	0,0704	0,5025	0,7066	0,0000	0,7066	1,084
2004	0,3062	0,2648	0,4209	0,0577	0,4786	0,6755	0,0000	0,6755	-0,790
2005	0,3045	0,2641	0,4244	0,0567	0,4811	0,6701	0,0000	0,6701	-1,310
2006	0,3025	0,2622	0,4260	0,0558	0,4818	0,6627	0,0000	0,6627	-0,645
2007	0,3015	0,2608	0,4275	0,0537	0,4813	0,6623	0,0000	0,6623	-1,079
2008	0,3277	0,2755	0,4510	0,0672	0,5182	0,7167	0,0000	0,7167	3,785
2009	0,3109	0,2711	0,4307	0,0589	0,4895	0,6963	0,0000	0,6963	4,364
2010	0,3006	0,2671	0,4246	0,0512	0,4758	0,6763	0,0000	0,6763	0,196
2011	0,3030	0,2680	0,4326	0,0481	0,4807	0,6773	0,0000	0,6773	1,182
2012	0,3072	0,2690	0,4315	0,0544	0,4859	0,6814	0,0000	0,6814	0,515

Table 4: Correlation matrix

Mdebt is the market debt ratio, defined as the ratio between total market capitalization and the sum between total financial debt and total market capitalization. *Bdebt* is the book debt ratio, defined as the ratio between the book value of equity and the sum between total financial debt and the book value of equity. *Profitability* is defined as the ratio between earnings before interests and taxes, and total assets. *Growth* is a measure of growth opportunities, defined as the ratio between the market value of assets (measured as the sum between total financial debt and total market capitalization) and book total assets. *Tangible* is the ratio between tangible fixed assets and total assets. *Inventories* is the ratio between inventories and total assets. *Rsize* is firm size, defined as the log of total revenues. *IFO* is the IFO World Economic Survey indicator. *GFCI* is the quarterly Global Financial Conditions Index obtained as the first principal component of a set of financial indicators, and *GFCIa* is an annual moving average of the quarterly values. *GFCI3* is the quarterly Global Financial Conditions Index obtained as a weighted combination of the first three principal components of the same set of financial indicators, and *GFCI3a* is an annual moving average of the quarterly values. *GDP* is the annual growth rate in real GDP. *Inflation* is the annual growth rate of the national Consumer Price Index. *Heritage* is the Heritage Index of Economic Freedom, while *PR* is Property Freedom, *FfC* is Freedom from Corruption, *FFT* is Freedom from Taxation, *GS* is Freedom from Government Spending, *BF* is Business Freedom, *MF* is Monetary Freedom, *TF* is Trade Freedom, *IF* is Investment Freedom and *FF* is Financial Freedom.

	Mdebt	**Bdebt**	**Profit**	**Growth**	**Tangible**	**Invent**	**Rsize**	**IFO**	**GFCI**	**GFCIa**	**GFCI3**	**GFCI3a**	**Gdp**	**Inflation**	**Heritage**	**PR**	**FfC**	**FFT**	**GS**	**BF**	**MF**	**TF**	**IF**	**FF**
Mdebt	1,000																							
Bdebt	0,793	1,000																						
Profitability	-0,021	-0,074	1,000																					
Growth	-0,336	-0,138	-0,121	1,000																				
Tangible	0,242	0,204	0,058	-0,147	1,000																			
Inventories	0,154	0,114	0,113	-0,148	-0,187	1,000																		
Rsize	0,263	0,197	0,322	-0,272	0,118	0,123	1,000																	
IFO	-0,161	-0,065	0,001	0,164	0,019	0,006	-0,270	1,000																
GFCI	0,092	0,016	0,000	0,027	-0,024	-0,011	-0,024	-0,313	1,000															
GFCIa	0,092	0,004	-0,039	-0,067	-0,029	-0,006	-0,007	-0,501	0,662	1,000														
GFCI3	0,086	0,010	-0,004	0,024	-0,027	-0,013	-0,033	-0,314	0,993	0,685	1,000													
GFCI3a	0,085	-0,001	-0,041	-0,068	-0,033	-0,009	-0,009	-0,480	0,652	0,994	0,683	1,000												
gdp	-0,036	-0,015	0,064	0,065	0,067	0,054	-0,053	0,661	-0,151	-0,419	-0,170	-0,408	1,000											
inflation	0,051	0,047	0,070	0,039	0,040	0,057	-0,064	0,160	0,081	-0,024	0,083	-0,018	0,257	1,000										
Heritage	-0,202	-0,142	-0,155	0,139	-0,082	-0,133	-0,262	0,028	0,017	0,004	0,023	0,005	-0,193	-0,346	1,000									
PR	-0,163	-0,074	-0,143	0,146	-0,105	-0,123	-0,235	0,001	-0,040	-0,092	-0,048	-0,108	-0,256	-0,368	0,809	1,000								
FfC	-0,207	-0,115	-0,154	0,133	-0,122	-0,124	-0,326	0,078	-0,016	-0,031	-0,016	-0,037	-0,283	-0,424	0,786	0,845	1,000							
FFT	0,059	-0,033	0,041	-0,074	0,110	0,019	0,163	0,008	0,010	0,064	0,021	0,082	0,260	0,098	0,140	-0,293	-0,323	1,000						
GS	0,064	-0,028	0,037	-0,048	0,137	0,033	0,211	0,024	0,040	0,060	0,043	0,067	0,328	0,181	0,084	-0,286	-0,416	0,816	1,000					
BF	-0,178	-0,123	-0,131	0,100	-0,103	-0,130	-0,188	-0,055	0,013	-0,017	0,019	-0,010	-0,327	-0,418	0,822	0,717	0,729	-0,057	-0,140	1,000				
MF	-0,059	-0,044	-0,064	-0,004	-0,056	-0,068	0,111	-0,096	-0,054	-0,087	-0,065	-0,099	-0,274	-0,671	0,486	0,510	0,572	-0,144	-0,166	0,465	1,000			
TF	-0,154	-0,102	-0,116	0,049	-0,119	-0,093	-0,213	-0,146	0,040	0,078	0,055	0,090	-0,353	-0,354	0,656	0,528	0,627	-0,066	-0,211	0,606	0,395	1,000		
IF	-0,179	-0,100	-0,121	0,124	-0,139	-0,094	-0,287	0,015	0,037	0,013	0,049	0,017	-0,196	-0,185	0,750	0,686	0,637	-0,154	-0,202	0,647	0,268	0,528	1,000	
FF	-0,224	-0,123	-0,155	0,202	-0,097	-0,115	-0,447	0,123	0,042	0,031	0,048	0,026	-0,150	-0,110	0,756	0,662	0,632	-0,172	-0,182	0,598	0,158	0,468	0,691	1,000

Table 5: Variance decomposition

We compute the Type III partial sum of squares and then normalize the results by forcing the sum across all effects to equal one, in order to make results easier to interpret. Panel a) reports the results of the variance decomposition for market debt ratios using One-Way Anova, grouping firms according to different characteristics. *Firm* indicates that observations are grouped by firms, *Country* that observations are grouped by the country of incorporation, *Year* by the year in which observations are taken, and *Industry* by the industry in which the firm operates, using the Fama-French 49-industries classification.

Panel b) reports the results for an Ancova analysis of covariance for market debt ratios. *Industry* in Column (1) is a categorical variable indicating the industry in which the firm operates; in Column (2)-(17), *industry* is instead the annual mean debt ratio in the industry in which the firm operates. *PR* stands for Property Rights, *FfC* for Freedom from Corruption, *FFT* for Fiscal Freedom, *GS* for freedom from Government Spending, *BF* for Business Freedom, *MF* for Monetary Freedom, *TF* for Trade Freedom, *IF* for Investment Freedom and *FF* for Financial Freedom.

Panel a)	**Firm**	**Country**	**Year**	**Industry**
Between groups	69,05%	8,80%	1,74%	11,42%
Within groups	30,95%	91,20%	98,26%	88,58%

Panel b)

Variable	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**	**(11)**	**(12)**	**(13)**	**(14)**	**(15)**	**(16)**	**(17)**
Country	35,81%	38,08%			21,20%			19,44%			13,95%			10,76%	18,40%		
Industry	50,52%	60,48%		31,98%	13,25%		24,73%	13,98%		22,76%	14,90%		22,12%	15,24%	76,41%	85,87%	
Year	13,67%	1,44%			3,46%			3,44%			3,80%			2,86%	1,08%		
Profitability			9,28%	11,09%	14,26%	9,64%	11,98%	13,75%	11,79%	14,02%	14,57%	12,58%	14,73%	15,12%			
Growth			39,56%	27,79%	20,33%	31,95%	26,30%	20,86%	29,14%	24,22%	22,26%	29,90%	24,87%	23,11%			
Tangible			29,31%	18,28%	16,34%	26,98%	18,74%	16,47%	26,00%	18,27%	17,53%	25,51%	18,11%	18,44%			
Size			8,94%	5,35%	6,07%	8,65%	5,53%	5,72%	9,47%	6,22%	6,12%	8,55%	5,56%	6,45%			
Inventories			12,91%	5,50%	5,08%	11,36%	5,65%	5,09%	9,90%	4,91%	5,46%	10,40%	5,27%	5,87%			
Inflation						2,56%	1,92%	0,17%	0,44%	0,30%	0,17%	0,87%	0,68%	0,16%	0,05%	0,21%	1,80%
Gdp						2,08%	1,06%	0,32%	0,74%	0,27%	0,26%	0,10%	0,01%	0,42%	0,68%	0,11%	0,00%
GFCIa						0,82%	0,02%	0,03%	0,91%	0,00%	0,03%	2,06%	0,20%	0,02%	0,11%	0,18%	6,49%
IFO						5,96%	4,08%	0,72%	3,63%	2,42%	0,77%	1,26%	0,86%	0,42%	1,58%	2,41%	19,23%
Heritage									7,98%	6,60%	0,17%						
PR												1,93%	1,39%	0,54%	0,60%	1,55%	12,70%
FfC												2,01%	1,58%	0,07%	0,09%	1,73%	13,44%
FF												0,53%	0,60%	0,16%	0,34%	1,25%	5,58%
GS												0,96%	1,08%	0,03%	0,05%	1,14%	4,44%
BF												0,17%	0,19%	0,21%	0,35%	0,52%	2,65%
MF												0,40%	0,46%	0,09%	0,22%	0,78%	3,51%
TF												0,89%	1,07%	0,02%	0,02%	1,76%	6,79%
IF												0,05%	0,01%	0,02%	0,01%	0,06%	1,12%
FF												1,83%	1,22%	0,00%	0,00%	2,43%	22,26%
Adj r-sq	18,20%	18,51%	19,55%	24,64%	28,64%	21,77%	25,61%	29,06%	23,15%	26,61%	29,08%	24,13%	27,35%	29,26%	19,32%	17,45%	8,47%

Table 6: Variance decomposition between firm and country-level determinants

We compute the Type III partial sum of squares and then normalize the results by forcing the sum across all effects to equal one, in order to make results easier to interpret. Part *(A)* of the table reports the percentage of the explained sum of squares captured by the corresponding variable (or interaction between variables) for market debt ratios. The first column represents the direct effect of macroeconomic and institutional factors; the first line reports the direct effect for each firm-level factor, and the remaining rows the interactions between firm- and country-level variables. The last column reports the total (direct and indirect) effect for each country-level variable, with the exception of the first row, where the sum of all firm-level direct effects is indicated. Part *(B)* reports the total effect on market debt ratios for each firm-level variable, as the sum of the direct effect and each interaction with country-level variables. Part *(C)* summarizes our results for market debt ratios, indicating the sum of all firm-level direct effects, and then the sum of all (direct, indirect and total) effects of macroeconomic and institutional variables. The adjusted R-squared for this model is 29.02%.

		Profitability	**Growth**	**Tangible**	**Size**	**Inventories**	**Industry**	**Total**
(A)		0,76%	1,56%	2,56%	0,22%	0,07%	1,27%	6,43%
Inflation	2,14%	1,08%	0,47%	1,02%	0,02%	0,03%	0,85%	5,62%
Gdp	0,20%	0,01%	0,13%	0,01%	0,86%	0,05%	0,02%	1,29%
GFCIa	2,31%	1,54%	0,07%	0,00%	0,54%	0,34%	4,38%	9,18%
IFO	0,70%	2,13%	1,59%	3,13%	0,31%	1,73%	0,66%	10,23%
PR	1,36%	0,12%	0,30%	2,99%	0,54%	0,13%	1,06%	6,50%
FfC	0,05%	1,66%	2,08%	0,04%	1,94%	0,52%	0,41%	6,69%
FFT	0,96%	0,07%	0,46%	0,06%	4,05%	0,16%	1,42%	7,18%
GS	2,62%	0,01%	1,51%	0,00%	2,96%	0,03%	0,59%	7,72%
BF	0,52%	0,21%	0,22%	2,17%	0,22%	0,24%	0,48%	4,05%
MF	0,00%	1,16%	0,00%	0,01%	0,61%	2,62%	0,47%	4,87%
TF	0,53%	0,00%	0,02%	0,69%	1,99%	0,07%	0,78%	4,09%
IF	0,37%	1,35%	0,12%	0,52%	0,83%	1,09%	0,08%	4,35%
FF	0,31%	2,27%	0,24%	10,14%	0,13%	6,43%	2,30%	21,80%
(B)	**Macroeconomic**	4,76%	2,26%	4,16%	1,73%	2,15%	5,91%	20,97%
	Institutional	6,85%	4,94%	16,62%	13,26%	11,29%	7,58%	60,54%
	Total	11,61%	7,20%	20,78%	14,99%	13,44%	13,49%	81,51%

(C)	**Firm level**	6,43%		
	Country level	**Direct**	**Indirect**	**Total**
Macroeconomic		5,35%	20,97%	26,32%
Institutional		6,71%	60,54%	67,25%
Total		12,06%	81,51%	93,57%

Table 7: The basic partial adjustment model of leverage

Speeds of adjustment estimated using a two-step procedure as in Hovakimian and Li (2011), with target leverage defined only as a function of firm-level characteristics. Leverage is measured using market debt ratios.
Row (A) contains estimates of Equation (3), which may suffer from mean-reversion bias; row (B) contains estimates of Equation (4), where we correct for the potential bias induced by mechanic mean reversion of leverage ratios. *HT* indicates Historical Targets, or targets estimated only using past information; *IST* indicates In-Sample Targets, estimated using information from the entire sample period, and *IST-fe* indicates In-Sample Targets, obtained including fixed effects in calculating the fitted values from the whole-sample fixed-effect regression. For the three estimates of target leverage, we also generate censored values where all negative observations are censored at zero. There are no fitted values from the first-step regression greater than one, so we do not need to censor at the upper bound of one. Statistical significance at the 1%, 5% and 10% level is indicated as usual with ***, **, *, respectively.

Speed of adjustment		***Censored***			***Uncensored***	
	HT	**IST**	**IST-fe**	**HT**	**IST**	**IST-fe**
	(1)	(2)	(3)	(4)	(5)	(6)
(A)	0,1394***	0,1443***	0,5304***	0,1393***	0,1443***	0,5257***
(B)	0,0898**	0,0956**	0,5424***	0,0895**	0,0952**	0,5314***

Table 8: The estimation of optimal debt ratios

Target leverage regressions on the full international sample. The estimates are obtained with panel firm fixed effects. Leverage is measured using market debt ratios. Part *(a)* reports coefficient estimates for various formulations of the basic model. Statistical significance at 1%, 5% and 10% level marked with ***, ** and *, respectively. Part *(b)* reports a dominance analysis for the various estimates. Due to the extremely large number of possible combinations, which would require to estimate 524.288 individual regressions, Column *4* reports standardized weights only for aggregate sets of variables (firm-level, macroeconomic and national institutions indicators) rather than for individual variables.

Part (a)	**1**	**2**	**3**	**4**
Profitability	-0,1420***	-0,1408***	-0,1345***	-0,1337***
Growth	-0,0218***	-0,0219***	-0,0197***	-0,0192***
Tangible	0,1537***	0,1590***	0,1554***	0,1579***
Size	0,0273***	0,0265***	0,0266***	0,0261***
Inventories		0,0870***	0,0880***	0,0843***
Industry			0,2265***	-0,0429***
Inflation				0,2772***
Gdp				-0,0003
Ifo				-0,0094***
GFCIa				0,0077***
PR				0,0024***
FfC				-0,0016***
FFT				0,0006***
GS				0,0006***
BF				-0,0008***
MF				0,0002***
TF				-0,0019***
IF				0,0003***
FF				0,0000
Cons.				0,1868***

Part (b): Standardized weights				
Profitability	26,55%	26,02%	22,95%	
Growth	35,37%	34,88%	29,38%	
Tangible	18,25%	18,54%	16,84%	
Size	19,83%	18,89%	17,69%	
Inventories		1,67%	1,59%	
Industry			11,56%	
Firm-level variables				50,67%
Macroeconomic indicators				36,69%
National institutions				12,64%
Fit statistic	5,79%	5,87%	6,27%	10,93%

Table 9: The estimation of optimal debt ratios with interaction effects

Target leverage regressions on the full international sample, with interaction effects between firm- and country-level variables. Leverage is measured using market debt ratios. The first column reports the intercept of the regression in the first row, and the coefficients for country-level variables in the following lines. the remaining columns report the coefficient of each firm-level variable in the first row, and the coefficient for the interaction between firm and country-level variables in the following rows. The estimates are obtained with panel firm fixed effects. Coefficient estimates significantly different from zero at 1%, 5% and 10% level are marked with ***, **, and *, respectively.

	Const.	**Profitability**	**Growth**	**Tangible**	**Size**	**Inventories**	**Industry**
	0,1723***	-0,2929***	-0,0581***	0,3583***	0,0052	-0,2577***	0,6695***
Inflation	0,8536***	-0,7110***	-0,0247**	-0,5742***	0,0150**	-0,1329	-1,0744***
Gdp	-0,0054***	-0,0019*	0,0005***	-0,0027***	0,0007***	-0,0021	0,0050***
Ifo	0,0097***	0,0141***	0,0021***	-0,0126***	-0,0010***	-0,0072***	-0,0332***
GFCIa	0,0133***	0,0081***	-0,0001	0,0004	0,0009***	0,0092***	-0,0426***
PR	-0,0003	-0,0003	0,0000	0,0024***	0,0002***	0,0015***	0,0005
FfC	-0,0021***	0,0032***	0,0004***	0,0003	0,0000	0,0029***	-0,0014**
FFT	0,0005	-0,0016***	-0,0001**	-0,0006**	-0,0001***	-0,0001	0,0036***
GS	0,0007***	0,0013***	0,0001***	0,0019***	0,0000	0,0018***	-0,0046***
BF	0,0013***	-0,0006*	-0,0001	-0,0027***	0,0000*	-0,0020***	-0,0018***
MF	-0,0029***	-0,0014***	-0,0001	-0,0003	0,0003***	0,0042***	0,0020**
TF	-0,0010***	-0,0018***	0,0000	-0,0007**	0,0003***	0,0002	-0,0092***
IF	0,0010***	0,0020***	0,0000	0,0009***	-0,0001***	-0,0011***	-0,0023***
FF	0,0011***	0,0011***	0,0001**	-0,0024***	-0,0003***	-0,0023***	0,0066***

Table 10: The estimated Speed of Adjustment (SOA) from the two-step model

Parts (1) and (3) use fitted values from estimates including only firm-level variables (profitability, growth, tangible, size, inventories and mean industry debt ratio) in the target-leverage regression, while (2) and (4) rely on the full model with firm and country-level variables and their interactions. In all the regressions, leverage is measured using market debt ratios.

HT indicates that rolling fixed effects panel regressions are used in order to obtain historical targets for leverage ratios. *IST* indicates that fitted values from the full-sample fixed effects panel regression are used to obtain in-sample estimated targets. *ISTfep* indicates that the same regression from *IST* is used, but with the inclusion of fixed effects in generating fitted values as a proxy for target leverage.

Parts (1) and (2) use raw fitted values as target estimates, while Parts (3) and (4) use censored fitted values, where negative values of target leverage are replaced with zero and values above one with one, in order to reflect the bounded nature of the actual debt ratio.

Column (A) (*No M.R. correction*) displays the estimated SOAs obtained from the regression of Equation (3), which does not correct for mean reversion, while Column (B) (*M.R. corrected*) reports results for Equation (4) which corrects for the mean reversion bias. All estimates are obtained using the Fama-MacBeth procedure. Coefficient estimates significantly different from zero at 1%, 5%, and 10% level are marked with ***, **, and *, respectively.

Target leverage definition			**No M.R. correction (A)**	**M.R. corrected (B)**
Uncensored targets				
(1)	**HT**	**Firm**	14,63%***	10,18%***
	IST		15,04%***	11,51%***
	ISTfep		14,10%***	9,18%***
(2)	**HT**	**Firm-country**	14,51%***	9,88%***
	IST		14,90%***	9,92%***
	ISTfep		52,13%***	52,30%***
Censored targets				
(3)	**HT**	**Firm**	14,64%***	10,29%***
	IST		15,04%***	11,60%***
	ISTfep		14,10%***	9,23%***
(4)	**HT**	**Firm-country**	14,52%***	9,95%***
	IST		14,91%***	10,03%***
	ISTfep		52,74%***	53,75%***

Table 11: The estimates of asymmetric speeds of adjustment as a function of deviations from target, financial slack, and credit risk

Estimates are obtained using the Fama-MacBeth method. *No M.R.C.* indicates that the estimate is obtained using Equation (6), which does not adjust for mean reversion bias; *M.R.C.* indicates that the estimate is from a regression of Equation (7), which corrects for mean reversion. Target leverage is measured using historical targets and with market debt ratios. *Below target* indicates that the firm was below target leverage at the end of the previous period (year), *Above target* that the debt ratio was instead greater than the optimal leverage at the end of the previous period. In Panel b), *deficit* indicates that the firm capital expenditure in the year is greater than internal funds, *surplus* that the firm internal funds exceed capital expenditure. In Panel c), *Rating* equal to 0 corresponds to the sub-sample of *investment grade* firms, 1 to the *risky* group and 2 to the *junk* debt group. We only report mean reversion corrected estimates for this last version of the adjustment model. Coefficient estimates significantly different from zero at 1%, 5%, and 10% level are marked with ***, **, and *, respectively.

	Below target		**Above target**	
Panel a)				
No M.R.C.	0,0137		0,2424***	
M.R.C.	-0,0098		0,2224***	
Panel b)				
No M.R.C.				
Deficit	0,1446***		0,3780***	
Surplus	0,0339		0,2073***	
M.R.C.				
Deficit	0,2122***		0,4694***	
Surplus	-0,0069***		0,1605**	
Panel c)				
"Rating"	**Deficit**	**Surplus**	**Deficit**	**Surplus**
0	0,1062***	-0,0069	0,2844**	0,1852**
1	0,2391*	0,0422	0,3002**	0,1283*
2	0,2606***	0,0340**	0,4948***	0,1919***

Table 12: Asymmetric adjustment under different market conditions

In *Panel (a)* we use the GFCIa financial conditions index to divide our sample in three subgroups based on the bottom, middle and top quantile; in *Panel (b)* we use the GDP growth rate, with quantiles calculated on the global sample. In Panels c and d we use the IFO index, with quantiles calculated on the overall sample and country-by-country respectively. All estimates are obtained using the Fama-MacBeth method. Leverage is measured using market debt ratios. Coefficient estimates significantly different from zero at 1%, 5%, and 10% level are marked with ***, **, and *, respectively.

	Below target		Above target			Below target		Above target	
Rating	**Surplus**	**Deficit**	**Surplus**	**Deficit**	**Rating**	**Surplus**	**Deficit**	**Surplus**	**Deficit**
Panel a)					***Panel b)***				
Hot market					**Expansion**				
0	0,0184	0,2173	0,1748**	0,4126*	**0**	-0,0147	0,1123*	0,2138	0,3234**
1	0,0059	0,5387***	0,4319*	0,0489	**1**	-0,0911	0,4908**	0,1404	0,1647
2	0,0264	0,3181***	0,1941***	0,5257***	**2**	0,0237	0,1276	0,2563***	0,4185***
Normal market					**Normal**				
0	-0,0110	0,1667	0,1434	0,2097**	**0**	0,0031	0,1153**	0,2308**	0,1880*
1	-0,0107	0,2149	0,1691	-0,0605	**1**	0,1555	-0,6128	0,1182	-0,0783
2	0,0449	0,2551***	0,1059*	0,4528***	**2**	0,0385***	0,2908***	0,2473***	0,5453***
Cold market					**Recession**				
0	-0,0080	0,0845	0,2474	0,1276	**0**	-0,0153	-0,1179	0,0753	0,0336
1	0,0777	0,1496	0,1741	0,5124**	**1**	0,0585	8,7300	0,1536*	0,1338
2	-0,0047	0,3346***	0,2192**	0,5494***	**2**	-0,0407	-0,0368	0,0662*	0,3914***
Panel c)					***Panel d)***				
Positive					**Positive**				
0	-0,0057	0,1482*	0,3060**	0,3805***	**0**	-0,0137	-0,8187	0,3035**	0,2063
1	0,4895	0,2043	-0,4985	0,3460	**1**	-3,5942	0,5601***	0,1310	-0,0147
2	0,0923***	0,1016	0,2270***	0,5215***	**2**	0,0319	0,2585***	0,2542***	0,4086***
Neutral					**Neutral**				
0	-0,0011	0,0481	0,1897**	0,2624**	**0**	-0,0106	0,1083	0,2281**	0,2885*
1	-0,1693*	0,0694	0,0561	0,6307**	**1**	0,0362	-1,6838*	0,1408	0,1206
2	0,0458**	0,2967***	0,2112***	0,4600***	**2**	0,0558**	0,2056***	0,2075***	0,4975***
Negative					**Negative**				
0	0,0053	0,0579	0,1301	0,0815	**0**	-0,0051	0,0264	0,1238	0,1212
1	0,2089	0,8149	-0,0385	0,7294**	**1**	0,1665*	0,5066	-0,1471	0,5096*
2	0,0006	0,1831**	0,1307**	0,3098***	**2**	-0,0062	0,1898**	0,1981***	0,4680***

Table 13: Speed of adjustment by groups defined using the Heritage Index, and its components

All estimates are obtained using the Fama-MacBeth procedure. Leverage is measured using market debt ratios. Panel a) reports results for sub-groups defined using the Heritage Index. Group *1* includes firms incorporated in countries in the lowest 33% quantile of the Heritage index distribution, corresponding to countries with the least pro-market institutions, while group *3* contains firms incorporated in countries positioned in the top 33% quantile of the Heritage index, with institutions that are the most pro-market. Panel b) reports results for each of the individual components of the Heritage Index. Group *1* includes countries with the least pro-market institutions with respect to the corresponding dimension of economic freedom, while group *3* includes countries with the most pro-market institutions. In both panels, rows labelled with 0, 1, and 2 indicate that the speed of adjustment refer to firms in the group with low, medium and high credit risk, respectively. *Below* and *Above* indicate groups of firms below and above target respectively, while *Deficit* and *Surplus* denote groups of firms with financial deficits and surpluses. Coefficient estimates significantly different from zero at 1%, 5%, and 10% level are marked with ***, **, and *, respectively.

	Below		**Above**		**Below**		**Above**		**Below**		**Above**	
	Deficit	**Surplus**	**Deficit**	**Surplus**	**Deficit**	**Surplus**	**Deficit**	**Surplus**	**Deficit**	**Surplus**	**Deficit**	**Surplus**
Panel a)												
	HERITAGE=1				**HERITAGE=2**				**HERITAGE=3**			
0	0.0233	-0.0234	0.327**	0.216**	0.144***	0.0144	0.243**	0.164**	0.117**	0.00275	0.121	0.221**
1	-0.337	-0.107	0.377*	0.183***	2.373	0.534	0.333	0.119	278.6	-0.0546	0.317	-0.0192
2	0.0799	0.0124	0.326***	0.158**	0.322***	0.00512	0.503***	0.200***	0.234***	0.0610**	0.553***	0.193***
Panel b)												
	FINANCIAL=1				**PROPERTY=1**				**INVESTMENT=1**			
0	0.0146	-0.0247	0.260**	0.134	0.0287	-0.0145	0.311***	0.189*	0.103**	-0.0291*	0.335***	0.164**
1	-1.395	0.00747	0.180	0.105	-0.0313	-0.121	0.658	0.0846	-0.220	-0.197*	0.378*	0.208***
2	0.0871*	-0.00366	0.306***	0.156**	0.0718	0.00355	0.301***	0.131**	0.188***	-0.00757	0.414***	0.149***
	FINANCIAL=2				**PROPERTY=2**				**INVESTMENT=2**			
0	0.0530	-0.00165	0.374***	0.240**	0.103***	0.00544	0.169*	0.201***	0.107***	0.0198	0.287**	0.253**
1	0.465	0.172	-1.132	-0.0325	0.456	0.0529	0.0897	0.125	0.683***	0.188	0.439	0.0166
2	0.230***	0.0165	0.446***	0.152***	0.241***	0.0320**	0.549***	0.223***	0.175***	0.0594***	0.450***	0.258***
	FINANCIAL=3				**PROPERTY=3**				**INVESTMENT=3**			
0	0.147**	0.0131	0.135	0.227**	0.232	0.179	0.629	-0.0840	0.176**	-0.0141	0.0269	0.219**
1	0.132	0.0210	-0.109	0.176	n/a	n/a	n/a	0.473	0.480	-0.417	1.347	0.148
2	0.220***	0.0730***	0.591***	0.217***	-0.122	-0.489	0.825*	0.297	0.213***	0.0495*	0.564***	0.163**
	BUSINESS=1				**TRADE=1**				**MONETARY=1**			
0	0.0377	-0.00308	0.307**	0.223**	0.149***	0.0192	0.354***	0.273**	0.0821	0.0133	0.331**	0.233**
1	-0.162	-0.0607	0.272	0.189**	0.185	-0.0858	0.415**	0.190**	-0.172	0.0724	1.826*	0.141
2	0.105*	0.0475*	0.363***	0.194***	0.155**	0.0629***	0.425***	0.294***	0.199**	-0.0341	0.392***	0.128*
	BUSINESS=2				**TRADE=2**				**MONETARY=2**			
0	0.104*	-0.000953	0.286**	0.235***	-0.0361	-0.0177	0.0588	0.0888	0.180***	0.0126	0.181	0.198*
1	0.686	0.0362	0.0406	-0.00124	1.122*	0.0313	-0.298	0.0598	-0.204	-0.291	-0.109	0.214
2	0.168***	-0.0121	0.360***	0.168***	0.120	-0.0335**	0.426***	0.0909***	0.220***	0.0783***	0.477***	0.255***
	BUSINESS=3				**TRADE=3**				**MONETARY=3**			
0	0.212*	-0.0348	0.136	0.225***	0.205***	-0.0346	0.157	0.200*	0.0923	-0.0286*	0.255*	0.132**
1	0.442	-0.159	0.588*	0.636*	0.221	-0.340	1.786	0.647*	1.514	0.133	0.209	0.120
2	0.214*	0.0227	0.760***	0.255***	0.255***	0.0457	0.607***	0.255***	0.172*	-0.0446	0.589***	0.144***
	FISCAL=1				**CORRUPTION=1**				**SPENDING=1**			
0	0.167***	0.0142	0.195**	0.167*	0.0461	0.00539	0.329**	0.251**	0.0577*	-0.00763	0.243**	0.178**
1	-4.314	0.0367	-0.354	0.139	0.0309	-0.276	0.359*	0.136**	0.384	0.166	-0.0244	0.262***
2	0.225***	0.0545***	0.628***	0.269***	0.0384	-0.0302	0.341***	0.168**	0.234***	0.0150	0.536***	0.227***
	FISCAL=2				**CORRUPTION=2**				**SPENDING=2**			
0	0.0736	0.00257	0.258*	0.197*	-0.106**	-0.00555	0.0285	0.159*	0.152***	0.0181*	0.201*	0.255***
1	0.216	-0.00799	1,058	0.0748	-0.407	0.134**	0.0492	0.108	0.685***	0.0655	0.525	0.0433
2	0.159**	-0.0223	0.465***	0.0976	0.174***	-0.0168	0.389***	0.135***	0.283***	0.0536***	0.566***	0.184***
	FISCAL=3				**CORRUPTION=3**				**SPENDING=3**			
0	0.0361	-0.0156	0.333**	0.245**	0.206***	8.05e-05	0.233**	0.149**	0.00180	-0.0104	0.344**	0.259**
1	0.187	0.552	0.298	0.168	0.0295	0.00811	-0.103	0.164	0.242	-0.445	0.481**	0.115
2	0.215***	0.0173	0.531***	0.282***	0.236***	0.0607***	0.573***	0.204***	0.0994	-0.0146	0.456***	0.282***

Table 14: Asymmetric speed of adjustment as a function of firm, macroeconomic, and institutional variables

All estimates are obtained using the Fama-MacBeth procedure. Leverage is measured using market debt ratios. Group 1 is defined as the bottom 33% of the distribution of the Heritage Index; it therefore includes firms based in countries with less market-friendly institutions. Group 2 is the middle 33% and Group 3 is the top 33%, or that of firms in more pro-market countries. *Hot*, *Normal* and *Cold* markets are defined according to the value of the GFCIa index: hot markets have smaller values of the index, indicating better financial market conditions, while cold markets have bigger values, corresponding to periods of financial tensions. *Rating* measures the credit risk of the company determined with the Ohlson's O-score; bigger values of rating indicate higher credit risk. In bold we highlight estimated speeds of adjustment from sub-samples with more than one thousand observations. Coefficient estimates significantly different from zero at 1%, 5%, and 10% level are marked with ***, **, and *, respectively.

	Below target		**Above target**		**Below target**		**Above target**		**Below target**		**Above target**	
Rating	**Deficit**	**Slack>0**	**Deficit**	**Surplus**	**Deficit**	**Surplus**	**Deficit**	**Surplus**	**Deficit**	**Surplus**	**Deficit**	**Surplus**
		Group 1				**Group 2**				**Group 3**		
Hot market												
0	0.221	**-0.027**	0.212	**0.118**	0.668	**0.022**	0.322*	**0.152**	0.183	**0.016**	0.439	**0.214**
1	-0.438	-0.141	0.499	0.514	0.457	1.108	0.431	0.185	1.211*	-0.141	0.298	0.200
2	-0.226	**-0.041**	**0.116**	**0.114***	0.442**	**0.062**	1.048*	**0.209**	**0.404****	**0.064***	0.808***	**0.228***
Normal market												
0	**0.028**	**-0.005**	**0.216**	**0.200****	0.243	**-0.006**	-0.0515	**0.097**	**0.264**	**0.001**	0.106	**0.228**
1	0.820	-0.113	0.501	0.010	1.217*	0.109	-0.268	0.202	0.341	0.012	-0.617	0.013
2	**0.148**	-0.107	**0.577****	**0.208***	-0.022	**0.183**	**0.438****	**0.138***	**0.351***	**0.046**	**0.235**	**0.073**
Cold market												
0	**-0.027**	**-0.029**	**0.430**	**0.089**	0.0822	**0.006**	0.068	**0.271***	**-0.169**	**0.002**	-0.023	**0.220**
1	-1.220	-0.104	0.879	0.341	5.473	0.239	0.240	0.384	0.406	0.028	0.815	0.179
2	1.657	**1.178**	**0.282**	**0.267***	0.214**	**0.049**	**0.296***	**0.091**	**0.041**	**0.018**	**0.779*****	**0.422**

Appendix A The behavior of average annual market and book debt ratios over time

Mean annual debt ratios, both when measured at market and book values, display a time pattern that appears to be affected by the business cycle. In order to further highlight the aggregate movements of debt ratios over time, we analyze how the average annual country and industry debt ratios evolve in the period 1997-2012. Figure A1 reports the mean annual market debt ratios when firms are aggregated based on the country of incorporation. Note that the average market debt ratios tend to display common short run trends across countries, although with very different magnitudes. Different patterns are observed when focusing instead on a longer horizon. A number of developing countries show a reduction of the mean market debt ratio over the sample period, while many European countries have much higher debt ratios at the end of the sample interval than at the beginning. These results may depend on a variety of factors, such as differences in the business cycle, market prices, supply-side effects, or institutional changes (such as the introduction of the Euro in some European countries), which may favor either increases or decreases in leverage. Overall, while long term trends appear to be country-specific, the short-run fluctuations around the trend seem to be affected by one or more common factors.

[Figure 1 about here.]

Figure A2 replicates the analysis using book debt ratios. We still find that yearly debt ratios tend to move together in the short run, while trends may differ significantly across countries over a longer horizon.

[Figure 2 about here.]

We also investigate these patterns by computing yearly industry mean debt ratios for each of the 46 industries in our sample[39]. Figures A3 and A4 display the evolution over time of industry yearly market and book debt ratios, respectively. Two different patterns emerge from the two figures. First, different industries display different average levels of debt. This result suggests that trade-off considerations may lead firms in different industries to adopt different leverage policies, while different firms within an industry may choose similar levels of debt. Second, industry averages appear to move together over time, possibly as a consequence of one or more underlying factors simultaneously affecting all firms in all industries. This phenomenon is more evident for market debt ratios, but it is present for book debt ratios as well.

[Figure 3 about here.]

[Figure 4 about here.]

In order to analyze this further, we run a Panel Vector Autoregression (*Panel VAR*) with debt ratios and four firm level variables (profitability, growth opportunities, firm size and tangible assets ratio) as endogenous variables, and GFCIa and GDP growth as exogenous regressors. We run the Panel VAR both with the covariates expressed in levels and in first differences. We then plot the dynamic multiplier of debt ratios with respect to GFCIa and GDP growth

[39] Recall that all firms in the banking, insurance and utilities sectors are removed from the sample, ending up with 46 of the original 49 industries.

in order to highlight the effect over time of a temporary global financial shock on mean debt ratios. The analysis is conducted both on country and industry mean (market or book) debt ratios. Table A.1 reports the results of the equation in the panel VAR estimation where the debt ratio appears as a dependent variable. We find that GFCIa is significant both when looking at country and industry mean, regardless of whether we look at market or book debt ratios, and whether we consider them in levels or first differences. When looking at country averages, the growth rate in national GDP is statistically significant with levels of the market debt ratio and the first difference of the book debt ratio, but not in the other two cases. When looking at industry averages, instead, the GDP growth rate is always statistically significant. Note that here the variable *GDP* measures the growth rate in world GDP, obtained from the World Bank data bank.

[Table A.1 about here.]

Figure A5 reports the dynamic multipliers of the various measures of debt ratios as a function of the GDP growth rate and of the GFCIa indicator. It is interesting to note how the dynamic multipliers of average debt ratios with respect to the GFCIa indicator display similar patterns regardless of whether one looks at book or market debt ratios, or using country vs. industry means. The same holds true when one focuses on first differences. When looking at the GDP growth rate, instead, patterns are somewhat different when grouping firms by country rather than by industry[40]. In particular, debt changes following a shock in GDP growth appear relatively flat when using country means, both at market and book values of leverage. When using industry means and the world GDP growth rate, instead, a shock in economic growth, ceteris paribus, produces a positive shock in leverage, which dies out only after four to five years, both when looking at market and book levels of leverage. With first differences,the effect appears significant only with market debt ratios, lasting only around a year.

[Figure 5 about here.]

Financial shocks seem to have a relatively long-lasting effect on leverage: when looking at the level of market debt ratios, a one-time shock in GFCIa produces a deviation of leverage that lasts for around 4 to 5 years, depending on whether one looks at country or industry averages. If we take the book debt ratio as a measure of leverage, the effect of a financial shock is smaller in magnitude but it still is relatively persistent. When looking at country averages, the effects of a financial shock take around 2 to 3 years to cancel out; if we instead look at industry averages, a financial shock may affect leverage for up to 5 years. Therefore global financial shocks seem to have a significant impact on firm leverage, simultaneously affecting all (or most) firms in the market. Moreover, when looking at industry means the GDP growth rate also appears to significantly affect debt ratios, indicating that firm financing decisions may depend on global levels of economic activity. As a consequence, a meaningful analysis of firms' financing decisions cannot fail to take into account macroeconomic factors as fundamental determinants of firms' behavior.

[40]Remember, however, that while GDP in country regressions measures the gdp growth rate in that country, in industry regressions it measures the world GDP growth rate measured by the World Bank. This implies that the variable GDP in the two groups of regressions does not measure the same phenomenon.

Table A.1: Panel VAR estimation

Panel Vector Autoregression of aggregate annual debt ratios on a set of firm-level variables and macroeconomic conditions, averaged by country (Part a.) or by industry group (Part b.). Column Y reports the dependent variable of the regression; *mdebt* is the market debt ratio, *bdebt* is the book debt ratio, and Δ indicates that the first difference of the corresponding variable is used, instead of the levels. Coefficient estimates significantly different from zero at the 1%, 5%, and 10% level are marked with ***, **, and *, respectively.

Y	Y_{t-1}	**profitability**	**growth**	**tangible**	**size**	**GFCIa**	**GDP**
Part a.: Country mean debt ratios							
mdebt	0,6341***	0,4056***	0,011	-0,191	0,0777**	0,0182***	,0036***
Δmdebt	-0,2152***	-0,6028***	0,0408***	0,1993	0,0006	0,0189***	-0,0004
bdebt	0,7731***	0,1733**	0,0039	-0,1768***	0,0392***	0,0041***	0,001
Δbdebt	-0,0545	-0,3511***	0,0075**	-0,5122***	0,0092	0,0055***	0,0009**
Part b.: Industry mean debt ratios							
mdebt	0,2913***	0,1848**	-0,0307***	-0,4436***	0,0679***	0,0248***	0,0143***
Δmdebt	-0,2163***	-0,4662***	-0,0078	-0,9005***	-0,0253	0,0205***	0,0069***
bdebt	0,4818***	0,0630	-0,01838***	-0,0819	0,0349***	0,0061***	0,0047***
Δ bdebt	-0,2923***	-0,2847***	-0,0191***	-0,9988***	-0,0403*	0,0047***	0,0015*

Figure A1: Yearly mean market debt ratios by country (1997-2012)

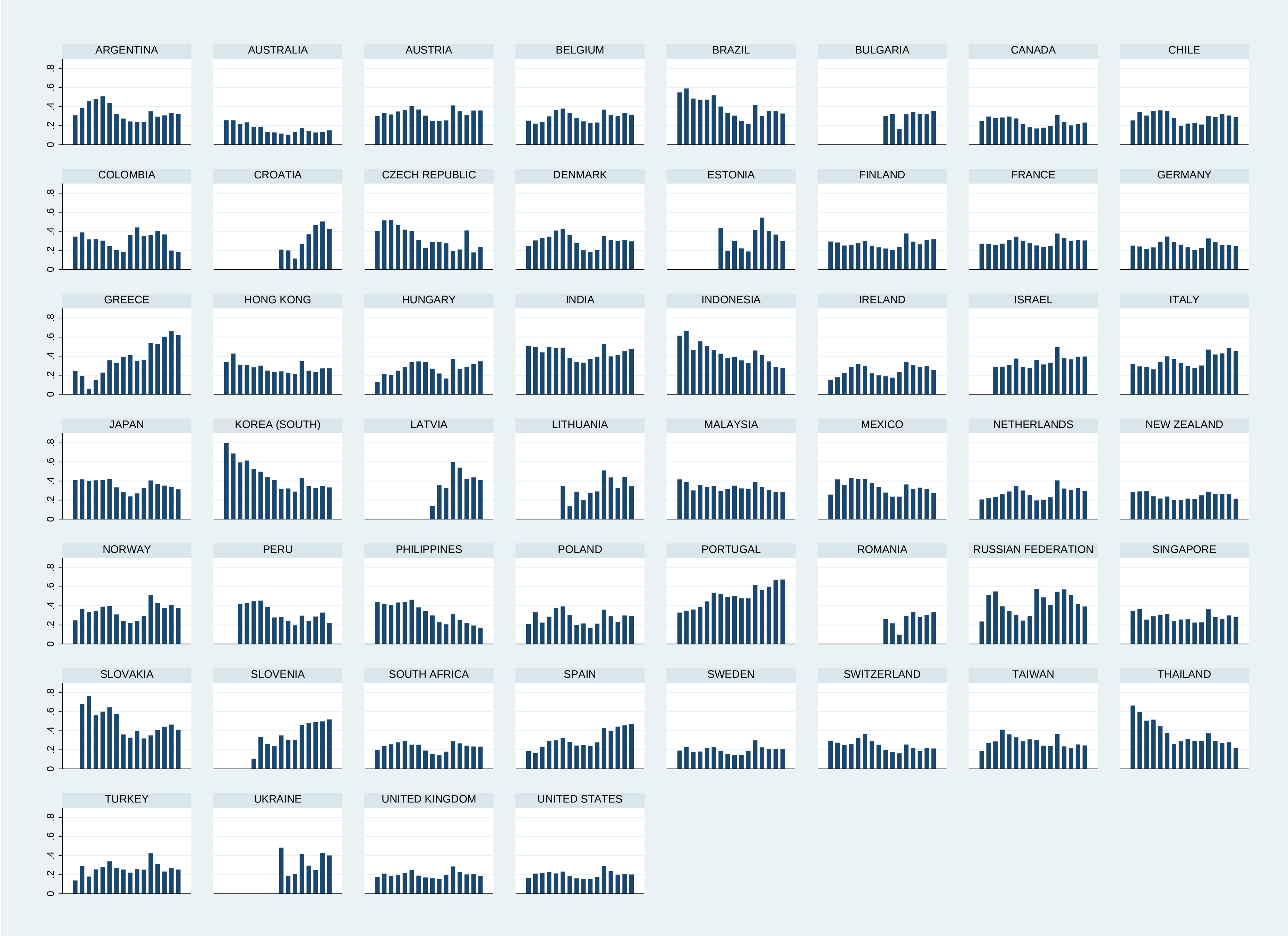


Figure A2: Yearly mean book debt ratios by country (1997-2012)

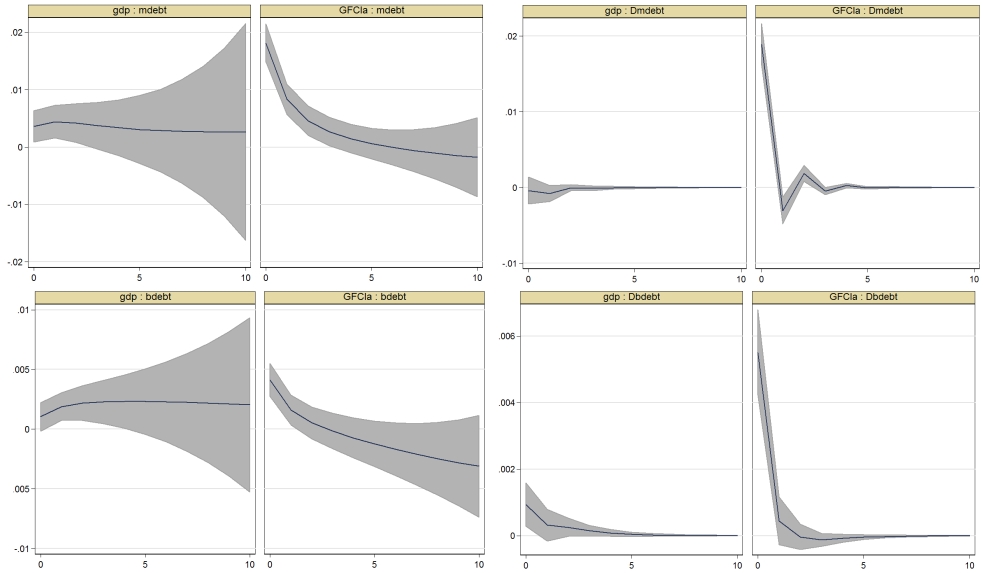
Figure A3: Yearly average market debt ratios by industry group (1997-2012)

Figure A4: Yearly average book debt ratios by industry group (1997-2012)

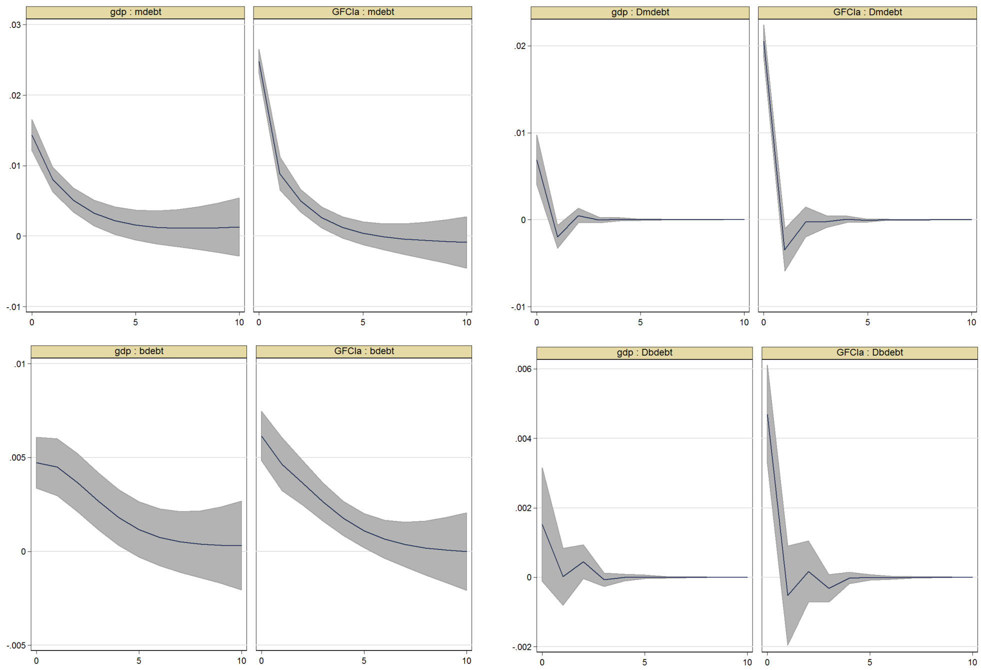
Figure A5: Debt and macroeconomic conditions: dynamic multipliers

The graphs show the estimated dynamic multipliers for market and book leverage ratios in response to a shock in *GFCIa* and *GDP*. Part a. refers to country groups, while Part b. refers to industry groups. The graphs in the four panels on the left are obtained from the levels regressions, while those on the right from the regressions using first differences of all variables. We indicate with *mdebt* the market debt ratio, and with *bdebt* the book debt ratio. *Dmdebt* and *Dbdebt* are the first difference in market and book leverage, respectively. Coefficient estimates significantly different from zero at the 1%, 5%, and 10% level are marked with ***, **, and *, respectively.

Part a.: mean debt ratios by country



Part b.: mean debt ratios by industry



Appendix B One-step regression analysis

In this Appendix, we discuss the results of the estimation of a partial adjustment model on our full dataset with a range of different estimators adopting the one-step procedure[41]. We report our results in Table B.1.

The estimated equation is the usual partial adjustment model equation found in the literature (e.g. Flannery and Rangan (2006)); i.e.

$$\frac{D_{i,t}}{A_{i,t}} = (1-\lambda)\frac{D_{i,t-1}}{A_{i,t-1}} + \lambda\beta X_{i,t-1} + \epsilon_{i,t}, \tag{B.1}$$

where X is a vector of explanatory variables determining optimal leverage, i indicates firm, t time, λ the speed of adjustment, β a vector of coefficients, and ϵ the error term. We use the same individual firms' characteristics introduced in Section 4: profitability, growth opportunities, firm size, and asset tangibility. Table B.1 summarizes our findings.

[Table B.1 about here.]

We find different speeds of adjustment depending on the chosen estimation method, ranging from a low speed of around 13% using the Fama-MacBeth method, in line with the results in Fama and French (2002), to significantly higher values obtained with fixed effects and Arellano-Bond with speeds of adjustment greater than 40%. By using the two methods that are more commonly employed in the recent literature, we find an average speed of adjustment close to 28% with the dynamic fractional panel estimator (column DFP in the table) and slightly above 28% with the Blundell-Bond 2-step system GMM estimator with predetermined explanatory variables (column BBp2s in the table). This means that firms readjust on average around 28% of their deviation from optimal leverage, which corresponds to an half-life of deviations of a bit more than two years. Based on these findings for our dataset, the mean-reversion bias obtained using the BBp2s estimator is small, compared to the estimated speed of adjustment obtained with the DFP estimator, which is specifically constructed to account for mean reversion.

For the sake of completeness, in order to make our results comparable with those in the pertinent literature, we also run all regressions separately country by country with the two most commonly used estimators. Table B.2 reports the results we obtain using Blundell-Bond System-GMM and Table B.3 the ones obtained using the Dynamic Fractional Panel method[42]. A wide range of adjustment speeds is observed across countries. Focusing on the United States of America, we find a speed of adjustment in line with the results of Flannery and Rangan (2006), and slightly higher than Lemmon et al. (2008), and Huang and Ritter (2009)[43].

[Table B.2 about here.]

[41] More specifically, we use the Fama and MacBeth (1973) estimator (FMB), panel fixed effects (FE), panel Tobit random effects (REPT), Arellano-Bond GMM, Blundell-Bond system GMM, and the dynamic fractional panel estimator (DFP). Note that we do not use the Least Squares Dummy Variable Corrected (LSDVC) estimator because the finite sample bias can be assumed to be irrelevant given our large sample size. Furthermore, strict exogeneity of the independent variables doesn't seem a realistic assumption in our framework, given the high persistence of debt ratios and the determinants of optimal leverage found in the literature. Because of the absence of strict exogeneity, when estimating GMM and System-GMM models, we assume that lagged firm-level characteristics are pre-determined with respect to leverage in the following year. We also test for a random-effect panel model, which is however rejected by the Hausman test on estimated coefficients. Results are available upon request.

[42] Results for all previously described estimation methods are available from the authors upon request.

[43] Flannery and Rangan (2006) estimate a speed of 34%, Lemmon et al. (2008) of 25%, Huang and Ritter (2009) of 23%.

[Table B.3 about here.]

In order to save on space, we avoid precisely commenting the estimated coefficients we obtain. We only point out how that – as also shown by Dang et al. (2015) – the coefficients for the determinants of target leverage are mostly inconsistent with existing cross-sectional analyses of capital structure decisions[44].

By introducing our macroeconomic and institutional factors as additional explanatory variables, our model becomes

$$\frac{D_t}{A_t} = (1-\lambda)\,\frac{D_{t-1}}{A_{t-1}} + (\lambda\beta)\,X_{t-1} + (\lambda\gamma)\,Z_t + \epsilon_{i,t} \tag{B.2}$$

where Z is a vector of macroeconomic and institutional indicators, β and γ are vectors of coefficients, and all other symbols have the same meaning as in Equation (B.1). The results of the estimation of Equation (B.2) are reported in Table B.4. We estimate the model both with the two-step Blundell-Bond estimator and with the Dynamic Fractional Panel estimator, obtaining very similar results[45].

[Table B.4 about here.]

The estimated speed of adjustment is almost identical with the two methods: 27.3% using Blundell-Bond (BB) and 27.4% using a Dynamic Fractional Panel (DFP) estimator. This implies an half-life of deviations from the optimal leverage of 2.176 and 2.162 years respectively, which means that firms on average would rebalance 50% of their deviation from target leverage in about 26 months.

All macroeconomic indicators are statistically significant and with signs that in most cases are concordant and in line with expectations in both models. The sign of the coefficient for *Inflation* is positive (and twice as large using BB rather than DFP), indicating that firms operating in the presence of higher inflation tend to use more debt, possibly because they perceive this source of financing as less expensive given that (unexpected) inflation may reduce the real cost of debt. *GFCIa* also has a positive coefficient, although much smaller than that of Inflation, suggesting that in times of financial stress, firms tend to rely more on debt. This can have two alternative explanations. First, firms may prefer debt over equity during periods of bad financial markets because they perceive debt as a cheaper source of funds than equity. Indeed, undertaking a seasoned equity offer in periods of financial crisis may be very difficult or pose tough conditions on the issuer[46]. Second, periods of financial stress typically entail also low economic growth, which makes firms less profitable and potentially unable to rely on internal funds alone for financing. In this case, firms may have an incentive to choose debt over equity, in line with the predictions of the pecking order theory. Looking at the correlation matrix in Table 4, we see that the correlation between GFCIa and GDP growth is -0.419: the lower is economic growth, the higher the financial conditions index is expected to be. However, the correlation is far from perfect, so that this interpretation may be only part of the story. The coefficient of the *Ifo* index is negative with both methods: firms tend to have lower debt when their view about economic prospects is more favorable, again indicating that they tend to rely

[44]Note, in particular, that we find a positive and statistically significant coefficient for growth opportunities, rather than the usual negative one.

[45]We discuss our findings as if this was the appropriate method for obtaining parameter estimates, and comment consequently, in order to provide a comparison with existing literature.

[46]Under this view, firms aim at timing the market, issuing the type of securities that they perceive as cheaper given the market conditions.

on debt during bad economic states and reduce it during good economic periods. Finally, the coefficient of the GDP growth rate is positive and statistically significant with both estimation methods, indicating that, ceteris paribus, firms tend to use more debt when GDP growth is higher. This may suggest that, for example, given a certain level of financial tensions, firms are more capable of issuing debt when GDP growth is higher, while they need to rely on equity if both financial and economic conditions are negative.

As for economic freedom indicators, we find almost identical results with BB and DFP. The only differences concern the Financial Freedom index, which has a positive sign with DFP and a negative one with BB (but in both cases with very small coefficients), and the coefficients related to fiscal policy – Fiscal Freedom (FFT), which is positive and statistically significant only when using BB, and Government Spending (GS), which instead is positive and statistically significant only with DFB (in both cases, the magnitude of the coefficients is very small: 0.0004 and 0.0002, respectively). This implies that, according to the former coefficient, firms use more debt in countries with more fiscal freedom, while the latter suggests that firms tend to use more debt in countries with lower government spending. The correlation bewteen FFT and GS is very high (0.82 – see the correlation matrix in Table 4). Indeed, the two indicators are likely to capture the same information. Leverage appears to be higher in countries with more fiscal freedom and less government spending, contrary to what we might expect from the traditional trade off theory. Two things are worth noticing. First, globalized economies are more and more interconnected, and firms may undertake tax arbitrage policies in order to escape an higher tax burden in their country to take benefit of lower taxation in other countries, so that the level of taxation in the home country may not be the best proxy for the fiscal policy to which the company is subject to, and the magnitude of the coefficients show that the impact of these two institutional variables is very small. Second, as shown in Graham et al. (2014), government debt may act as a substitute of (or crowd out) corporate debt, so that companies operating in more fiscally conservative countries, all else being equal, may be able to issue more debt.

The two firm-level variables measuring (fixed and current) tangible assets, *tangible* and *inventories*, have the expected positive sign. The same holds true for *size*: bigger firms have more debt than smaller ones, and having tangible assets as potential collateral for debt allows for higher debt ratios. Consistently with the pecking order theory, *profitability* is negatively correlated with debt. *Growth*, instead, has a positive coefficient, rather than the negative sign that is often found in empirical cross-sectional studies (see e.g. Rajan and Zingales (1995)) and that one would expect from the trade-off theory. This result is however consistent with the results in dynamic studies of leverage, like Fama and French (2002) or Öztekin and Flannery (2012)[47].

Finally, we add interactions between firm-level and country-level variables – to see if and how macroeconomic and institutional factors affect the regressors – by estimating the model

$$\frac{D_t}{A_t} = (1-\lambda)\,\frac{D_{t-1}}{A_{t-1}} + (\lambda\beta)\,X_{t-1} + (\lambda\gamma)\,Z_t + (\lambda\delta)\,X_{t-1}Z_t + \epsilon_{i,t}, \tag{B.3}$$

[47]Note that these results may be seen as supporting a simple version of the pecking order theory. One could argue that high-growth firms, reasonably with large financing needs, end up having high debt ratios because they cannot rely on internally generated funds alone to fuel growth, and, due to their reluctance at issuing equity, rely mostly on debt as a financing instrument. An alternative interpretation could instead be a simple consequence of the market valuations of the firm: by increasing leverage, the same firm with the same book assets may increase market value simply because the value of the debt tax shield increases. This would imply that it is not an higher market-to-book ratio that causes an higher debt ratio, but rather an higher debt ratio that, all else being equal, induces the market to price the same firm higher simply because of the increase in the debt tax shield.

where all labels have the same meaning as in Equation (B.1) and (B.2). Table B.5 reports the results obtained by estimating Equation (B.3) by means of a Dynamic Fractional Panel estimator.

[Table B.5 about here.]

The results are in line with those reported above. The overall speed of adjustment is 27.61%, an almost identical value than the one reported for the model without interactions. Macroeconomic and institutional variables are statistically significant, both by themselves and when interacted with firm-level characteristics. We find that *inventories* are negatively correlated with leverage. *Size* is not statistically significant when considered alone, while it often depicts a negative coefficient when interacted with macroeconomic indicators. *Growth* still has a positive coefficient, although mitigated by the negative coefficients frequently found for the interactions with macroeconomic variables.

Table B.1: Estimates of the partial adjustment model on the whole sample

The dependent variable is market debt ratio in all regressions; all four firm-level independent variables are lagged by one period. *POLS* is pooled ordinary least squares; *FMB* the Fama-MacBeth estimator; *FE* the panel fixed effect estimator; *REPT* the Random-Effects Panel Tobit estimator; *AB1s* and *AB2s* the Arellano-Bond 1-step and 2-step estimators with exogenous independent variables respectively; *ABp1s* and *ABp2s* the Arellano-Bond 1-step and 2-step estimators with predetermined, instead of exogenous, independent variables; *BB1s* and *BB2s* the Blundell-Bond 1- and 2-step estimators with exogenous regressors; *BBp1s* and *BBp2s* the Blundell-Bond 1- and 2-step estimators with predetermined independent variables; *DFP* the Dynamic Fractional Panel estimator. *S.O.A.* is the estimated Speed of Adjustment to target leverage, obtained as one minus the estimated coefficient for the lagged dependent variable. Coefficient estimates significantly different from zero at 1%, 5%, and 10% level are marked with ***, **, and *, respectively.

	Estimation method:												
Variable	**POLS**	**FMB**	**FE**	**REPT**	**AB1s**	**AB2s**	**ABp1s**	**ABp2s**	**BB1s**	**BB2s**	**BBp1s**	**BBp2s**	**DFP**
mdebt$_{(t-1)}$	0,8532***	0,8693***	0,5497***	0,7563***	0,6091***	0,579***	0,5735***	0,5586***	0,7498***	0,7654***	0,6747***	0,7153***	0,7227***
	(0,001)	(0,015)	(0,002)	(0,002)	(0,005)	(0,011)	(0,004)	(0,008)	(0,003)	(0,007)	(0,002)	(0,006)	(0,002)
profitability	0,0001**	-0,003	-0,0264***	0,0036*	0,0794***	0,0553***	-0,0139***	-0,0255***	0,0863***	0,0666***	-0,0165***	-0,0134***	0,003
	(0)	(0,007)	(0,002)	(0,002)	(0,003)	(0,005)	(0,003)	(0,006)	(0,003)	(0,005)	(0,002)	(0,004)	(0,002)
growth	0	-0,0013*	0,0015***	-0,0007**	0,0256***	0,0185***	0,0141***	0,0139***	0,0302***	0,0239***	0,0027***	0,0042***	0,0097***
	(0)	(0,001)	(0)	(0)	(0)	(0,001)	(0,001)	(0,001)	(0)	(0,001)	(0)	(0,001)	(0)
tangible	0,0294***	0,0275***	0,0338***	0,0623***	-0,0696***	-0,0649***	0,1277***	0,1227***	-0,091***	-0,0904***	0,0854***	0,0892***	0,0165***
	(0,001)	(0,005)	(0,003)	(0,002)	(0,005)	(0,008)	(0,011)	(0,019)	(0,005)	(0,009)	(0,005)	(0,009)	(0,003)
size	0,0026***	0,0017	0,0166***	0,011***	0,0053***	0,0049***	0,074***	0,0782***	0,0068***	0,0076***	0,0223***	0,0223***	0,0168***
	(0)	(0,001)	(0)	(0)	(0,001)	(0,001)	(0,002)	(0,004)	(0,001)	(0,001)	(0,001)	(0,001)	(0)
c	0,0196***	0,0265***	0,0064*	-0,0333***	0,0687***	0,0661***	-0,4539***	-0,4678***	0,0182***	0,0002	-0,0891***	-0,107***	-0,0085***
	(0,001)	(0,006)	(0,003)	(0,002)	(0,006)	(0,011)	(0,02)	(0,03)	(0,006)	(0,01)	(0,006)	(0,009)	(0,002)
S.O.A.	0,1468	0,1307	0,4503	0,2437	0,3909	0,4210	0,4265	0,4414	0,2502	0,2346	0,3253	0,2847	0,2773

Table B.2: Blundell-Bond 2-step country by country regressions, with predetermined explanatory variables

Equation (B.1) is estimated using the Blundell-Bond System GMM estimator for each country, with the market debt ratio as dependent variable and lagged firm-level variables as pre-determined regressors. The column *mdebt* reports the estimated coefficients for the lagged dependent variable. Coefficient estimates significantly different from zero at the 1%, 5%, and 10% level are marked with ***, **, and *, respectively. The last column reports the estimated speed of adjustment (*SOA*), obtained as one minus the coefficient for the lagged dependent variable.

Country	**mdebt**	**profitability**	**growth**	**size**	**tangible**	**c**	**SOA**
Argentina	0,7522	-0,0412	0,0242	-0,0013	-0,0268	0,0938	0,2478
Australia	0,6157***	0,0015	-0,0002	0,015***	-0,0031	0,0036	0,3843
Austria	0,6844	0,0514	0,0017	0,0206	0,1023	-0,0795	0,3156
Belgium	0,5952***	-0,1117	-0,0055	0,0203**	0,0023	-0,0123	0,4048
Brazil	0,6131	-0,0899	0,0058	0,0001	0,2528	0,0584	0,3869
Bulgaria	0,4386***	-0,1609	0,0021	0,0115	0,1107	0,0763	0,5614
Canada	0,6036***	-0,028**	-0,0002	0,0203***	0,0448*	-0,0482**	0,3964
Chile	0,5876***	-0,007	0,0015	-0,0022	0,061	0,1022	0,4124
Colombia	0,6068	-0,2523	0,0123	-0,0337	-0,114	0,4192	0,3932
Croatia	0,7104**	-0,7109	0,0244	-0,0011	0,179	0,0699	0,2896
Czech Republic	0,6522	-0,038	-0,002	-0,0391	0,2823	0,3063	0,3478
Denmark	0,6856***	-0,0813	-0,0073	0,0086	0,0399	0,0446	0,3144
Estonia	-0,1975	0,0103	-0,0914	-0,0011	0,2067	0,4038	1,1975
Finland	0,6791**	-0,0848	0,0029	0,0183	0,1381	-0,0901	0,3209
France	0,6497***	-0,0684**	0,0015	0,0153***	0,0363	-0,0096	0,3503
Germany	0,7226***	-0,0358**	0,0042**	0,0235***	0,0808**	-0,116***	0,2774
Greece	0,7119***	-0,5007***	0,0023	0,0337***	-0,0306	-0,0489	0,2881
Hong Kong	0,5363***	-0,016	0,0019	0,0236***	0,1176***	-0,0617**	0,4637
Hungary	0,5326	-0,0654	0,0036	0,01	0,097	0,0237	0,4674
India	0,6157***	-0,1364***	-0,0045*	-0,008***	0,1465***	0,1852***	0,3843
Indonesia	0,7146***	-0,105**	0,0057	-0,0037	0,1423**	0,0771	0,2854
Ireland	0,6416	-0,0918	-0,0012	0,0142	0,0122	-0,0141	0,3584
Israel	0,542***	0,002	-0,0042	0,0338***	0,1088*	-0,0697	0,458
Italy	0,7314***	-0,0389	-0,0082	0,0071	-0,0294	0,0761	0,2686
Japan	0,8897***	0,0351**	0,0056***	0,036***	-0,1319***	-0,2101***	0,1103
Korea (South)	0,6496***	-0,019	0,0214***	0,037***	0,0902***	-0,1822***	0,3504
Latvia	-0,7365	14,8822	-0,8477	-2,143	2,3181	0	1,7365
Lithuania	0,551	0,0412	0,0393	0,0469	0,1482	-0,2617	0,449
Malaysia	0,678***	-0,0983***	0,0181***	0,0273***	0,0662***	-0,0881***	0,322
Mexico	0,6855***	-0,1857	0,026	-0,0194	0,137	0,2008	0,3145
Netherlands	0,5432**	-0,0118	-0,0045	0,0175	0,0892	-0,0327	0,4568
New Zealand	0,6323***	-0,0095	0,0031	0,0141	0,0047	-0,0035	0,3677
Norway	0,4345***	-0,0019	0,0008	0,0185*	0,3014***	-0,0314	0,5655
Peru	0,5354*	-0,0931	0,0083	-0,0207	0,0934	0,2275	0,4646
Philippines	0,6131***	-0,1145*	0,0053	0,0229**	0,1152	-0,0584	0,3869
Poland	0,609***	0,0329	-0,0015	0,013	-0,026	0,0322	0,391
Portugal	0,7077	-0,1134	0,029	-0,0027	-0,1661	0,2129	0,2923
Romania	0,3283	-0,3412	-0,0028	0,0286	0,1956	-0,0965	0,6717
Russian Federation	0,4146***	-0,2425	0,0129	-0,0262	-0,107	0,541**	0,5854
Singapore	0,58***	0,0403	0,0013	0,0225***	0,1661***	-0,0785**	0,42
Slovakia	0,5575*	0,194	-0,3057	0,004	-0,2323	0,4104**	0,4425
Slovenia	0,8669*	0,118	0,0267	-0,0038	-0,067	0,1025	0,1331
South Africa	0,6752***	0,0198	-0,006	-0,0008	-0,0287	0,1036***	0,3248
Spain	0,7306***	-0,1603	-0,0003	0,0269	-0,1304	-0,0737	0,2694
Sweden	0,5706***	-0,0053	-0,0025	0,0134***	-0,0163	0,0093	0,4294
Switzerland	0,6522***	-0,059*	0,0057	0,0268*	0,1186*	-0,1806*	0,3478
Taiwan	0,5533***	-0,0661**	0,0077***	0,0311***	0,1435***	-0,1412***	0,4467
Thailand	0,7962***	-0,1378***	0,0312***	0,0163*	0,0044	-0,0648	0,2038
Turkey	0,5643***	-0,0198	0,0002	0,0083	-0,0749	0,0849	0,4357
Ukraine	0,7053*	-0,5133	0,0043	0,2877**	0,9325	-2,8545*	0,2947
United Kingdom	0,6721***	-0,0061	0,0006	0,0147***	0,0068	-0,0318*	0,3279
United States	0,6759***	-0,0049	0,004***	0,0173***	0,1148***	-0,1203***	0,3241

Table B.3: Dynamic Fractional Panel country by country regressions

Equation (B.1) is estimated by means of the Dynamic Fractional Panel estimator for each country, with the market debt ratio as dependent variable. The column *mdebt* reports the estimated coefficients for the lagged dependent variable. Coefficient estimates significantly different from zero at the 1%, 5%, and 10% level are marked with ***, **, and *, respectively. The last column reports the estimated speed of adjustment (*SOA*), obtained as one minus the coefficient of the lagged dependent variable.

Country	mdebt	profit	growth	tangible	size	c	SOA
Argentina	0,8868***	0,0098	0,0366***	-0,0522	0,0152	0,0124	0,1132
Australia	0,6581***	0,0059	0,0014	0,047***	0,0156***	-0,1505***	0,3419
Austria	0,7351***	0,0983**	0,0129*	0,1185**	0,026***	-0,047	0,2649
Belgium	0,7501***	-0,0381	0,0105**	-0,0394	0,0156***	0,0461**	0,2499
Brazil	0,755***	-0,0759	0,0346***	0,1242**	0,0037	0,0166	0,2450
Bulgaria	0,5736***	-0,1895	0,0174	-0,0877	0,0247	-0,0845	0,4264
Canada	0,6192***	-0,0025	0,0045**	0,0287*	0,0164***	-0,0383***	0,3808
Chile	0,7197***	0,0694	0,0199***	0,0783**	-0,0006	-0,0004	0,2803
Colombia	0,6679***	-0,2001	0,024	-0,0473	0,0006	0,299***	0,3321
Croatia	0,7204***	-1,0117*	0,0232	0,0581	0,0314	0,5121***	0,2796
Czech Republic	0,7732***	0,1079	0,0793*	0,3294*	-0,0391	0,1302	0,2268
Denmark	0,7703***	-0,0331	0,0066	0,0385	0,0128*	0,0494**	0,2297
Estonia	0,0925	-0,4456*	0,0119	0,2843	0,1769**	0,0769	0,9075
Finland	0,8034***	-0,0052	0,0125***	0,0334	0,0357***	0,0509***	0,1966
France	0,7513***	-0,014	0,011***	-0,0133	0,022***	0,0577***	0,2487
Germany	0,7463***	-0,0092	0,0088***	0,0163	0,0246***	-0,0314**	0,2537
Greece	0,8428***	-0,3186***	0,013***	0,014	0,0414***	0,072***	0,1572
Hong Kong	0,6495***	0,0025	0,0043***	0,0632***	0,0163***	-0,031***	0,3505
Hungary	0,5531***	-0,0292	0,038***	0,0735	0,0386***	0,1195	0,4469
India	0,7822***	-0,0338*	0,0203***	-0,0147	0,0148***	0,0628***	0,2178
Indonesia	0,8004***	-0,0413	0,0212***	0,0933***	0,0089	-0,0203	0,1996
Ireland	0,747***	-0,0775*	0,0037	-0,0127	0,0093	-0,0169	0,2530
Israel	0,5853***	-0,0746**	0,0083	-0,0112	0,0338***	-0,0181	0,4147
Italy	0,8781***	0,0836***	0,0127***	-0,0346	0,0034	0,0734***	0,1219
Japan	0,8669***	0,0816***	0,0148***	-0,0758***	0,0442***	-0,0105**	0,1331
Korea (South)	0,7513***	0,0231*	0,0344***	-0,0645***	0,0013	-0,0331***	0,2487
Latvia	0,6603***	-0,6924	0,146	0,4431	0,1903	-0,9307	0,3397
Lithuania	0,8744***	0,1312	0,1502***	0,1067	0,0869*	-0,0665	0,1256
Malaysia	0,7379***	-0,0383***	0,0353***	0,029**	0,0135***	-0,057***	0,2621
Mexico	0,8184***	-0,0358	0,058***	0,0914**	0,0126	0,0999***	0,1816
Netherlands	0,6775***	0,0156	0,0049	-0,0008	0,0363***	0,0104	0,3225
New Zealand	0,6573***	0,0326	0,0069	-0,0634**	0,0141**	0,0066	0,3427
Norway	0,626***	0,0188	0,014***	0,0726*	0,0152**	0,1045***	0,3740
Peru	0,7085***	-0,0191	0,0291***	0,1539*	-0,0171	0,0764*	0,2915
Philippines	0,7525***	-0,0846**	0,0035	0,0432	0,0074	-0,0885***	0,2475
Poland	0,7429***	0,0726**	0,0188***	-0,0696	0,0246***	0,0409**	0,2571
Portugal	0,8371***	-0,0857	0,0588***	-0,1313***	0,0396***	0,0516**	0,1629
Romania	0,4568***	-0,1637	0,0187	0,4229**	0,1337**	0,2648*	0,5432
Russian Federation	0,5286***	-0,2492**	0,049***	0,0633	-0,0095	0,1803**	0,4714
Singapore	0,7032***	0,0638***	0,0166***	0,0485***	0,0198***	-0,0012	0,2968
Slovakia	0,7146***	0,3854	0,154	0,5024	-0,0128	0,3427**	0,2854
Slovenia	0,9649***	0,1342	0,0679***	0,0785	0,0419	-0,0537	0,0351
South Africa	0,7048***	0,0341*	0,0101**	-0,0667**	0,0117***	0,0976***	0,2952
Spain	0,8803***	-0,0527	0,0193***	-0,092**	0,0313***	0,0694***	0,1197
Sweden	0,6774***	0,0213	0,0044*	0,0027	0,0083**	0,0164	0,3226
Switzerland	0,7992***	0,0123	0,0144***	0,0357	0,0277***	-0,0101	0,2008
Taiwan	0,634***	-0,0293*	0,0247***	0,0491***	0,0302***	-0,061***	0,3660
Thailand	0,8959***	-0,0186	0,0543***	-0,0348	0,0074	-0,0414***	0,1041
Turkey	0,6495***	0,0151	0,0111***	-0,0422	0,0258***	-0,0065	0,3505
Ukraine	0,5982***	-0,3517	0,0577	0,831*	0,1756**	0,5625*	0,4018
United Kingdom	0,7045***	0,0097	0,005***	-0,0002	0,0172***	0,0033	0,2955
United States	0,686***	-0,0104**	0,0062***	0,0473***	0,0115***	-0,0712***	0,3140

Table B.4: Estimation of the augmented version of the partial adjustment model

BB is the Blundell-Bond 2-step system-GMM estimator, where we assume that the lagged firm-level variables and the lagged industry mean are predetermined, while macroeconomic and institutional variables are exogenous. *DFP* is the Dynamic Fractional Panel estimator. *S.O.A.* is the speed of adjustment to target leverage, which is calculated as one minus the coefficient of the lagged debt ratio. Standard errors are in parenthesis; *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level.

	BB	**(Std. Err.)**	**DFP**	**(Std. Err.)**
Debt$_{t-1}$	0,7272***	(0,006)	0,7257***	(0,002)
Profitability	-0,0173***	(0,005)	-0,0039*	(0,002)
Growth	0,0015***	(0,001)	0,0068***	(0,000)
Size	0,0239***	(0,001)	0,0146***	(0,000)
Tangible	0,1187***	(0,008)	0,0319***	(0,003)
Inventories	0,2037***	(0,016)	0,0266***	(0,006)
Industry	-0,4793***	(0,012)	-0,539***	(0,008)
Ifo	-0,0074***	(0,000)	-0,0059***	(0,000)
Gdp	0,004***	(0,000)	0,0019***	(0,000)
Inflation	0,5499***	(0,034)	0,2749***	(0,012)
GFCIa	0,0106***	(0,000)	0,0116***	(0,000)
PR	0,0011***	(0,000)	0,0016***	(0,000)
FfC	-0,0013***	(0,000)	-0,0005***	(0,000)
FFT	0,0004***	(0,000)	-0,0001	(0,000)
GS	0,0001	(0,000)	0,0002***	(0,000)
BF	0,0015***	(0,000)	0,0004***	(0,000)
MF	-0,0018***	(0,000)	-0,0003***	(0,000)
TF	-0,003***	(0,000)	-0,0018***	(0,000)
IF	-0,0016***	(0,000)	-0,0007***	(0,000)
FF	-0,0002***	(0,000)	0,0001**	(0,000)
constant	0,3506***	(0,024)	-0,07***	(0,019)
S.O.A.	0,2728		0,2743	

Table B.5: Estimation of the augmented version of the partial adjustment model with interaction terms

The table reports results for a regression of Equation (B.3) estimated with the Dynamic Fractional Panel estimator. The first column shows coefficients for macroeconomic and institutional variables; the first row reports the coefficient for lagged leverage, firm-level variables, and the industry mean debt ratio. All other entries in the table show the coefficient of the interaction between the country-level variable in the row and the firm-level variable in the column. Coefficient estimates significantly different from zero at the 1%, 5%, and 10% level are marked with ***, **, and *, respectively.

		debt$_{t-1}$	**profitability**	**growth**	**size**	**tangible**	**inventories**	**industry**
		0,7239***	-0,0502	0,0453***	-0,0074	0,1293***	-0,2749***	-0,0691
Ifo	0,0038***		0,0029**	0,0010***	-0,0037***	-0,0004***	0,0052***	-0,0236***
Gdp	-0,0077***		-0,0063***	-0,0004**	-0,0031***	0,0013***	-0,0019	0,0052***
Inflation	0,7215***		-0,9012***	-0,0915***	-0,3306***	0,0528***	0,0710	-1,5188***
GFCIa	0,0135***		-0,0025**	-0,0004**	0,0005	0,0014***	0,0104***	-0,0435***
PR	0,0011***		-0,0004	-0,0003***	0,0014***	0,0000	0,0013***	-0,0007
FfC	-0,0008***		0,0012***	0,0001*	0,0007***	0,0001*	0,0001	-0,0015***
FFT	0,0009***		-0,0008**	0,0001	-0,0011***	0,0000	-0,0014***	-0,0009
GS	0,0006***		0,0010***	0,0001*	0,0012***	0,0000*	0,0002	-0,0022***
BF	0,0003		-0,0014***	-0,0001	-0,0010***	0,0001***	-0,0007*	0,0000
MF	-0,0029***		0,0000	-0,0004***	-0,0017***	0,0002***	0,0032***	0,0045***
TF	-0,0019***		0,0009**	0,0001**	0,0008***	0,0001***	0,0023***	-0,0052***
IF	0,0003		0,0008***	0,0001***	-0,0001	-0,0001**	-0,0007**	-0,0024***
FF	0,0012***		-0,0002	-0,0001***	-0,0007***	-0,0002***	-0,0014***	0,0044***
Intercept	-0,0207							
Speed of Adjustment:		0,2761						

Appendix C Regression analysis using book leverage ratios

In this Appendix, we replicate the regression analysis of Sections 4 and 5 by applying the two-step procedure to leverage ratios measured at book values of both equity and debt. Therefore, the debt ratio is defined as the ratio between the book value of debt divided by the sum between the book value of equity and the book value of debt. We only report the estimated speeds of adjustment for the same linear and non-linear formulations of the partial adjustment equation used in the last part of Section 4 and in Section 5. Table C.1 reports our findings for adjustment models with a pooled sample and for sub-samples assuming non-linearities determined by firm-level characteristics.

[Table C.1 about here.]

Results are consistent with those obtained relying on market debt ratios. Firms are quicker at adjusting when above rather than below target and when needing external funds to finance investments, which indicates that firms are not entirely active in rebalancing their capital structure. Credit risk also affects the adjustment process, with riskier firms rebalancing faster than those with lower risk, both when above or below target leverage, consistently with the results obtained for market leverage.

Table C.2 shows the results we obtain when also allowing for the adjustment process to be affected by changing macroeconomic conditions.

[Table C.2 about here.]

Results are somewhat different with respect to those found with market debt ratios. While it remains true that macroeconomic conditions affect the adjustment process, we find that differences between low and high credit risk firms are less pronounced than with market leverage. For example, financial conditions affect the speed of adjustment, but unlike what we observed for market leverage, we now find that in cold markets both low and high credit risk firms do not adjust leverage when above target and they are characterized by negative financial slack, while in hot markets high (low) risk firms have a high (low) speed of adjustment (the estimated speed of adjustment is 66% and statistically significant, and 9% and not statistically significant, respectively). Both in cold and in hot markets low risk firms appear to adjust faster in the presence of positive financial slack.

Finally, we run a regression where we split our sample based on bottom, medium and high quantiles of both the GFCIa index and the overall Heritage Index. Results are reported in Table C.3.

[Table C.3 about here.]

As already noted when using market debt ratios, the sample size for each sub-group is severely reduced compared to the overall sample, and this may affect the significance of the analysis, especially for the intermediate credit risk group that has the smallest number of observations in the sample. We still find that both macroeconomic conditions and the degree of economic freedom affect the dynamic adjustment process towards the optimal debt ratio. In particular, for high credit risk firms we find that they are more prone to rebalancing when they need to raise external funds, and they depict a faster adjustment towards the target during periods of better financial conditions. Above target low credit risk firms, instead, do not show a significant speed of adjustment when facing a financing deficit, regardless of market conditions. in the presence of financing surpluses, above target low credit risk firms show a slow but statistically significant speed of adjustment.

Table C.1: Book leverage, firm characteristics and adjustment speed

Panel a) reports the estimated speed of adjustment for a linear model and for an asymmetric model allowing for changing speeds of adjustment for firms above or below target. Panel b) allows for additional non-linearities as a function of positive or negative financial slack (*Slack*). Panel c) further divides the sample based on the credit risk of firms (*Rating*). All estimates are obtained using the Fama-MacBeth method. Coefficient estimates significantly different from zero at the 1%, 5%, and 10% level are marked with ***, **, and *, respectively.

Panel a)				
	Symmetric	**Above**	**Below**	
S.O.A.	0,0965***	0,2011***	0,0174	

Panel b)				
	Above		**Below**	
	Slack <0	**Slack >0**	**Slack <0**	**Slack >0**
S.O.A.	0,3172***	0,1825***	0,2489***	0,0214**

Panel c)				
	Above		**Below**	
Rating	**Slack <0**	**Slack >0**	**Slack <0**	**Slack >0**
0	0,0286	0,1413***	0,0812*	0,0281***
1	0,1842	0,179***	1,0805***	0,2081**
2	0,3819***	0,2218***	0,3775***	0,0741***

Table C.2: Macroeconomic conditions and book leverage speeds of adjustment

All estimates are obtained using the Fama-MacBeth method. Coefficient estimates significantly different from zero at the 1%, 5%, and 10% level are marked with ***, **, and *, respectively.

	Above		**Below**		**Above**		**Below**		**Above**		**Below**	
	Slack <0	**Slack >0**	**Slack <0**	**Slack >0**	**Slack <0**	**Slack >0**	**Slack <0**	**Slack >0**	**Slack <0**	**Slack >0**	**Slack <0**	**Slack >0**
Panel a: financial conditions index												
	Cold Market				*Normal market*				*Hot market*			
0	-0,133	0,187***	0,157	0,0353**	0,00587	0,119**	0,135	0,0123	0,0949	0,129***	0,0945	0,0627
1	0,178	0,208**	1,38	0,112	0,832	0,519*	0,0363	0,0829	0,322	0,147	2,518**	0,217
2	-0,0614	0,104	0,200**	0,0705	0,319***	0,139*	0,379**	0,0736	0,665***	0,337***	0,376***	0,0710**
Panel b: GDP growth rate												
	Recession				*Normal*				*Growth*			
0	-0,147	0,110***	-0,0782	0,0149	0,00592	0,111***	0,0935	0,0266**	0,113	0,167***	0,159*	0,0392*
1	0,015	0,0453	4,235	0,206	-0,0755	0,232**	0,582*	0,371	0,528*	0,214***	0,696	-1,468
2	0,274**	0,0825**	0,691	0,039	0,449***	0,218***	0,355***	0,0795**	0,18	0,250***	0,0851	0,109***
Panel c: IFO index												
	Negative				*Normal*				*Positive*			
0	0,126	0,0871*	-0,0402	0,0337*	-0,0151	0,127***	0,0933**	0,0452**	-0,0199	0,104*	0,101	0,0583***
1	0,0129	0,240***	35,95	-0,239	0,218	0,0212	-0,421	0,0031	-4,324	0,0926	2,749**	0,205
2	0,0396	0,160***	0,218	-0,0303	0,291***	0,214***	0,194***	0,0470*	0,520***	0,250***	0,222**	0,107***
Panel d: gdp growth rate (country-level quantiles)												
	Recession				*Normal*				*Growth*			
0	0,123	0,145***	0,197	0,127**	0,102*	0,162***	0,0695	0,0179	0,17	-0,084	0,161	-0,0107
1	-0,114	0,340***	1,159***	0,12	0,316	0,162*	-0,219	-2,227	0,0454	2,265	2,492*	0,809
2	0,421**	0,102	0,681	0,162**	0,346***	0,215***	0,303***	0,0845**	0,420***	0,174**	0,175	-0,00353
Panel e: IFO index (country-level quantiles)												
	Negative				*Normal*				*Positive*			
0	0,00435	0,184***	0,0970*	0,0576***	0,058	0,126***	0,0343	0,0349*	-0,0613	0,0193	-0,0236	0,0226
1	-0,318	0,292**	1,066*	-0,319	-0,0835	0,128	1,327	0,0929	0,383	0,0691	4,767	0,341**
2	0,213*	0,243***	0,286**	0,108***	0,336***	0,223***	0,260**	0,0748*	0,495***	0,164*	-0,277	0,0687***

Table C.3: Asymmetric speeds of adjustment based on institutions and macroeconomic conditions.

All estimates are obtained using the Fama-MacBeth method. Coefficient estimates significantly different from zero at the 1%, 5%, and 10% level are marked with ***, **, and *, respectively.

	Above		**Below**		**Above**		**Below**		**Above**		**Below**	
Rating	**Surplus**	**Deficit**	**Surplus**	**Deficit**	**Surplus**	**Deficit**	**Surplus**	**Deficit**	**Surplus**	**Deficit**	**Surplus**	**Deficit**
	Low market friendliness				**Medium market friendliness**				**High market friendliness**			
Hot market												
0	0.163*	0.0194	-0.0252	0.0457	0.0184	-0.261	0.0639	-0.225	0.224**	0.171	0.0955*	0.211**
1	0.277**	-0.787	-1.052	-2.225	-0.0202	-2.512	0.771	1.270	0.142	4.405	0.764	0.592
2	0.318***	0.533	-0.0195	-0.663	0.148**	0.194	-0.0776	1.112	0.487***	1.000**	0.186**	0.467**
Normal market												
0	-0.141	1.593	-0.0369	-0.453	0.0268	-1.171	-0.0111	0.0553	0.275***	0.00157	0.0600***	0.148
1	2.534	-0.185	-0.987	3.846	-0.251	-7.636	0.0769	1.438	-0.115	-2.777	0.535**	2.446
2	0.0684	0.243**	0.0269	-0.579	-0.00421	0.301	0.198	0.0688	0.343**	0.219	0.0752	0.456**
Cold market												
0	0.0775	0.161	0.0290	-0.178	0.192**	-0.0110	0.0446	-0.103	0.258***	-0.464	0.0479*	-0.00592
1	0.181	0.120	-0.321	2.054	0.0262	-0.957*	0.486*	0.909	0.757*	-0.526	0.151	0.952
2	0.141**	0.0339	0.362	-3.495	0.0809	-0.244	-0.00377	0.388	0.114	-0.145	0.126**	0.187

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