

# Developments in the Deleveraging Process of European Companies: Some Effects on the Asset Side

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#### Abstract

This **Outlook #3**<sup>1</sup>, entitled "Developments in the Deleveraging Process of European Companies: Some Effects on the Asset Side" uses BACH data to compare recent trends in non-financial corporation performance in the following eleven European economies: Austria, Belgium, the Czech Republic, France, Germany, Italy, the Netherlands, Poland, Portugal, Slovakia and Spain. In particular, indicators on the financial structure of non-financial corporations, their debt and the structure of the asset side are presented. The analysis includes an assessment of the recent situation in the countries under study and analyses the effects of the economic and financial crisis as well as the evolution of non-financial corporation financing between 2008 and 2013<sup>2</sup>. The main focus is the analysis of deleveraging effects during the financial crisis. Particular attention is given to the role of firm size and industry affiliation and to measures of dispersion.

#### Disclaimer

This analysis is based exclusively on BACH data. Therefore, the evidence provided reflects the different national samples used to calculate BACH data and might differ from other sources. More information regarding methodological limitations and national sample specificities can be found in the Annex and on the BACH website. The opinions of the authors of this document do not necessarily reflect those of the national central banks to which they belong or those of the ECCBSO.

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<sup>2</sup> However, it should be mentioned that: a) the Austrian and German data for 2013 are preliminary, and b) Czech and Slovak 2013 data have not been included in the analysis.

#### FOREWORD

The European Committee of Central Balance-Sheet Data Offices (ECCBSO) is an informal body whose members consist of experts either from the Central Balance-Sheet Data Offices belonging to or associated with the National Central Banks of the European Community, or from National Statistical Institutes.

The Bank for the Accounts of Companies Harmonized Working Group (BACH WG) is one of ECCBSO's Working Groups. It was created within the foundation of developing and improving a European statistical database: the BACH database.

The <u>BACH database</u> provides comparable aggregated data (both economic and financial) based on the annual accounts of non-financial incorporated companies from European countries. Freely available, BACH includes data from 11 countries: Austria, Belgium, Czech Republic, France, Germany, Italy, the Netherlands, Poland, Portugal, Slovakia and Spain.

We sincerely hope you can benefit from this analysis and we invite you to visit the BACH database and explore it as much as possible by making your own analysis. Do not hesitate to share your results with the BACH WG.

## **1. THE CONCEPT OF DELEVERAGING AND ITS EFFECTS**

In finance, leveraging - also known as gearing - is the practice of buying more of an asset by using borrowed funds, in the belief that the income from the asset or asset price appreciation will be more than the cost of borrowing. The more capital from outside sources the owner borrows, the less equity capital he/she needs, so any profits or losses are shared among a smaller base and are proportionately larger as a result. Financial leverage is often defined as the ratio between debt<sup>3</sup> and equity (leverage ratio), but sometimes it is defined as the ratio between debt and balance sheet total.

Basically, deleveraging refers to the reduction of the leverage ratio, or to the reduction of the percentage of the debt in the balance sheet of a company. In theory, the easiest deleveraging method at the micro-economic level is to pay off any existing debt on its balance sheet immediately - the company concentrates on repaying its loans to reduce leveraging. This can be achieved by selling assets which results in a decline in total assets. Alternatively, the company may raise capital to repay the debt or retain earnings and thus in effect replace debt with equity. In general a combination of both approaches (contraction of the balance sheet accompanied by a raise in equity) might be followed.

The structure of the balance sheet will change during the deleveraging process - and with different consequences. For instance, a decline in current assets is not the same as a decline in non-current assets. A decline in fixed assets will bring about a long-term change in the value-adding potential.

While leverage allows a borrower to acquire assets and multiply gains in good times, it also multiplies losses in bad times. To give up potential gains in good times, means lowering the risk in bad times. Thus, leverage has a positive impact when the rate of return from operating activity is higher than the cost of debt, but increases firms' vulnerability to adverse shocks. Deleveraging usually happens after a market downturn, motivated by the need to cover losses. Often lenders force borrowers to lower the leverage by demanding a higher level of collateral and/or full or partial repayment. However, a market downturn is not the sole reason for deleveraging. Precaution and the desire for independence may also lead to debt reduction.

It is frustrating and painful for companies if they have to deleverage but are unable or can only do so at high costs. These effects might be especially pronounced during and shortly after a financial crisis. Selling assets at a discount can itself lead to heavy losses which put a further strain on the available equity. Non-functional security and credit markets often make it very difficult to raise capital from the public market. The private capital market might not be an alternative: equity holders suffer from losses, firms' share prices have fallen considerably and the market expects the crisis to last long. These factors could exacerbate the difficult economic situation.

The same principles generally apply at the macro-economic level, but additional considerations must be taken into account. The deleveraging of an economy refers to the simultaneous reduction of debt levels in several sectors: corporate sector, private sector and government sector. It is normally measured as a decline of the total debt-to-GDP ratio in the national account.

Debt reduction of the corporate sector as a result of a financial crisis – in particular the financial crisis in 2008 – has significant macro-economic consequences and is often associated with severe recessions.

"Deleveraging and slower nominal growth are in many cases interacting in a vicious loop, with the latter making the deleveraging process harder and the former exacerbating the economic slowdown. Moreover, the

<sup>3</sup> Here, debt normally refers to financial debt.

global capacity to take on debt has been reduced through the combination of slower expansion in real output and lower inflation."<sup>4</sup>

This means that deleveraging is responsible for the continuing fall in the prices of both physical capital and financial assets after the initial market downturn. It is an essential component of the process that leads the economy to a recession. During a recession leverage becomes too low compared to the long run average. As a result, asset prices become too low. They do not correctly reflect the fundamental value of the assets. However, the decline in private-sector financing is desirable in some scenarios of debt overhang. It may be necessary for removing imbalances and improving firms' financial position.

Therefore, it is not surprising that some economists<sup>5</sup> demand that central banks should monitor and regulate the level of leverage in the economy, limiting it in good times and fostering higher levels in bad times.

At a global level including the corporate sector, the private sector and the government sector, "the world has not yet begun to delever and the global debt-to-GDP is still growing."<sup>6</sup> In other words, although we are seeing lower levels of debt for the corporate sectors and the private sectors in many countries, the government sector debt for these countries is still growing.

The main research questions of this study are therefore: *Can we observe deleveraging in the corporate sector on the basis of the BACH data and which factors determine the deleveraging patterns?* 

4 Buttiglione, L., Lane, P. R., Reichlin L. & Reinhart V. (2014), "Deleveraging? What Deleveraging?" Geneva Reports on the World Economy 16. International Center for Monetary and Banking Studies (ICMB), p. 2.
5 Such as John Geanakoplos, professor of Economics at Yale..
6 (Buttiglione, Lane, Reichlin & Reinhart, 2014, p. 1 f).

## 2. DATA DESCRIPTION

In order to analyse economic developments in European countries in the last few years with the goal to identifying possible deleveraging effects in these economies, suitable data are needed. The Bach database was chosen as it gives access to relatively harmonised data from the balance sheet and income statement of non-financial corporations (NFCs) from different European countries based on the respective national accounting frameworks. This enables us not only to calculate the simplified structure of financial indicators (chapter 3) which are used for analysing deleveraging effects, but also to compare developments between particular countries.<sup>7</sup>

Currently the BACH database comprises annual data from 11 European countries, namely Austria, Belgium, the Czech Republic, France, Germany, Italy, the Netherlands, Poland, Portugal, Slovakia and Spain. As it holds data from annual balance sheets and income statements, the BACH database is an adequate data source for analysing NFCs' financial situation. Currently the data cover the period from 2000 onwards<sup>8</sup> and provide a sufficient level of detail by business sector (17 NACE sections and about 80 NACE divisions) and size class (based on net turnover, allowing the users to select small, medium and large firms) for each country. Furthermore, two samples of annual data are available: a variable sample and a sliding sample. The variable sample (for each year) includes all corporations with known data for the selected year. At the same time the sliding sample (containing two years) includes all corporations for which the data are available in two consecutive years. To sum up, the BACH database offers a variety of outputs for each combination of financial year/corporations size class/business sector/sample (variable or sliding).

Regarding the range of data, in total 95 indicators are provided, covering balance sheet items (41), income statement items (22), items from the notes (3) and economic and financial ratios (29). Some key absolute values are also provided: total assets, net turnover and the gross value added, all reported in thousands of euro, plus the number of firms and the number of employees.

Balance sheet items are expressed as a percentage of total assets while income statement items and items from the notes are expressed as a percentage of net turnover. Economic and financial ratios are grouped into categories of financial characteristics and behaviours of corporations: namely "Financial structure ratios" (six indicators), "Financial and debt service ratios" (seven indicators), "Profitability ratios" (ten indicators), "Activity and technical ratios" (two indicators) and "Working capital ratios" (four indicators). All indicators are based on a harmonised template. Taking into account different national structures of the balance sheet or income statement, conversion bridges from original items in national statistics to the BACH indicators are available. This facilitates an analysis and understanding of the reasons behind differences among particular countries.

The values of balance sheet ratios, income statement ratios and items from the notes expressed as weighted means should be determined once the absolute values for total assets and net turnover have been obtained.

To allow for a deeper analysis of the developments and financial trends and behaviour in differentlysized corporations, the BACH database contains (besides the aggregate data for all non-financial corporations) the classification of non-financial corporations by size. It is based on the Commission Recommendation of 6 May 2003 (2003/361/EC); as regards turnover,<sup>9</sup> two major enterprise size

8 For some countries, data start in a different year (after 2000).

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<sup>7</sup> We also refer to Outlook #2: Financial structure and profitability of European companies (October 2014).

<sup>9</sup> In the definition of enterprise size class, the European Commission takes three variables into account: turnover, number of employees and total assets. The different types of relationships between enterprises are also considered. However, due

classes are considered: large companies with turnover higher than EUR 50 million and small and medium-sized enterprises (SMEs) with turnover lower than EUR 50 million. SMEs are further split into two parts: Small companies (turnover lower than EUR 10 million) and Medium-sized companies (turnover between EUR 10 million and EUR 50 million). All indicators are stated in terms of weighted means<sup>10</sup> and quartiles (the median as well as the first and third quartiles, which represent the underlying data distribution).

While the BACH data are a reasonable choice, we need to bear in mind certain limitations. The national data samples are not completely harmonized, in particular due to differences in the exhaustiveness and representativeness of the relevant NFC population. The statistical coverage of the corporate sector by annual data differs between countries. Great caution should be exercised regarding national samples based on subsets of corporations. In these countries the composition of the sample may change every year and the compilation of the time series can cause problems from an analyst's point of view. The year-on-year trend does not necessarily reflect economic phenomena, but may instead be a consequence of a change in the composition of the sample — "sample composition bias". On the other hand, some company segments may not be that well represented in the samples, as in the case of micro-enterprises. At the same time national data are not completely aligned with the concepts in the BACH templates. In particular, differences in national accounting practices cannot be completely eliminated. Besides, in order to harmonize data among countries, national samples include neither the newly established entities nor those that have ceased their activities during the current year, which implies additional limitations to the analysis derived from BACH data.

to limited access to the number of employees and total assets variables, as well as the lack of information about groups of corporations, the enterprise size class in BACH only considers turnover thresholds.

<sup>10</sup> The weighted mean corresponds to the ratio between the sum of the individual values underlying the concept (numerator) and the sum of the individual values (denominator), taking into account in both cases the sample values in each combination (financial year/enterprise size class/business sector/ sample).

## 3. RESULTS: SOME RECENT FEATURES OF INDEBTEDNESS OF EUROPEAN NON-FINANCIAL CORPORATIONS

The analysis of the BACH data shows that financial debt in relation to total assets varies considerably from country to country. Except for the Czech Republic, Spain and the Netherlands, there was no decline in financial debt on a nominal basis from 2008 to 2013. However, the analysis may provide different results by breaking down the analysed period, particularly with regard to Italy and Portugal. Taking all BACH countries into consideration, there has been a moderate rise in financial debt on a nominal basis over that period.

The data reveal large differences in the developments of financial debt for large firms compared to small and medium-sized firms, especially in Austria, Germany, Slovakia and Poland. However, the Austrian and German data for 2013 are preliminary. Besides, Czech and Slovak 2013 data have not been included in the analysis. For the majority of the BACH countries we can say that the increase in nominal financial debt is driven by large firms.

Calculated across all countries, the Energy sector<sup>11</sup> shows the highest increase in financial debt, and the Commerce & accommodation sector<sup>12</sup> the lowest, but all sectors experience country-specific developments.

Defining leverage as financial debt in relation to the sum of equity and financial debt is the so-called "leverage ratio".<sup>13</sup> While Austria, Belgium, the Czech Republic, France, the Netherlands, Poland and Spain have decreased their leverage ratio, Italy, Portugal and Slovakia have increased it. Germany's remained more or less constant over the entire period of observation. This ratio calculated across all BACH countries has decreased slightly over the 2008-2013 period. To be more precise, equity has increased more than financial debt, with the result that the leverage ratio has fallen. Put in a highly simplified way, debt has been replaced with equity in relative terms, that is, in regard to balance-sheet composition.

This finding is supported by analysing changes in the composition of assets and liabilities for that period. In all analysed countries, financial assets have increased – the biggest increase was in Poland. With the exceptions of the Czech Republic, Italy and Portugal, deleveraging generally did not result in a decline of non-financial fixed assets. Only in Spain has there been a fall in other assets and liabilities. The results do not allow us to identify a common behaviour pattern among countries.

Annex II collects the results and conclusions coming from each of the analysis included in this Outlook in order to provide a global view of the whole analysis.

A further caveat is that the analysis may provide different results by breaking down the analysed period into shorter time series!

An Investment-Financing Regression Model shows a clear linkage between the percentage of sectors with debt contraction and the percentage of sectors with tangible assets contraction.

Finally, a Probit Model attempts to identify the financial debt developments affecting the investment decisions.

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<sup>11</sup> NACE business sectors B, D and E (see Annex I).

<sup>12</sup> NACE business sectors G and I (see Annex I).

<sup>13</sup> The definition of the leverage ratio depends on the research question. Hence, the definition of the leverage ratio here differs from that indicated in Outlook #2.

### **3.1. RECENT DEVELOPMENTS IN DEBT: DESCRIPTIVE STATISTICS**

#### 3.1.1. IS THERE DELEVERAGING?

The analysis of deleveraging requires, as a first step, a harmonised definition of indebtedness and the quantification of the indebtedness level of each country, as shown in chart 3.1. The definition of financial debt can be found in *Annex I* - 1.

After that, the primarily approximation to deleveraging may be measured by the development of financial debt, as shown in charts 3.2, 3.3 and 3.4.

Chart 3.1 *Financial Debt: Breakdown and Relative Weight by Country*<sup>14</sup> shows the relative amount and the structure of the financial debt for sector Zc (aggregate made up of firms of total NACE<sup>15</sup> without holding companies and head offices) in the sliding sample from 2008 to 2013<sup>16</sup> for Austria, Belgium, the Czech Republic, France, Germany, Italy, the Netherlands, Poland, Portugal, Spain and Slovakia.



Financial debt in relation to total assets varies considerably among the countries under consideration. Poland shows the absolute minimum – a mere 31.1%. As for the Czech Republic, the financial debt ratio stands at 35.2%. By contrast, Portugal (60.0%), Austria (56.8%), Spain (52.2%), Italy (51.9%) and France (51.6%), have significantly higher financial debt ratios than the other countries.

It is worth mentioning that, according to the BACH database, liabilities to credit institutions and securities account for only a minor portion of the corporations' financial debt. The BACH average<sup>17</sup> of bank loans and bonds is at around 2/5 of total debt, varying slightly from country to country. The financing segment "other creditors" is made up principally of debt held within the group.

15 Statistical Classification of Economic Activities in the European Community.

<sup>14</sup> As shown in the Annex, L3 Other creditors includes both L31 Other financial creditors, and L32 Other non- financial creditors. For the purpose of analysing financial debt it would be better to use L31 instead of L3, but due to difficulties in obtaining L31 for all the countries and in order to maximize homogeneity L3 is used.

<sup>16</sup> On the basis of the sliding samples 2008-2009, 2009-2010, 2010-2011, 2011-2012 and 2012-2013 an artificial sliding sample 2008-2013 (2008 = -1, 2013 = 1) was created. For the construction of the calculated sliding sample see Annex I – 2. 17 In this Outlook, the BACH average data has been built as a weighted average by the weight of each country in terms of total liabilities according to the Financial Accounts of Non-financial Corporations figures available at EUROSTAT.

#### Do we see deleveraging in the sense of a nominal decline of financial debt?

Chart 3.2 *Financial Debt* depicts the indebtedness process of member countries for sector Zc during the period 2008-2013. This index is based on the development of nominal financial debt since 2008<sup>18</sup>.



Taking all BACH countries (BACH average) into consideration, there has been a rise in the index of financial debt of ten percentage points from 2008 to 2013 (base year 2008 is equal to 100). Except for the Czech Republic, Spain and the Netherlands, there was no decline in financial debt on a nominal basis during that period. For Poland and the Czech Republic the values in the above chart are presented in their local currency. For the Czech Republic the index of financial debt has declined to 93 since 2008, similar to the situation in Spain, a decline to 95. For the Netherlands this index has been a more or less constant 98. Italy (109), Belgium (110), France (111), Portugal (113) and Austria (115) show a modest increase in the financial debt index. For Slovakia (120) and Germany (121) the increase is a little higher. The picture in Poland is rather different: the index of financial debt rose to 133. That means that at least in terms of the evolution of financial debt, and except for the Czech Republic, Spain and Netherlands, there has not been a deleveraging process in this period.

However, the analysis provides different results by breaking down the analysed period, particularly with regard to Italy<sup>19</sup> and Portugal.

<sup>18</sup> Regarding methodology we refer to Annex I -2.

<sup>19</sup> In Italy, for example, we see evidence of deleveraging after the peak of the sovereign debt crisis in 2011. Whereas in 2012 leverage remained quite stable (and actually started to decline slightly), in 2013 it fell significantly (a drop in financial debt and an increase in equity).

#### Is there a difference between large firms and SMEs in the development of financial debt?

Chart 3.3 Financial Debt: Breakdown by Size reveals large differences in the development of the index of financial debt<sup>20</sup> for large firms compared to all SMEs, especially in Austria, Germany and Slovakia. However, the Austrian and German data for 2013 are preliminary. Nevertheless, the index value for large Austrian firms is noticeable: 149. That corresponds to an increase of 49%, whereas SMEs show a slight deleveraging trend. Similar, but not quite so pronounced is the situation in Germany.<sup>21</sup> In Slovakia the rise of financial debt has been driven by SMEs. For the other BACH countries the differences between large firms and SMEs are much smaller.



For the majority of the BACH countries we see that the increase in nominal financial debt is driven by large firms.

<sup>20</sup> Regarding methodology we refer to Annex I – 2.

<sup>21</sup> Preliminary data in Germany contain less SMEs, therefore the difference between large firms and SMEs can be different once the definitive data for 2013 are released.

#### Are there sectoral differences as regards deleveraging?

Chart 3.4 Financial Debt Index Variation (by sector) in 2013-2009<sup>22</sup> shows the behaviour of the main sectors for the analysed countries and their dispersion from 2008 to 2013 (2008 = 100).<sup>23</sup> The **financial debt index** in the countries analysed **grew on average** by 10 index points from 2008 to 2013. **Calculated across all countries, the Energy sector shows the highest increase in financial debt** (23 index points), and **the Commerce & accommodation sector the lowest** (four index points), but **all sectors reveal country-specific developments**.



					Commerce &	<u>Other</u>	
	Agriculture	Energy	<b>Manufacturing</b>	<b>Construction</b>	accommodation	<u>services</u>	<u>Total</u>
AT	20	4	13	26	6	8	15
BE	17	28	-2	18	8	15	10
CZ	33	-8	-13	-26	-6	-5	-7
DE	35	17	37	15	8	11	21
ES	-7	-7	-5	-9	-3	-1	-5
FR	26	46	-4	12	3	9	11
IT	6	20	2	38	-1	14	9
NL	-2	-24	6	-2	2	-11	-2
PL	6	108	8	38	29	39	33
РТ	21	48	18	6	6	9	13
SK	12	5	4	35	21	29	20
average	17	23	7	13	4	8	10

<sup>22</sup> Please note, in Poland the sector Energy reveals very high values - not shown in the chart - which results from high level of investments, in particular in electric power generation, transmission and distribution sector.
 <sup>23</sup> For the construction of the index see Annex I - 2.

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#### 3.1.2. CHANGE IN THE LEVERAGE RATIO

In this Outlook, the leverage ratio (see *Annex I-2*) is defined as the relationship between financial debt and the sum of equity and financial debt. Chart 3.5 *Change in Leverage Ratio 2013-2008* shows the change in leverage ratio for the analysed countries for sector Zc during the period 2013-2008.



The above chart shows that the leverage ratio calculated across all BACH countries has decreased 1pp in the period between 2008 and 2013. While the Netherlands, Belgium, Spain, the Czech Republic, Austria, France and Poland have decreased their leverage ratio, Slovakia, Portugal, Italy and Germany have increased it.<sup>24</sup>

As shown in chart 3.2, there was no decline in financial debt on a nominal basis during that period except for the cases of the Czech Republic, Spain and the Netherlands. However on the basis of the leverage ratio the majority of the analysed countries display a decline in the leverage ratio.

<sup>&</sup>lt;sup>24</sup> The restrictions of subchapter 3.1.1. IS THERE DELEVERAGING? - Do we see deleveraging in the sense of a nominal decline of financial debt, also apply here. Behind these aggregated results, for some countries (such as Italy) deleveraging has started later and with lower intensity.

#### What lies behind the change in the leverage ratio?

Chart 3.6 *Financial Debt and Equity* displays the developments in financial debt and equity for the analysed countries for sector Zc during the period 2008-2013. It shows for each analysed country the influence of debt and equity on the leverage ratio.<sup>25</sup>



The leverage ratio has decreased for some countries like the Czech Republic, Spain and the Netherlands, because equity has increased and financial debt decreased. With respect to Belgium, France, Poland and Austria the leverage ratio has decreased, because equity increased more than financial debt. Referring to Slovakia, the leverage ratio has increased, since only the financial debt rose.

In Italy the financial debt grew more than equity, thus causing the increase in the leverage ratio. Germany shows a similar picture, possibly to the compilation of payables to affiliates, which rose sharply in the period under consideration.<sup>26</sup> In Portugal the relationship seems to be clear: financial debt increased, equity decreased. However, while charts 3.2 and 3.6 highlight an increase in financial debt growth from 2008 to 2013 (113 with index 2008 = 100) for Portugal, different conclusions might be reached if the time-series is brokendown into two periods: 2008-2010 and 2011-2013. This would be justified by several factors including the implementation of the Financial Assistance Programme, which started in May 2011 and ended in May 2014. In the later period, 2011-2013, there were signs of a gradual deleveraging of the non-financial corporation sector in Portugal with financial debt showing a slight decline in 2013.

**Calculated across all countries, equity has increased more than financial debt, with the result that the leverage ratio has been fallen** (see also Chart 3.5 *Change in Leverage Ratio 2013-2008*). Thus total asset growth is financed by relatively more equity than debt.

#### To sum up, on a relative basis, debt has been replaced with equity.

 $<sup>^{\</sup>rm 25}$  Regarding methodology we refer to Annex I – 2.

<sup>&</sup>lt;sup>26</sup> For Germany L31 includes (trade) payables to affiliates and enterprises in which the company has participating interests, whereas trade payables to "others" are not part of financial debt as defined here.

#### 3.1.3. WHAT ARE THE EFFECTS ON THE ASSET SIDE?

The change in leverage for the analysed countries during that period has been explained, so we now want to focus on the change in the structure of the balance sheets.

Chart 3.7 *Total assets* presents the evolution of the balance sheet total for each member country during the 2008-2013 period.<sup>27</sup> This chart shows that those countries with the poorest asset growth performance (CZ and ES) also have the weakest debt flows. This result would suggest that the differences in the investment activity of firms are closely related to their financial conditions and countries' economic situations. Thus, firms from countries with positive total asset flows have generally had looser financial conditions and more favourable economic scenarios than the other countries. Policymakers may see it as important to understand whether financial constraints in some markets have played an important role in falling investment during the financial crisis, worsening the long-term potential output. Nevertheless, additional information regarding the impact of supply and demand factors in the credit market should be taken into account to draw relevant conclusions.



<sup>&</sup>lt;sup>27</sup> Regarding methodology we refer to Annex I – 2.

Chart 3.8 Relationship between the Change in Total Assets and the Change in Financial Debt shows the relationship between total assets and financial debt<sup>28</sup>. We find that financial debt contraction is linked to assets contraction: an increase in total assets is associated with an increase in financial debt. This demonstrates that an expansion of the balance sheet is typically not financed by equity or debt other than financial debt. Financial debt is the main source for investment financing. As regards the regression plot, note that Poland is an outlier and has a high impact on the linear regression line.

CHART 3.8 | RELATIONSHIP BETWEEN TOTAL ASSETS AND FINANCIAL DEBT – By Total companies (2013, 2008=100)



<sup>&</sup>lt;sup>28</sup> Please see subchapter 3.2.1. INVESTMENT-FINANCING REGRESSION MODE to find some additional information on the interpretation of regression models.

*Chart 3.9 Change in Composition of Balance Sheets in 2009-2013* provides some additional information about the relation between changes in the composition of assets and liabilities.<sup>29</sup>



Looking at the above charts, we can say that financial assets have increased in all analysed countries. The biggest increase was in Poland. We also recognise that with the exception of Italy, the Czech Republic and Portugal, non-financial fixed assets have risen. Here, too, the strongest increase in non-financial fixed assets was observed in Poland. Only in Spain has there been a fall in other assets and liabilities. Note that changes in the composition of assets and liabilities vary from country to country. The results do not allow us to identify a common behaviour pattern among countries. Echoing the view expressed in SUBCHAPTER 3.1.2.: Calculated across all countries equity has increased more than financial debt, with the effect that the leverage ratio has been reduced.

<sup>&</sup>lt;sup>29</sup> As explained in ANNEX I - 1: Other assets and liabilities' include: Inventories + Other receivables + Deferred assets + Cash at banks – Deferred liabilities.

## **3.2. WHICH CORRELATIONS CAN BE DERIVED FROM THE DATA BY USING ANALYTICAL MODELS?**

#### 3.2.1. INVESTMENT-FINANCING REGRESSION MODEL

Note that in all countries there are sectors with a debt contraction. This is even true when the overall trend in the respective countries is an expansion (see Chart 3.2). The same result can be observed for the contraction of tangible assets (see Chart 3.8). Chart 3.10 *Relationship between Debt and Investment* shows the relationship between the percentage of sectors with debt contraction and the percentage of sectors with fixed nonfinancial assets contraction per country. We find that **debt contraction is linked with** fixed nonfinancial **assets contraction.** However, it is not easy to identify the causal effect of deleveraging on investment, because the very likely endogeneity of lending and investment needs to be addressed.



#### CHART 3.10 | RELATIONSHIP BETWEEN DEBT AND INVESTMENT – By Total companies

Regression Line: The regression line is the line drawn through the scatter-plot of the two variables, where *percentage of sectors with debt contraction* is the independent variable and *percentage of sectors with fixed nonfinancial assets contraction* is the dependent variable. In addition, the coefficients of the regression function and the coefficient of determination (R2) are displayed. R2 measures the quality of the estimation. It shows that the correlation between sectors with debt contraction and sectors with fixed nonfinancial assets contraction is high.

#### 3.2.2. A PROBIT MODEL EXPLAINING INVESTMENT DECISIONS

In addition to the previous analysis, the wealth of information in the BACH database helps to provide a more detailed quantification of the impact of credit availability in firms' investment decisions, considering the dispersion between geographical areas, firm size and sector of activity.

To this end, an empirical analysis (probit model) has been conducted with the data available in the BACH database from 2008 to 2013, in which the dependent variable is a categorical variable, adopting the value of 1 for those aggregates of firms with fixed non-financial assets expansion during 2008-2013, and 0 for the rest. A set of control variables has been included among the regressors. These control variables are: country, firm size and the sector of activity (at the level of NACE Rev.2 sections). In addition, the model includes as explanatory variables: (i) the cumulative growth rate of turnover, in order to calibrate how the economic position of the different aggregates of corporations can affect the investment decisions, (ii) Tobin's Q , defined as the ratio between the sum of market value of equity and debt divided by the book value of assets and expressed as a categorical variable (it is equal to 1, when the Tobin's Q ratio is higher than 1, and 0 otherwise) and, finally, (iii) the cumulative growth rate of financial debt has been included in the model to try to capture the importance of external funds availability in the behaviour of investments.

The accompanying Table 1 shows the results of the proposed model. This outcome would suggest that growth of turnover and debt, jointly with the Tobin's Q ratio,<sup>30</sup> are effective predictors of firms' investment behaviour, since the coefficients of these variables are significant. Furthermore, likelihood-ratio tests indicate that the control variables are significant and the variables are thus included in the model. However, in a probit model, the quantitative effect of the determinants on the probability to invest varies with the rest of the covariates. For this purpose, we use a hypothetical aggregate of firms which uses variables equal to the means of the sample. Table 1 shows the estimated marginal effects of changes in the explanatory variables for our model. The size of the marginal effects indicate that an increase in growth rate turnover and debt<sup>31</sup> tends to increase the probability of positive change in fixed non-financial assets by 0.22% and 0.18%, respectively. These estimations are consistent with the opinion that debt contraction for European non-financial corporations in the recent crisis (2008-2013) could have played an important role in the business investment reduction. Following this line of argument, firms would not have found alternative financing mechanisms in equity to cover their financing needs.

<sup>&</sup>lt;sup>30</sup> The Tobin's Q ratio data should be viewed with caution, as they are based on indirect estimates using information from Spain's discount rate, incorporating the differentiation across countries through the spread existing in convergence bond interest rates.

<sup>&</sup>lt;sup>31</sup> However, the endogenous nature of investment flows and debt, in other words, the simultaneous feedback from investment to indebtedness, would hamper the interpretation of these results.

#### TABLE 3.1 | RESULTS OF THE PROBIT MODEL

### RESULTS OF THE ESTIMATION EXERCISE: PROBIT COEFFICIENTS AND MARGINAL EFFECTS (Probability of capital stock increase)

Estimation period	2008-2013	
Constant	1.041	
	(0.428)*	
Δ Turnover	0.008	
	(0.001)***	
Average marginal effect	0.22%	
Δ Debt	0.006	
	(0.001)***	
Average marginal effect	0.18%	
Q-Tobin	0.295	
	(0.099)**	
Dummy variables		
Sector of activity	Included	
Firm size	Included	
Country	Included	
Observations	1547	
R-squared	0.25	

\*\*\*,\*\* and \*; significant at 1%, 5% and 10%, respectively.

Likewise, the Probit model provides information about the different behaviour in investment decisions for firms depending on their residence. The estimations of marginal effects for the country dummy variables on the probability of investing are fully in line with the previous analysis about the different developments of financial debt among BACH countries, and reinforce the idea that corporations located in the countries that have undergone bouts of high financial tension have had the worst adverse repercussions in terms of business investment (see Chart 3.11 Marginal Effects: Dummy Variables (countries)<sup>32</sup>).

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<sup>&</sup>lt;sup>32</sup> The "omitted" category in the model is AT, and serves as a baseline to which the other countries are compared. 20

50% 40% 30% 20% 10% 0% -10% -20% ES SK CZ NL IT РΤ BE FR ΡL DE

### CHART 3.11 | MARGINAL EFFECTS: DUMMY VARIABLES

In %

### **3.3.CONCLUSION**

#### Deleveraging and its effects on the asset side of European companies.

Except for the Czech Republic, Spain and the Netherlands, there was no decline in financial debt on a nominal basis from 2008 to 2013. Taking all BACH countries into consideration, there has been a moderate rise of financial debt on a nominal basis over that period.

The data reveal large differences in financial debt developments for large firms compared to small and medium-sized firms, especially in Austria, Germany and Slovakia. For the majority of the BACH countries the increase in nominal financial debt was driven by large firms.

Calculated across all countries, the Energy sector shows the highest increase in financial debt, and the Commerce and Accommodation sector the lowest, but all sectors reveal country-specific developments.

"Leverage ratio" is defined as financial debt in relation to the sum of equity and financial debt. The leverage ratio has country-specific developments. Calculated across all BACH countries, it has decreased slightly over the 2008-2013 period. Put in simplified terms, debt has been replaced with equity.

Analysing changes in the composition of assets and liabilities for the period 2009 to 2013 shows that financial assets have increased in all analysed countries. Except for in Italy, the Czech Republic and Portugal, there has been a rise in non-financial fixed assets. Only in Spain was a fall in other assets and liabilities observed. In general, deleveraging did not result in a decline of total assets.

However, the analysis provides different results by breaking down the analysed period, particularly with regard to Italy and Portugal.

An Investment-Financing Regression Model shows a clear linkage between the percentage of sectors with debt contraction and the percentage of sectors with tangible assets contraction. Similarly, financial debt contraction is linked with assets contraction.

A Probit Model explains the relationship between financial debt and investment decisions: the higher the increase in financial debt, the higher the probability of a positive change in fixed non-financial assets.

## **ANNEX I: KEY INDICATORS AND METHODOLOGY**

## 1. PRELIMINARY CONSIDERATIONS: SIMPLIFIED BALANCE SHEET, SLIDING SAMPLE AND EXCHANGE RATE IMPACT

In order to focus on analysing the most significant balance sheet items in relation to financing and investment, the following simplified balance sheet was constructed:

ASSETS							
Fixed non-financial assets	(A11_WM + A12_WM)* total assets						
Tangible fixed assets	A12_WM * total assets						
Intangible fixed assets	A11_WM * total assets						
Financial assets	(A13_WM + A6_WM) * total assets						
Inventories	Not defined						
Net trade credit	(A3_WM - L4_WM - L5_WM) * total assets						
Other assets and liabilities	(A2_WM + A4_WM + A5_WM + A7_WM - L6_WM) * total assets						
Cash and bank	A7_WM * total assets						
EQUITY AND LIABILITIES							
Total equity	(E_WM + Lp_WM)*total assets						
Einancial debt	(I1 WM+I2 WM+I3 WM)*total assets						

As shown in the table, all variables have been converted from WM (Weighted Mean) to absolute values, in order to be used for the structural data, indices and rates defined in this document.

Since the analysis included in this study refers to the examination of certain variables over the 2008-2013 period, and since the annual samples in BACH include changes – not only those arising from variations inherent in the variables, but also those in the demographics of non-financial corporations and those in the composition of the samples owing to the limitations in data collection – it was considered appropriate to work with sliding samples. Using the sliding sample in the calculation of the year-on-year changes serves to mitigate the impact of the breaks or variations caused by changes in the composition of the samples.

Note that except for the Probit analysis the figures considered in the charts referred to Poland and Czech Republic are expressed in national currencies.

## 2. ANALYSIS OF FINANCIAL DEBT: CONSTRUCTION OF THE INDEBTEDNESS INDEX AND LEVERAGE RATIO

Since the purpose of this study is to analyse changes in indebtedness in each BACH member country during the 2008-2013 period, an indebtedness index was constructed as follows:

1) Calculation of the **year-on-year rate of change** for each country, sector Zc, size 0 and uniform samples, from 2009 to 2013, both inclusive:

Year-on-year rate N (rate N) = (Finan\_debt; each country; year N; sector Zc; size 0; sample=1) (Finan\_debt; each country; year N-1; sector Zc; size 0; sample=-1) 2) Construction of an **index** for each country, for sector Zc and for size 0:

#### Indebtedness Index = 100\* (rate 2009)\*(rate 2010)\* (rate 2011)\* (rate 2012) \*(rate 2013)

The construction of an index of this type provides a suitable benchmark variable for identifying and categorising the indebtedness/deleveraging process of member countries during the period 2008-2013, but also for all sizes and sectors as done in graphs 3.3 and 3.4. For the sectors the following stratification is used:

NACE	DESCRIPTION
B+D+E	Energy
G+I	Commerce, accommodation and food service activities
H+J+L+Mc+N+P+Q+R+S	Other services
С	Manufacturing
F	Construction
Α	Agriculture, forestry and fishing

Finally, the index may also allow for an analysis of cross-references for all sectors and sizes, by means of constructing a discrete variable which discriminates cross-references where there has been deleveraging throughout the 2008-2013 period, namely, those where the index is less than 100.

3) With respect to the **leverage ratio**, it was estimated as defined below:

Based on the estimated ratio, the change in leverage has been calculated as follows:

ratio 2008= (Leverage\_ratio; each country; year 2008; sector Zc; size 0; sample1)

ratio N=ratio N-1\* (Leverage\_ratio; each country; year N; sector Zc; size 0; sample1) (Leverage\_ratio; each country; year N-1; sector Zc; size 0; sample -1)

Variation from 2008 to 2013 = Ratio 2013- ratio 2008

#### 3. ANALYSIS OF INVESTMENT

An investment index was constructed by replicating for total fixed assets (tangible and intangible assets) the work conducted for the analysis of indebtedness in order to show, for each country, the percentage of sector-size cross-references in which investment has contracted over the 2008-2013 period.

## 4. CONSTRUCTION OF A PROBIT MODEL WHICH EXPLAINS THE VARIABLES AFFECTING THE INVESTMENT DECISION

In addition to the previous analyses an attempt was made to model non-financial corporations' behaviour regarding their investment decisions during the period 2008-2013.

The criteria determined for the construction of the model were as follows:

#### Type of model: PROBIT

Dependent variable: investment

#### Independent variables:

- Continuous:
  - Change\_debt
  - Change\_Turnover
- Discrete
  - o Country
  - Activity
  - o Size
  - o Q\_Tobin

The following table specifies the criteria used to define each variable:

	Type of		
Name	variable	Formula	Values
Investment	Binary	2013 Non-financial fixed assets Index	=If index >100 then 1; else 0
Change_debt	Continuous	2013 Financial Debt Index	=Index-100
Change_Turnover	Continuous	2013 Turnover Index	=Index-100
Country			
Activity			
Size			

In determining the explanatory variables of firms' investment decisions, the estimation of a variable approximating to Tobin's Q ratio was considered significant, and is formulated as follows:

## Tobin's q =Equity Market value+ Liabilities Market valueEquity Book value+ Liabilities Book value

Tobin's Q is an excellent indicator of firms' propensity to invest, as firms will have an incentive to invest if the market value of their equity and liabilities exceeds the related book value. As such, the ratio is expected to be a significant variable in the analysis of the factors which supposedly come into play in firms' investment decisions and, consequently, is potentially significant in the modelling of firms' behaviour. Therefore, based on the available BACH data, the best possible approximation of the ratio has been made for each country, cross-reference, size and year.

In this setting and in order to calculate the variables involved in the ratio, it was considered that the market value of liabilities should not differ significantly from their book value and, consequently, interest has centred on the valuation of equity at market prices considered to be the current value of expected future flows.<sup>33</sup>

According to this criterion, the value of equity at market prices may be similar to:

Equity Market Value = <u>
Net Ordinary Results</u> Rate of discount

where:

- ordinary results, in the absence of predictive information, are the best possible approximation of expected flows, and
- the discount rate should include: a) the cost of risk-free financing b) the risk premium associated with the equity and c) the illiquidity premium arising from the absence of trading in regulated markets.

Of these items:

• The approximation for net ordinary results based on the BACH data was performed as follows:

Net Ordinary Results =

- + IT3 Net profit or loss for the period
- I43 Extraordinary Income
- + I84 Extraordinary Expenses
- As for the discount rate, the following was used:
  - For Spain: the rate calculated in Spain for the valuation of unlisted shares.
     This rate is estimated from the listed corporations aggregate on the basis of the following formula:

```
Equity Market Value = <u>Net Ordinary Results</u>
Rate of discount
```

From these data, the discount rate applicable to the valuation of unlisted shares was deemed to be the median of the individual rates of the aggregate – after stripping out firms with systematic losses and outliers from this aggregate – to which an additional illiquidity premium of 3% is added.

 For the other countries: given that in the BACH framework there is insufficient information to replicate the estimations made in the case of Spain, the rates corresponding to each country were estimated on the basis of Spain's discount rate, incorporating the differentiation across countries through the spread existing in convergence bond interest rates.

Once the net ordinary results of each cross-reference and the discount rate applicable to each country and year had been estimated, the ratio was calculated for each cross-reference, country and year and, as with the other variables analysed, an index was constructed which includes changes in the ratio during the period studied. The variable which was finally incorporated into the PROBIT model, however, was not the index obtained, but a discrete variable which takes the value of 1 in the cross-references where the index is higher than 1 and the value of 0 where the index is the same as or less than one.

<sup>&</sup>lt;sup>33</sup> To perform this estimation the approximation undertaken in Spain to value the shares and other equity not traded on regulated markets was replicated in the BACH context. This estimation comprises the valuation of shares at the current value of expected future flows.

		CZ	ES	NL	РТ	BE	FR	AT	PL	г	SK	DE	BACH
Chart 3.2	Financial Debt evolution	$\downarrow$	$\checkmark$	$\downarrow$	<b>^</b>	1	1	1	1	1	1	1	<b>^</b>
Chart 3.3	Financial Debt evolution. By size	Decrease due to falls in all Decrease sizes falls in s		Decrease due to falls in SMEs	Increase justified by rises in all sizes, except AT								
	Large firms	$\mathbf{V}$	$\checkmark$	↑	<b>^</b>	1	1	1	↑	Ϋ́	1	1	1
	Small firms	$\downarrow$	$\checkmark$	$\downarrow$	<b>^</b>	1	1	$\checkmark$	1	1	<b>^</b>	1	<b>↑</b>
Chart 3.4	Financial Debt evolution. By sector	Decrease due to falls in almost all activity sectors Increase due to rises in almost all activity sectors											
	Agriculture	1	$\checkmark$	$\checkmark$	<b>↑</b>	1	1	1	1	1	1	1	1
	Manufacturing	$\downarrow$	$\checkmark$	↑	Ϋ́	$\checkmark$	$\checkmark$	1	1	↑	Ϋ́	↑	<b>↑</b>
	Commerce and accomodation	$\downarrow$	$\checkmark$	↑	<b>^</b>	1	1	1	1	1	1	1	<b>^</b>
	Energy	$\checkmark$	$\downarrow$	$\checkmark$	Υ	1	1	1	↑	1	1	↑	1
	Construction	$\checkmark$	$\checkmark$	$\checkmark$	<b>^</b>	1	1	1	1	↑	1	↑	1
	Other services	$\checkmark$	$\checkmark$	$\checkmark$	<b>^</b>	1	1	1	1	↑	1	↑	1
Chart 3.5 & 3.6	Change in leverage ratio	Evolution (incre	volution (increase/decrease) justified by the combination of both effect				Decreases justified by Equity increases being stronger Increases justified by Financial Debt than Financial Debt increases rises being stronger than Equity rises						
	Leverage ratio	$\downarrow$	$\checkmark$	$\downarrow$	<b>↑</b>	.↓	$\checkmark$	$\checkmark$	$\checkmark$	^	1	1	$\checkmark$
	Financial debt	$\checkmark$	$\checkmark$	$\checkmark$	<b>^</b>	1	1	1	1	↑	1	↑	1
	Equity	1	1	1	$\checkmark$	1	1	1	1	1	1	1	1
Chart 3.7	Total assets evolution	Increases justified by Equity increases being		Increase justified by Financial Debt increases	Evolution justified by increases in both Equity and Financial debt								
					being bigger than Equity reductions:								
		1	1	$\uparrow$	1	1	1	$\uparrow$	$\uparrow$	1	1	1	$\uparrow$



European Committee of Central Balance-Sheet Data Offices

