

Equity ratios of Austrian nonfinancial corporations – evidence from balance sheet data

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This article analyzes the equity ratios of Austrian nonfinancial corporations using balance sheet data. According to our data, the median equity ratio is about 34%, subject to strong heterogeneity across industries. While companies with a high share of tangible assets tend to have a low equity ratio, we find hardly any link between the share of intangible assets and the equity ratio. Our results suggest that low-tech companies have a lower equity ratio than companies with a higher level of technology intensity. However, high-tech companies do not generally exhibit a higher equity ratio than medium-tech companies. The median equity ratio of start-ups is higher than the overall median equity ratio but lower than the median equity ratio of all high-tech companies. Furthermore, our data suggest that the relationship between firm size and equity ratio is not linear – up to a certain size, the equity ratio decreases with firm size. At least in part, this might be due to the public information available about firms as we find a strong relationship between opaqueness and firm size. Firm age affects the equity ratio only for the first ten years of company life.

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Within the financing mix of a company, equity fulfills very specific tasks: It is available to companies permanently or at least on a long-term basis, it does not have to pay regular interest, and is a liquidity cushion in times of economic downturns. Moreover, equity holders are residual claimants if a company is liquidated, i.e. they will only be reimbursed after all other claims have been satisfied. Due to its long-term nature and risk-bearing capacity, equity is particularly important for financing long-term and risky investment projects. As a result, equity is of particular importance in areas such as financing start-ups or investments and innovations.

An adequate endowment of companies with equity fosters both macroeconomic and financial stability. From a financial stability perspective, one aspect to consider is the relation between capital structure and the probability of default. With rising indebtedness, borrowers' ability to repay becomes progressively more sensitive to drops in revenue and sales as well as increases in interest rates (Cecchetti et al., 2011).² From a cyclical point of view, in an economic downturn, the pressure of debt service causes highly leveraged firms to cut back investment (and, possibly, production and employment) more severely than low-leverage firms. Thus, high leverage may make the economy less stable (Bernanke and Campbell, 1988). Moreover, an insufficient equity base might lead to a debt overhang (Myers, 1977). Overindebted firms might find themselves in a situation where they cannot

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² Moreover, Adalet McGowan et al. (2017) show that the increasing survival of old firms that have persistent problems meeting their interest payments ("zombie firms") hinder productivity growth in OECD countries.

take on additional debt to finance future projects, even if these projects could generate a positive net present value, because the prospective profit would be used to service existing liabilities. For the economy as a whole, the ensuing investment cuts might lead to a dampening of economic growth.

The finance literature offers two competing but not mutually exclusive models of firms' financing decisions. The trade-off theory (Kraus and Litzenberger, 1973) stresses that companies set a target leverage at which the benefits of debt financing (e.g., tax advantages or the mitigation of agency conflicts between managers and shareholders) just offset the direct and indirect costs arising from potential financial distress. The pecking order theory (Myers and Majluf, 1984; Myers, 1984) highlights the influence of asymmetrical information between outside investors or lenders and company management on the capital structure. In general, companies prefer internal over external financing because asymmetrical information increases financing costs; but if external funds are necessary, companies prefer debt to equity because debt financing entails lower costs and no outside shareholders.

Based on these theoretical considerations, the economic literature in recent decades has identified a large number of aspects that could affect the concrete capital structure of firms, which either refer to the legal and institutional framework of an economy or company-specific factors. While legal and institutional factors help explain the level of equity in an economy, they can only be employed in cross-country comparisons because within a country these factors are the same for all companies.

This article focuses on company-specific factors and provides a cross-sectional analysis of the equity ratio of Austrian companies for 2016, based on a comprehensive set of balance sheet data. In doing so, this paper adds to the economic policy debate on corporate finance in Austria by relating a number of different firm characteristics to the equity ratio. On the one hand, we address the equity situation of technology-intensive firms in general and of start-ups, in the sense of young technology-intensive firms, in particular. On the other hand, we look into the well-established feature that the difference in the equity ratio between smaller and larger companies is particularly strong in Austria.

The rest of the paper is structured as follows: Section 1 discusses the equity ratio indicator employed in this paper. In section 2, we present the data, and in section 3, we provide an overview of the characteristics of Austrian companies according to the determinants of the equity ratio suggested by theory. In section 4, we discuss the relationship between these determinants and the equity ratio of Austrian nonfinancial corporations. Section 5 concludes.

1 The equity ratio – calculation, meaning and limitations

As our analysis is based on financial statements, our definition of equity follows that of the Austrian Corporate Code, which defines equity as consisting of subscribed capital, capital reserves, convertible bonds and preference shares, retained earnings and the net profit or loss for the year (section 229). That is, equity comprises both externally raised equity and internally generated equity. As we use balance sheet data, our measure of the equity ratio is based on book values.

We calculate the equity ratio by dividing total equity by total assets. In other words, the equity ratio reflects the amount of equity a firm uses to finance its assets or, put differently, the amount of leverage it employs to finance its business.

This ratio is commonly used in continental Europe to analyze corporate capital structures, while in the U.S. the debt-to-equity ratio is more widespread.

There are a number of caveats in interpreting the equity ratio. For one, the balance sheet total and thus the equity ratio are affected by the type of financing a firm employs. For example, the use of operational leasing and factoring shortens the balance sheet, thus affecting the equity ratio irrespective of an underlying change in the economic situation. The equity ratio is also influenced by valuation of assets. This refers in particular to hidden reserves that arise when an asset is written off faster than it has actually lost value (e.g. through special depreciation), or when its value has increased over time (e.g. in the case of a property). This increase in value may not be disclosed openly in the balance sheet. Therefore, not all assets of a firm are necessarily recorded in the balance sheet. Thus, even if a company has negative equity, it is not necessarily overindebted. While in many cases, negative equity comes from accounting for accumulated losses from previous years, it can also mean that the firm is in a ramp-up stage, and has used a large amount of funds to create products and infrastructure that will later yield profits. As long as the company's cash flow is adequate to meet its bills, it can continue operating. Moreover, due to the capital links subsidiaries of a group may also have negative equity ratios.

Another point to consider is the lack of personal and business asset separation in limited partnerships (Kommanditgesellschaft, KG) where at least the general partner is personally liable for any debt of the partnership. In many cases, limited partnerships are able to obtain bank loans only by pledging personal assets as collateral. This is also often the case for limited liability companies, when banks ask owners and managing directors to provide personal guarantees to extend the limitation of liability before granting a loan.

2 The data

We use a database compiled by the OeNB's Statistics Department that combines annual financial statements from the company register (Firmenbuch) taken from the SABINA database and master data from the OeNB. The latter include items such as the industry standard classification system of economic activities used in the European Union, commonly referred to as NACE code, the legal form and the date of incorporation.

Corporations whose liability is limited are obliged to disclose their annual financial statements to ensure adequate protection of enterprises or persons doing business with them. In Austria, these include stock corporations (AG) and limited liability companies (GmbH) as well as limited partnerships that are part of a mixed form without a personally liable partner (such as GmbH & Co KG), and cooperatives. The scope of the disclosure requirements depends on company size.³ Small firms are not required to report their assets and liabilities in full detail. Consequently, despite the comprehensive coverage of the database, only a few variables are available for all firms. For the large majority of firms in our sample the dataset contains only data for the main balance sheet items. The subitems as well as information from the profit and loss account (e.g. sales and revenues, costs and expenses) are available only for a comparatively small subset of several thousand companies.

³ Section 221 of the Austrian Corporate Code classifies corporations as micro, small, medium-sized and large on the basis of different thresholds for total assets, annual turnover and number of employees.

This paper focuses on those balance sheet positions that are available for the wide sample. This has the advantage that we can use a sample that has a very high representativeness, but at the same time means that only a few positions can be included in the analysis. In particular, the analysis is limited to the main balance sheet items and does not include any items from the profit and loss account. Likewise, we cannot distinguish internally generated from externally raised equity, which also means that we cannot test the validity of the pecking order theory. Another drawback is that we do not have information on the ownership of the company. Consequently, we are not in a position to account for cross-ownership across companies, and we cannot separate firms within a group (e.g. subsidiaries) from stand-alone firms. Furthermore, we cannot analyze whether publicly owned companies behave differently than privately owned companies.

Overall, the database includes information on more than 143,000 companies. For our analysis, we take into account corporations and quasi-corporations (specifically stock corporations, limited liability companies, limited partnerships) from the nonfinancial sector. Hence, we exclude 7,805 companies that belong to a different sector or have a different legal form or for which information on the sector or the legal form is missing. Furthermore, 1,037 companies perform financial and insurance activities (NACE K) or are classified as public administration and defense or compulsory social security (NACE O) or their NACE classification is missing. For 801 companies we cannot calculate the equity ratio because the balance sheet total is zero or negative, or because information on equity is missing. Additionally, we exclude 2,568 very small companies from the analysis with assets of less than EUR 5,000, which is the legal minimum share capital.⁴ Moreover, two-thirds of these companies have negative equity. Hence, it is questionable whether these very small firms are really engaged in some meaningful business activity. This leaves us with 130,967 companies for our analysis.

About 6% of all companies in our sample have an equity ratio of less than –100% and about 0.1% an equity ratio of above +100%. We cannot determine whether the extreme values reflect reporting errors or whether they are based on valid observations. While there is no generally agreed method for handling such observations, excluding them would affect the reported equity ratio in this paper.⁵ Moreover, given the size of our dataset, outliers are less worrisome than they would be in a smaller dataset. For these reasons, we decided not to discard any observations on the basis of their equity ratio but to focus on the median as a more robust measure of central tendency and the distribution of the equity ratio according to its potential determinants.

3 Potential determinants of the equity ratio

The available data allow us to analyze the relevance of the following potential determinants of the equity ratio.

⁴ The minimum share capital of a limited liability company is EUR 35,000. It is possible to start with a share capital of only EUR 10,000 (“Gründungsprivilegierung”), of which one half has to be paid immediately, subject to the obligation to raise the share capital to the amount of EUR 35,000 within 10 years after establishment. For a stock corporation, the minimum share capital is EUR 70,000. For a limited partnership, there are no minimum capital requirements.

⁵ In the literature, different methods are used to handle these extreme values, e.g. trimming the dataset or winsorizing the top and bottom percentiles of the distribution.

Industry: We group the firms in our sample according to the first hierarchical NACE level. This first level includes 21 sections identified by alphabetical letters from A to U. Our database includes neither households as employers (T) nor extraterritorial organizations (U). As pointed out above, we have excluded firms that perform financial and insurance activities (K) or are assigned to public administration (O). Given the distinct scope of their activity, we treat the activities of head offices (NACE group 70.1) – which are classified under professional activities (M) in NACE – as a separate entity.⁶ This division includes the overseeing and managing of other units of the same enterprise (or group). Additionally, we have merged education (P) and human health and social work activities (Q) as well as arts, entertainment and recreation (R) and other service activities (S), as the companies in these industries perform similar activities and the number of enterprises in these industries is comparatively low.⁷ The largest number of firms can be found in trade (21% of all companies), real estate (14%) and professional activities (13%). Grouping the industries into the three classical economic sectors, about half a percent of companies in our database belong to the primary sector (agriculture), about 21% to the secondary sector (production of goods) and about 79% to the tertiary sector (supplying of services).⁸

Level of technology: As pointed out above, equity is of particular relevance for financing research and development (R&D) activities. As our data do not allow measuring R&D activities of firms directly, we employ the sectoral approach used in Eurostat's Statistics on high-tech industries and knowledge-intensive services (Eurostat, 2018). Therefore, the technology variable is based on NACE classification, albeit on a more granular division than the industry variable (3-digit code for manufacturing, 2-digit code for services). However, technology is only defined for manufacturing and services and thus neither for the primary sector nor for energy, utilities and construction. Following the Eurostat classification, the manufacturing (sub)industries are mapped to the following technology levels: high-technology (pharmaceutical products, computer, electronic and optical products, air and spacecraft and related machinery), medium high-technology (e.g. chemicals and chemical products, weapons and ammunition), medium-low technology (e.g. reproduction of recorded media, coke and refined petroleum products), low technology (e.g. food products, beverages). Services are broken down into high-tech knowledge-intensive services, (e.g. information service activities, scientific research and development), knowledge-intensive services (e.g. advertising and market research), and less knowledge-intensive services (e.g. wholesale and retail trade, real estate activities). Additionally, we merge the high-technology manufacturers and high-tech-knowledge-intensive services into the category high-tech.

Only 6.5% of all companies in our sample are high-tech companies (4.5% of all manufacturers, 6.8% of all services). At the same time, about 38% of all manufacturers are categorized as low technology and about 61% of all services as less knowledge-intensive services. The high proportion of less knowledge-intensive services follows from the high proportion of trade and real estate activities in the

⁶ Additionally, entities classified by Statistics Austria as belonging to both NACE K.64.2 (Activities of holding companies) and the institutional sector S 11 are grouped under this section by the OeNB's statistics department.

⁷ For the terminology employed here and the NACE code, see Table A1.

⁸ For information on the number of companies see, Table A2.

service sector. With a median age of eight years high-tech companies are somewhat younger than non-high-techs (10 years). The median balance sheet total of high-techs (EUR 200,000) are less than half of the median balance sheet total of non-high-techs (EUR 500,000).

Amongst high-tech firms, start-ups have recently received particular attention in the economic policy debate.⁹ There is no standard definition of a start-up, but most definitions comprise some similar features. There is general agreement that start-ups are companies in the first phase of their life cycle. We set the limit at four years. Furthermore, we only consider SMEs as potential high-tech firms as it is often done in public sector funding guidelines. However, not every young company is a start-up. Most of the definitions also refer to the business purpose and business model of the company, which should be innovative and growth-oriented. Again, this is difficult to operationalize. We approximate innovative by high-tech companies as defined above. According to this definition, about 2% of all Austrian companies and 34% of all high-tech companies are start-ups.

Asset structure: The Austrian Corporate Code breaks down fixed assets into three components: intangible assets, tangible assets and financial assets. However, information on these assets is missing for a relatively large number of companies. Specifically, tangible assets as a share of total assets are available for 80% of all companies in our sample, intangible assets as a share of total assets for 42% and the financial assets ratio for 40%. For intangible assets and financial assets as a share of total assets, the share of missing observations depends strongly on firm size. The financial assets and intangible assets ratios are only available for 32% and 38% of all micro firms, respectively, but for 85% and 58% of all large companies. For those companies for which the tangible assets ratio is available the median ratio is 17%. If the intangible assets ratio is available, it is generally very small (median 0.29%) and about a third of all companies that report an intangible assets ratio specify a value of zero.

Firm size: For classification by size, we refer to European Commission (2003) where companies are grouped primarily according to staff headcount and additionally according to turnover or total assets. However, as staff headcount is available only for less than half and turnover for less than 20% of all firms in our sample, we classify companies solely according to their total assets. Accordingly, micro enterprises are companies with total assets of up to EUR 2 million, small companies have total assets of between EUR 2 million and EUR 10 million, and medium-sized companies of between EUR 10 million and EUR 43 million. Companies with total assets of more than EUR 43 million are classified as large companies. Together, micro enterprises, small enterprises and medium-sized enterprises form the category small and medium-sized enterprises (SME), which is often referred to in economic policy discussions. As pointed out above, we cannot account for whether the companies are autonomous or are linked to other enterprises. About 98% of the firms in the sample are SME, of which more than three-quarters are micro firms.

Age: We calculate age using the date of the first entry in the commercial register¹⁰ and group companies into five age classes: 1 to 4 years (29% of the firms in the

⁹ For the role of finance for start-ups in general, see Gassler et al. (2018).

¹⁰ We do not use the founding year because a company constitutes an economic entity only once it has been entered in the commercial register (Wiesinger, 2015).

sample), 5 to 9 years (21%), 10 to 19 years (26%), 20 to 29 years (15%), and 30 years and older (10%). The notion that younger firms are usually smaller as firms tend to grow with time is also reflected in our data. About 86% of all enterprises that are up to 4 years old are micro enterprises and only 0.8% are large enterprises. In contrast, only 64% of the firms that are at least 30 years old are micro enterprises and 5% are large enterprises.

Opacity: Public availability of information about a firm (or the lack of it) is often seen as a major determinant for its access to outside finance. As discussed above, companies are only required to make a limited amount of information about themselves public, and the legal disclosure requirements depend on company size. Companies might however opt to make more information public than they are required to do. It is possible that a firm chooses the degree of opacity and the type of financing simultaneously. That is to say, as firms tend to consider sharing information with outsiders as disadvantageous (or not as advantageous at any rate), they tend to provide information only when there is an economic incentive to do so. A case in point would be that companies within a group (which we cannot single out with our data) have no reason to provide information to the public for getting finance.

To operationalize the opacity of a company we calculate the share of variables with missing values in SABINA for each company in our dataset.¹¹ As SABINA is compiled based on information from the company register, this measure can serve as an indication of the amount of publicly available information about a company. We normalize these shares so that the variable takes the value 1 for the most opaque company and 0 for the least opaque one.

As predicted by standard financial theory, our data suggest that larger firms are less opaque than smaller ones. Although for the bigger part of the size distribution, the decline is only gradual and only the largest 10% of companies exhibit on average a significantly lower opacity than smaller firms. Moreover, opacity is inversely correlated with age. In general, younger firms are more opaque than more mature ones. 32% of firms up to 4 years of age fall into the quartile with the highest opacity, and only 12% into the lowest opacity group. Conversely, only 16% of the firms that are 30 years or older belong to the highest opacity group, while 42% are part of the least opaque companies. Very opaque companies have a tangible assets ratio that is significantly above average; the median tangible assets ratio for the highest opacity quartile amounts to 60%.

Legal form: The vast majority of companies analyzed are limited liability companies (93%). Limited partnerships account for 6.4% of the firms in the sample, mostly formed with the sole general partner being a limited liability company (GmbH & Co KG). Only 0.5% of the firms are stock corporations.

4 How are these determinants related to the equity ratio?

Overall, the median value of the equity ratio of all firms in our sample is 34.1%, which masks a very high degree of heterogeneity, however. As much as 20% of the enterprises have a negative equity ratio, whereas 0.1% have an equity ratio of more than 100% (implying negative debt).

¹¹ Disregarding variables from the master data provided by the Statistics Department of the OeNB and variables that are derived from other variables, e.g. the equity ratio.

Table 1.1

Total		Size					Legal form			Age (years)					Opacity (quartiles)				Tangible assets ratio (quartiles)				
		Me- dian	Inter- quartile range	micro	small	me- dium	SME	large	AG	KG	up to 4	5–9	10–19	20–29	30+	1	2	3	4	1	2	3	4
<i>Median values (%), 2016</i>																							
Industry																							
Manufacturing	36.4	53.6	35.7	34.8	37.9	35.8	42.9	38.1	41.9	20.8	25.0	32.6	38.7	40.7	41.2	36.2	29.1	27.1	77.3	34.1	38.1	35.5	22.0
Energy	14.3	50.1	18.1	6.7	16.6	13.3	32.7	14.2	41.4	10.8	6.8	8.7	21.0	34.6	51.8	16.7	8.5	10.5	40.0	29.8	40.2	32.7	7.0
Utilities	36.6	55.6	40.1	33.1	40.6	37.1	27.4	39.4	35.5	21.9	26.7	34.5	39.0	45.5	43.6	39.6	28.7	34.0	67.9	34.1	38.6	38.3	26.0
Construction	30.2	54.9	32.7	23.2	25.4	30.3	24.2	31.6	35.3	14.2	19.4	31.7	35.1	37.8	35.8	34.0	30.2	23.8	22.9	25.2	34.5	34.6	14.4
Trade	32.1	59.7	30.9	34.9	35.6	32.1	36.1	33.3	41.8	15.4	17.6	29.4	37.2	40.5	41.6	34.6	29.4	22.8	49.2	30.7	33.3	29.6	16.7
Transportation	30.7	54.8	31.1	28.8	29.7	30.5	35.2	31.8	40.9	14.8	22.6	28.8	32.9	33.4	37.8	29.7	26.1	27.1	61.3	25.6	32.6	31.3	18.6
Accommodation	14.0	74.0	12.5	15.2	25.1	13.9	27.5	15.1	24.3	5.9	5.1	13.9	22.6	20.7	16.5	17.5	9.0	1.4	58.9	22.1	22.5	11.9	5.9
Information	43.3	64.3	44.1	39.3	38.1	43.4	39.1	43.9	36.5	31.3	38.9	43.4	45.7	44.3	48.1	38.5	43.0	46.2	51.5	43.8	42.8	41.8	26.3
Real estate	19.8	67.0	22.8	12.7	22.3	19.3	34.0	21.3	49.1	9.6	6.1	17.5	26.6	44.2	54.6	35.8	31.2	19.1	7.4	35.7	44.6	39.3	10.9
Professional activities	49.7	59.9	50.7	38.2	43.5	49.7	38.0	50.0	45.7	33.9	46.7	52.0	51.4	47.5	47.0	41.1	48.5	52.8	59.9	50.0	48.9	47.3	22.7
Head offices	70.7	76.8	65.0	71.6	80.8	69.5	83.3	71.2	67.1	39.3	64.5	67.1	74.4	77.2	77.0	67.1	65.0	72.6	73.4	61.4	67.0	64.8	31.1
Administration	30.8	56.7	30.9	32.1	29.5	30.9	12.2	32.1	25.9	12.1	24.0	33.2	31.8	35.3	38.1	31.1	30.7	27.1	38.3	28.8	33.3	33.8	16.4
Social activities	33.8	63.2	37.3	21.3	24.3	33.8	18.4	34.9	17.8	17.2	23.6	30.1	38.7	46.9	40.4	24.8	36.4	37.5	50.9	43.9	37.5	28.3	10.3
Arts and Entertainment	25.1	79.0	25.1	24.3	27.1	25.1	38.3	26.3	50.9	6.9	12.5	28.9	32.5	33.6	32.6	24.1	22.7	21.4	50.0	29.8	39.4	26.6	7.0
Mining	40.8	62.8	40.2	36.9	49.2	40.5	64.3	44.9	52.1	19.2	17.3	49.8	40.1	46.4	42.8	40.0	29.9	40.1	82.6	28.2	20.1	33.3	40.6
Agriculture	22.4	56.7	18.1	43.9	50.2	21.9	72.4	21.9	73.8	27.3	14.5	28.3	38.8	26.0	35.7	32.6	17.5	19.1	16.6	18.8	24.9	31.4	14.1
Total	34.1	65.3	34.9	29.1	36.1	33.8	46.4	35.6	49.5	14.6	21.9	33.2	39.2	41.3	42.3	34.2	32.9	32.2	41.3	36.6	38.5	33.7	12.8
Sector																							
Primary	22.4	56.7	18.1	43.9	50.2	21.9	72.4	21.9	73.8	27.3	14.5	28.3	38.8	26.0	35.7	32.6	17.5	19.1	16.6	18.8	24.9	31.4	14.1
Secondary	32.5	55.2	33.3	27.7	34.6	21.9	38.8	33.8	40.9	17.4	20.0	29.9	36.0	39.7	39.2	34.8	29.0	23.7	44.6	27.8	35.8	35.2	15.6
Tertiary	34.9	67.9	35.7	29.6	37.1	21.9	52.2	36.4	52.8	13.5	22.5	34.1	40.2	42.2	44.1	33.9	34.3	33.8	40.7	38.6	39.7	33.1	12.2

Source: SABINA, OeNB, own calculations.

Note: Definitions are given in the text. For NACE classifications see Table A1 in the annex.

4.1 The role of technology

There is a strong heterogeneity in the equity ratio across industries. The median equity ratio is only 14% for accommodation but 50% for professional activities and even 71% in the case of head offices (see table 1). The economic literature has identified a number of possible explanations for this heterogeneity. For example, financing decisions may be affected by industry structure, such as the number of firms that are active in an industry as well as the level and forms of competition in an industry (Frank and Goyal, 2009; MacKay and Philips, 2005). As a crude measure to vindicate this proposition, we correlate equity ratios across industries and the Herfindahl-Hirschman index (HHI) of total assets as a proxy for the concentration within the individual industries. However, the correlation between the HHI and the equity ratio across industries is slightly negative (-0.06).

Furthermore, the capital structure is affected by the type of production and the technologies employed. For example, according to Titman and Wessels (1988), firms that manufacture machines and equipment should be financed with relatively more equity. This assertion is corroborated by the fact that manufacturing exhibits an above-average equity ratio although tangible assets ratio is above the average, too.

Moreover, different technologies employed by different industries require different endowments with (different types of) fixed assets. In this respect, the amount of tangible assets employed impacts the financing decisions of firms in several ways. Tangible assets are easier to value and hence easier to pledge as collateral when raising secured debt (Frank and Goyal, 2009). Furthermore, agency costs between owners and creditors are smaller when firms offer tangible assets as collateral. Our data show that companies with a high tangible assets ratio tend to have a low equity ratio. Companies in the highest quartile of the tangible asset ratio have a median equity ratio of only 13% while companies in the lowest quartile have a median equity ratio of 37%. Differences are also apparent at the industry level. Accommodation, energy and real estate activities, the three industries with the lowest equity ratio, have high tangible assets ratios (median values of 56%, 83%, 82%, respectively) whereas industries with a low tangible assets ratio, such as information (5%) or professional activities (6%), have high equity ratios.

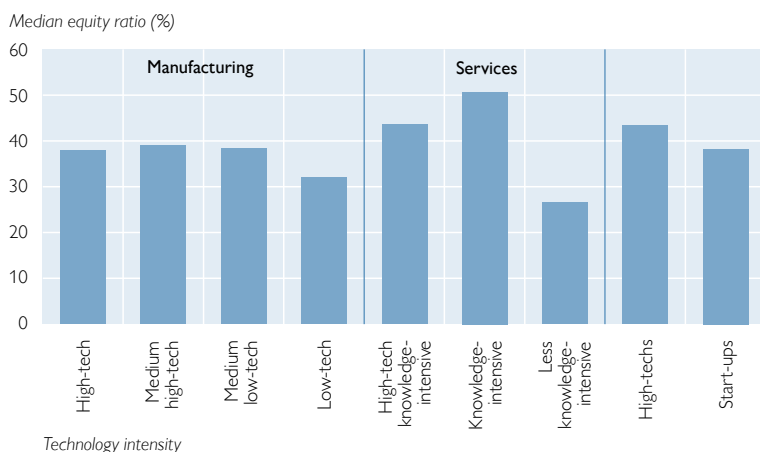
In contrast, we find hardly any link between the intangible assets ratio and the equity ratio.¹² The equity ratio generally increases with the financial assets ratio. In this respect, head office activities are noteworthy as they exhibit both a far above-average financial assets ratio and the highest equity ratio. The median financial assets ratio of head office activities amounts to 55% compared to 4.7% across all companies.

Furthermore, the literature posits a positive correlation of the equity ratio with R&D intensity. One reason is that there is usually no secondary market for R&D and that R&D is hard to collateralize (Titman and Wessels, 1988). Moreover, the long-term nature of R&D and the high risks in terms of the probability of success of R&D projects give rise to agency issues, especially during the initial stages (Berk et al., 2004). Our data suggest that low-technology manufacturers and less knowledge-intensive services have a significantly lower equity ratio than other manufacturers or services (chart 1). The low equity ratio of low-tech manufactures and less knowledge intensive services might be linked to their relatively high tangible assets

¹² However, this result as well as the results regarding the financial assets ratio might be biased because of a relatively high number of missing values.

Chart 1

Equity ratio and technology



Source: SABINA, OeNB, own calculations.

ratio, which enables them to take on more debt. Furthermore, high-tech knowledge-intensive services and knowledge-intensive services have a higher equity ratio than high-tech manufactures. Within the manufacturing sector the median equity ratio of high-tech manufactures does not differ significantly from the median equity ratio of medium high-technology and medium low-technology enterprises. Consequently, for manufacturing our data do not support the conclusion that high-tech companies have a higher equity ratio in general than non-high-tech companies.

The median equity ratio of start-ups is 38%, which is about 4 percentage

points higher than the overall median equity ratio but about 5 percentage points lower than the median equity ratio of all high-tech companies.¹³ However, the equity ratio is positively correlated with company age, at least up to a certain age (see below). Comparing start-ups with other young companies, which exhibit an equity ratio of 22%, the equity ratio of start-ups is 16 percentage points higher.

4.2 The role of firm size

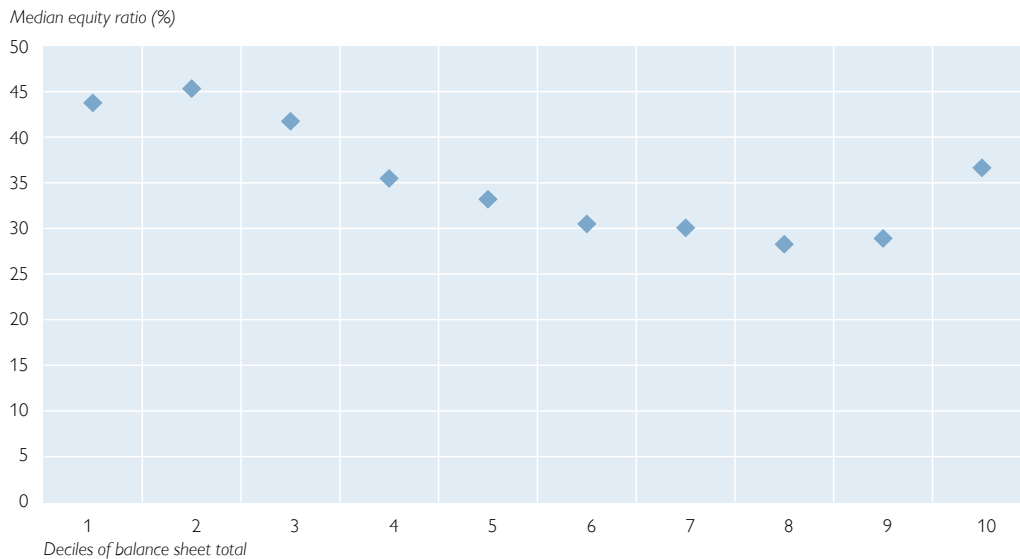
It has been a recurrent theme in Austrian economic policy that smaller firms have lower equity ratios than larger ones (OeNB, 2014; Dirschmid and Waschiczek, 2005). The trade-off theory posits a positive relationship between the size of the firm and the equity ratio. A number of authors have suggested that larger firms have a lower risk of financial distress because their investment projects and their revenues tend to be more diversified (Titman and Wessels, 1988; Rajan and Zingales, 1995). In this vein, prospective outside investors might consider firm size as an inverse proxy for the probability of default. In contrast, the pecking order theory stresses informational aspects. As there are economies of scale in producing information, there tends to be less public information available about smaller firms. For example, financial statements of smaller firms are often less comprehensive. A case in point is the fact that there are fewer corporate register reporting requirements for smaller firms. Thus, as they are more informationally opaque than larger firms, smaller companies tend to use less outside equity to finance their investment projects (Harris and Raviv, 1991). On the other hand, opaque companies might have to rely relatively more on internally generated equity. Hence, from the point of view of the pecking order theory, the impact of size on the overall equity ratio is *prima facie* ambiguous.

In general, firms in the highest opaqueness quartile (that is, the most opaque firms) have significantly higher equity ratios than less opaque companies, whereas

¹³ This result is not influenced by setting the maximum age of a start-up at 4 years in our definition. When choosing other age brackets (such as 2–4, 2–6 or up to 6 years), the median equity ratio changes only marginally.

Chart 2

Size and equity ratio



Source: SABINA, OeNB, own calculations.

in the first three quartiles, the differences are not very pronounced. As discussed above, firms might provide information to outsiders above the legal minimum requirements when they have economic incentives to do so. If that is the case, the capital structure is not a consequence of opaqueness; much rather the level of opaqueness is a deliberate decision in line with the financial needs of the firm. This view would correspond to Berger and Udell's (1998) idea of a financial growth cycle, in which financial needs and options change as the firm grows, gains further experience, and becomes less informationally opaque.

Turning to the correlation between the equity ratio and size, our data suggest the relationship between size and equity ratio is not linear (chart 2). Disregarding the smallest firms up to total assets of about EUR 40,000 the equity ratio declines with company size. Only for the 20% largest companies the equity ratio is increasing again. The median equity ratio for micro enterprises is 35% and thus higher than for small (29%) and only slightly lower than for medium-sized (36%) enterprises but smaller than for large firms (46%). This decrease with firm size cannot entirely be explained by the theories discussed above. One potential reason is that the tangible assets ratio is increasing in size up to about the 90th percentile of total assets. Hence, very small companies have on average a relatively low tangible assets ratio, making it more difficult to obtain outside funding. To some extent, legal minimum capital requirements contribute to the observed non-linear relationship between firm size and equity ratio. As it is possible to start a limited liability company with a share capital of only EUR 5,000, micro enterprises with a very low net worth but minimum paid-in capital have a higher equity ratio than companies with higher total assets with the same minimum capital. This is reflected by the fact that for micro firms, the median share of subscribed capital in total capital amounts to 21%, whereas it is 3% for other firms. Consequently, in the case of micro firms, subscribed capital contributes 14% to the balance sheet total, compared to 1.1% for others.

Age is a further variable for which theory predicts a positive impact on the equity ratio. One reason is that older firms usually have more internal funds from retained earnings as they had more time to build up reserves. Moreover, unprofitable firms usually do not get old. However, we find a positive correlation between age and equity ratio only for the first ten years of company life. Thereafter, the correlation vanishes. Here, other features that influence a firm's equity ratio and also change over the life cycle of a firm might be at play. For example, the tangible assets ratio that reaches a minimum for companies that are about ten years old is increasing for older companies, suggesting a larger role for debt financing. Furthermore, older firms are on average larger than younger ones. Hence, the relationship between size and equity ratio discussed above can also play a role in the life cycle effects on the equity ratio.

Finally, equity ratios differ substantially according to the legal form of the firm. The median equity ratio for stock corporations amounts to 50%, whereas it is 36% for limited liability companies and only 15% for limited partnerships. As the vast majority of the firms in our sample are limited liability companies, they strongly shape the overall median equity ratio. To some extent, the differences in the legal minimum capital requirements for different legal structures might affect the differences in the equity ratio, especially in the early years of a company. The low values for limited partnerships might be explained by the considerations about the nonseparation of personal and business assets discussed in section 1. The differences in the equity ratio across legal forms might also reflect the influence of size. With median total assets of EUR 30 million, stock corporations are much larger than limited liability companies (EUR 461,000) or limited partnerships (EUR 993,000). Furthermore, stock corporations are less informationally opaque than other companies as legislation pertaining to stock corporations is tailored to large public companies, subjecting stock corporations to substantially more requirements concerning public information compared with other legal forms. As a consequence, they have easier access to outside equity financing.

5 Summary and conclusions

This article provides an overview of the equity ratio of Austrian nonfinancial firms using an extensive database based on SABINA and OeNB data. While allowing for a broad coverage in terms of the number of firms, our approach entails a limited number of variables for which data are available for all companies. Nevertheless, it allows some conclusions that might be relevant for economic policy.

For one, we have addressed the relationship between technology intensity and the equity ratio. Low-tech companies have a lower equity ratio than companies with higher technology intensity. This pattern is more pronounced in the service sector than in manufacturing. However, the median equity ratio of high-tech manufactures does not differ significantly from the median equity ratio of medium-low-technology manufacturers. Start-ups exhibit a higher equity ratio than young companies outside the high-tech sector. At the same time, the technology employed, represented by the intensity of the use of tangible assets, affects the equity ratio. Specifically, industries with higher tangible assets ratio have a lower equity ratio.

The second finding of our paper is that the relationship between firm size (in terms of total assets) and equity ratio is not linear. Up to a certain size, the equity ratio decreases with firm size. At least in part, minimum capital requirements

might also contribute to the higher equity ratio of micro enterprises. We find a strong relationship between opaqueness and firm size, and the most opaque firms have significantly higher equity ratios. On the one hand, opaqueness might be a hindrance to raising outside equity. On the other hand, the degree of opaqueness might be a deliberate decision of firms, based on cost-benefit considerations weighing the additional cost of providing information to outsiders against the additional benefit of outside equity capital. In contrast, firm age – which is also related to firm size, as older firms are on average larger than younger ones – affects the equity ratio only in the first decade of company life. Here, the endowment with tangible assets might play a role as the tangible assets ratio reaches a minimum at about that age.

However, including nearly all companies in the analysis entails some limitations as the number of variables that is available for all companies is limited. Using a subsample of companies for which a larger number of variables is available, future research could for example analyze the relationship between the equity ratio and firm size in a multivariate framework. Furthermore, such a subsample may be used to address the relative importance of internally generated and externally raised equity. Another point meriting scrutiny is the interplay between opaqueness and the equity ratio or – in more general terms – the interplay between size, age, opaqueness and equity ratio. Finally, it might be worthwhile to look at those 20% of the Austrian companies that report a negative equity ratio.

In recent years, Austria has implemented a number of policy measures to foster equity financing, especially for young and innovative enterprises and regarding venture capital financing (see for example Gassler et al. 2018). These measures can be expected to enable firms to increase their equity ratio further, although it will take time until these initiatives show their full effect.

In this respect, it has to be taken into account that financial matters are now decided mostly on the European level, so that in general there is little scope for national policies. The proposal for an EU-wide Capital Markets Union is a prominent case in point. In this sense, supporting the various initiatives on the individual elements of the Capital Markets Union constitutes one of the key starting points for further expanding equity-based corporate financing.

There are other reasons why further policy measures targeted to increase the equity ratio are not necessarily required. In the current situation, the capital requirements of companies are covered primarily by internal financing and very low-interest debt. Generally, Austrian firms consider access to finance to be a relatively small problem, as, for example, the Survey on the Access to Finance of Enterprises (SAFE) shows (ECB, 2018). Especially younger firms require not only (equity) finance but also other forms of support. Thus, the role of venture capital goes beyond its financing function but consists also in monitoring and providing expertise and support for the management of the companies in which they invest. This supporting function, which is a key aspect of venture capital financing especially in the early stages of funding, e.g. in the start-up and expansion stage of companies, cannot be increased easily by policy measures.

References

- Adalet McGowan, M., D. Andrews and V. Millot. 2017.** The Walking Dead? Zombie Firms and Productivity Performance in OECD Countries. OECD Economics Department Working Papers 1372. OECD Publishing, Paris.
- Bernanke, B. and J. Y. Campbell. 1988.** Is There a Corporate Debt Crisis? Brookings Papers on Economic Activity 1. 83–125.
- Berger, A. N. and G. F. Udell. 1998.** The Economics of Small Business Finance: The Roles of Private Equity and Debt Markets in the Financial Growth Cycle. In: *Journal of Banking and Finance* 22. 613–673.
- Berk, J. B., R. C. Green and V. Naik. 2004.** Valuation and Return Dynamics of New Ventures. In: *Review of Financial Studies* 17. 1–35.
- Cecchetti, S. G., M. S. Mohanty and F. Zampolli. 2011.** The real effects of debt. BIS Working Paper 352. September.
- Dirschmid, W. and W. Waschiczek. 2005.** Institutional determinants of equity financing in Austria. In: *OeNB Financial Stability Report* 9. 77–92.
- ECB. 2018.** Survey on the Access to Finance of Enterprises in the euro area. April to September 2018. November.
- European Commission. 2003.** Commission Recommendation of 6 May 2003 concerning the definition of micro, small and medium-sized enterprises. C(2003) 1422.
- Eurostat. 2018.** Glossary: High-tech. *Statistics Explained*. July 4.
- Frank, M. and V. K. Goyal. 2009.** Capital Structure Decisions: Which Factors are Reliably Important? In: *Financial Management*. Spring. 1–37.
- Gassler, H., W. Pointner and D. Ritzberger-Grünwald. 2018.** Financing growth of small and medium sized enterprises and startups in Austria. In: *OeNB Financial Report* 36. December.
- Harris, M. and A. Raviv. 1991.** The theory of capital structure. In: *Journal of Finance* 46. 297–355.
- Kraus, A. and R. H. Litzenberger. 1973.** A State-Preference Model of Optimal Financial Leverage. In: *Journal of Finance* 28. 911–922.
- MacKay, P. and G. M. Phillips. 2005.** How Does Industry Affect Firm Financial Structure? In: *The Review of Financial Studies* 18(4). 1433–1466.
- Myers, S. C. 1977.** Determinants of Corporate Borrowing. In: *Journal of Financial Economics* 5. 147–175.
- Myers, S. C. 1984.** The capital structure puzzle. In: *Journal of Finance* 39. 575–592.
- Myers, S. C. and N. S. Majluf. 1984.** Corporate financing and investment decisions when firms have information that investors do not have. In: *Journal of Financial Economics* 13. 187–224.
- OeNB. 2014.** Austrian SMEs' Access to Finance – Evidence in BACH Data. Box 1. In *OeNB Financial Stability Report* 28. December. 26–27.
- Rajan R. and L. Zingales 1995.** What Do We Know about Capital Structure? Some Evidence from International Data. In: *Journal of Finance* 50. 1421–1460.
- Titman, S. and R. Wessels. 1988.** The determinants of capital structures choice. In: *Journal of Finance* 43. 1–19.
- Wiesinger, S. 2015.** Innersektorale Kredite und Handelskredite als Substitut klassischer Bankkredite? In: *OeNB Statistiken Q4/15*. 35–48.

Annex

Table A1

A1 NACE codes of industries and abbreviations

Sector	Code	Description	Short form used in text
Primary	A	Agriculture, Forestry and Fishing	Agriculture
Secondary	B	Mining and Quarrying	Mining
	C	Manufacturing	Manufacturing
	D	Electricity, Gas, Steam and Air Conditioning Supply	Energy
	E	Water Supply; Sewerage, Waste Management and Remediation Activities	Utilities
	F	Construction	Construction
Tertiary	G	Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles	Trade
	H	Transportation and Storage	Transportation
	I	Accommodation and Food Service Activities	Accommodation
	J	Information and Communication	Information
	L	Real Estate Activities	Real estate
	M	Professional, Scientific and Technical Activities	Professional activities
	M70.1	Activities of head offices	Head offices
	N	Administrative and Support Service Activities	Administration
	P; Q	Education; Human Health and Social Work Activities	Social activities
	R; S	Arts, Entertainment and Recreation; Other Service Activities	Arts and Entertainment

Source: Eurostat.

Table A2.1

Number of Austrian nonfinancial corporations in the sample

Industry	Total				Legal form			Age (years)					Opacity (quartiles)				Tangible assets ratio (quartiles)					
	Size				large	GmbH	AG	KG	up to 4	5-9	10-19	20-29	30+	1	2	3	4	1	2	3	4	
	micro	small	me- dium	KMU																		
Manufacturing	10776	7:155	2:248	910	10.313	463	9.738	80	958	1.924	1.724	3.005	2.192	1.929	5.470	2.678	1.412	1.216	1.328	2.574	4.005	1.587
Energy	1.491	897	381	128	1.406	85	1.265	31	195	414	406	490	102	79	582	298	331	280	85	51	217	933
Utilities	613	397	154	43	594	19	563	4	46	111	107	182	149	64	245	158	119	91	64	67	197	202
Construction	14:188	11.602	2:140	377	14:119	69	13.305	15	868	4.367	2.709	3.286	2.213	1.612	4.344	4.312	2.887	2.645	2.696	4.063	3.522	1.513
Trade	26.851	21.619	3.949	952	26.520	331	25.352	65	1.434	6.730	5.017	6.749	4.748	3.605	8.430	8.073	5.870	4.478	7.321	7.032	5.849	2.226
Transportation	4:572	3:457	784	233	4:474	98	4:091	56	425	958	794	1:175	849	795	1:580	1:183	988	821	673	739	1:331	1:174
Accommodation	8:320	6:602	1:430	267	8:299	21	7:520	4	796	2:487	1:743	1:963	1:394	733	2:666	2:413	1:815	1:426	454	1:037	2:205	3:539
Information	7:192	6:394	596	145	7:135	57	6:887	43	262	2:393	1:611	2:129	723	336	1:751	2:062	2:134	1:245	2:552	2:034	1:044	333
Real estate	18:105	11:363	4:782	1.527	17:672	433	16:051	70	1.984	6:378	3:707	4:098	2:304	1.618	1.868	3:178	6:117	6.942	1.458	1.206	2.148	9.676
Professional activities	17:348	15:665	1:381	247	17:293	55	16:714	53	581	5:091	4:203	5:460	1.804	789	2:964	5:535	5:434	3.415	5.595	4.949	2.619	1.015
Head offices	10:072	5:748	2:328	1.124	9:200	872	9:610	273	189	3:390	2:442	2:582	978	680	1.207	1.114	3.291	4.460	1.329	490	747	902
Administration	5:247	4:341	644	185	5:170	77	4:969	12	266	1:642	1:143	1:342	749	369	1.206	1:512	1.486	1.043	1.388	1:197	1.005	771
Social activities	2:118	1:756	294	63	2:113	5	2:014	2	102	583	493	688	273	80	603	649	504	362	391	525	539	359
Arts and Entertainment	2:917	2:535	287	74	2:896	21	2:711	12	194	876	640	731	441	229	744	855	754	564	420	503	741	819
Mining	310	172	91	27	290	20	269	2	39	46	50	79	65	70	150	47	63	50	13	27	116	83
Agriculture	847	666	155	22	843	4	788	4	55	387	210	177	44	29	195	240	252	160	35	64	265	403
Total	130.967	100.369	21.644	6.324	128.337	2.630	121.847	726	8.394	37.777	26.999	34.136	19.028	13.017	34.005	34.307	33.457	29.198	25.802	26.558	26.550	25.535
Sector																						
Primary	847	666	155	22	843	4	788	4	55	387	210	177	44	29	195	240	252	160	35	64	265	403
Secondary	27.378	20.223	5.014	1.485	26.722	656	25.140	132	2.106	6.862	4.996	7.042	4.721	3.754	10.791	7.493	4.812	4.282	4.186	6.782	8.057	4.318
Tertiary	102.742	79.480	16.475	4.817	100.772	1.970	95.919	590	6.233	30.528	21.793	26.917	14.263	9.234	23.019	26.574	28.393	24.756	21.581	19.712	18.228	20.814

Source: SABINA, OeNB, own calculations.

Note: Definitions are given in the text.

Table A2.2

Number of Austrian nonfinancial corporations in the sample

	Total				Legal form		Age (years)				Opacity (quartiles)				Tangible assets ratio (quartiles)							
	Size				GmbH	AG	KG	up to 4	5–9	10–19	20–29	30+	1	2	3	4	1	2	3	4		
	micro	small	me- dium	KMU	large																	
Technology-intensity																						
<i>Manufacturing</i>																						
High	486	111	43	453	33	463	7	16	120	80	156	66	63	231	129	80	46	109	171	134	25	
Medium-high	2,235	1,334	280	2,058	177	2,050	27	158	376	346	648	460	405	1,185	562	263	225	386	662	752	170	
Medium-low	3,991	2,659	891	3,851	140	3,651	22	318	734	640	1,153	788	675	2,021	1,017	549	404	470	975	1,527	602	
Low	4,064	2,863	802	3,951	113	3,574	24	466	694	658	1,048	878	786	2,033	970	520	541	363	766	1,592	790	
<i>Services</i>																						
High-tech knowledge-intensive	6,926	6,145	142	6,867	59	6,644	55	227	2,439	1,618	2,015	596	258	1,630	1,969	2,102	1,225	2,386	1,951	1,051	336	
Knowledge-intensive	32,923	26,056	4,393	31,972	951	31,492	336	1,095	9,972	7,908	9,686	3,564	1,791	5,636	8,281	10,120	8,886	8,211	6,628	4,496	2,984	
Less knowledge-intensive	62,893	47,279	11,502	61,933	960	57,783	199	4,911	18,117	12,267	15,216	10,103	7,185	15,753	16,324	16,171	14,645	10,984	11,133	12,681	17,494	
High-tech	7,412	6,444	691	7,320	92	7,107	62	243	2,559	1,698	2,171	662	321	1,861	2,098	2,182	1,271	2,495	2,122	1,185	361	

Source: SABINA, OeNB, own calculations.

Note: Definitions are given in the text.