

Market prices and the evolution of corporate leverage in the euro area

ANTONIO SÁNCHEZ SERRANO

2022 edition



**Market prices and the
evolution of corporate
leverage in the euro area**

ANTONIO SÁNCHEZ SERRANO

2022 edition

Manuscript completed in September 2022

This document should not be considered as representative of the European Commission's official position.

Luxembourg: Publications Office of the European Union, 2022

© European Union, 2022



The reuse policy of European Commission documents is implemented based on Commission Decision 2011/833/EU of 12 December 2011 on the reuse of Commission documents (OJ L 330, 14.12.2011, p. 39). Except otherwise noted, the reuse of this document is authorised under a Creative Commons Attribution 4.0 International (CC-BY 4.0) licence (<https://creativecommons.org/licenses/by/4.0/>). This means that reuse is allowed provided appropriate credit is given and any changes are indicated.

For any use or reproduction of elements that are not owned by the European Union, permission may need to be sought directly from the respective rightholders. The European Union does not own the copyright in relation to the following elements:

For more information, please consult: <https://ec.europa.eu/eurostat/about/policies/copyright>

Copyright for the photograph: Cover © Creative Stock Studio/Shutterstock

The information and views set out in this publication are those of the authors and do not necessarily reflect the official opinion of the European Union. Neither the European Union institutions and bodies nor any person acting on their behalf may be held responsible for the use which may be made of the information contained therein.

Theme: Economy and finance statistics

Collection: Statistical working paper

ISBN 978-92-76-59107-8 doi: 10.2785/304183 KS-03-22-176-EN-N

Abstract

Corporate leverage is an important variable for financial stability. The System of National Accounts provides a solid methodology to monitor aggregated trends. In this framework, the valuation of balance sheet items at market prices implies that both changes in volume and changes in prices define the evolution of corporate leverage over time. To demonstrate how revaluations can also explain the dynamics of corporate leverage, we build time series that only consider transactions in financial assets and liabilities. We find that the trends in corporate leverage in the euro area since 1999 would have been different if revaluations had been excluded. Users of national accounts for financial stability purposes should be aware of the impact that market prices can have on corporate leverage. Besides, ongoing methodological work to improve national accounts should continue, in particular in what regards techniques for the estimation of market values of some financial instruments.

Keywords: leverage, market prices, non-financial corporations, equity valuation, financial instruments.

JEL codes: E01, E44, G12, G32.

Disclaimer: The views expressed in this paper are those of the author and do not necessarily represent the views of the European Systemic Risk Board (ESRB), any of its Member Institutions or the ESRB Secretariat.

Acknowledgements: Comments from Bo Becker, Enrico Perotti and Javier Suarez are gratefully acknowledged. All remaining errors are my own.

§ Corresponding author: +49 69 1344 4446, antonio.sanchez@esrb.europa.eu. European Systemic Risk Board, Sonnemannstrasse 20, 60314 Frankfurt am Main.

Table of content

Abstract	3
Table of content	4
Non-technical summary	5
1. Introduction	6
2. Valuation of balance sheet items in the System of National Accounts.....	9
3. Gauging the effect of revaluations on corporate leverage	12
3.1. Corporate leverage and the revaluation of assets.....	13
3.2. Corporate leverage and the revaluation of liabilities	14
3.3. Discussion of results.....	16
4. Conclusions	18
References	19
Annex 1. Corporate leverage and revaluations of non-financial assets	21
Annex 2. Corporate leverage and revaluations in the US	22

Non-technical summary

For monitoring financial stability, it is important to measure the evolution of corporate leverage (the share of debt over total assets in the balance sheet) over time. Higher leverage in the corporate sector erodes resilience, amplifies the impact of adverse shocks, can lead to high volatility and can ultimately increase systemic risk in the financial system.

Data based on the System of National Accounts can be useful to monitor aggregate sectoral leverage. After the global financial crisis, the FSB-IMF Data Gap Initiative called for a wider use of sectoral accounts and flow-of-funds data to monitor systemic risks and vulnerabilities, including the build-up and dynamics of corporate leverage. Under the System of National Accounts, the valuation of financial assets and liabilities at market values could be an additional factor to explain the evolution of corporate leverage, in addition to the incurrence of new debt or changes in the size of the balance sheet. In other words, aggregate trends in corporate leverage may be affected by differences in how financial assets and liabilities are valued on balance sheets. Furthermore, the valuation at market prices of some balance sheet items is not free of methodological issues, particularly in the case of non-listed shares. These are issues on which preparers of national accounts have been working for decades, but which may not be known by users outside the statistical domain.

In this paper, we compute corporate leverage for the euro area considering only transactions of financial assets and liabilities, excluding thus revaluations. We do not intend to question the use of market values in the System of National Accounts, but to raise an important methodological issue, of which users of this information may not be aware. In practical terms, we look first at revaluations of financial assets, as they appear in the denominator of the leverage ratio, and then at the revaluations of financial liabilities, which comprise revaluations of own equity.¹ Then, we assess the importance of revaluations in the evolution of corporate leverage in the euro area since 1999, by comparing it with the time series with revaluations.²

We find that revaluations of balance sheet items have had a sizable impact on the evolution of euro area corporate leverage. Actually, corporate leverage would have peaked earlier during the global financial crisis in case revaluations had been excluded. Those were times of exuberant financial markets, which were reflected in the valuation of financial assets and liabilities at market prices. Later on, the decreasing trend in corporate leverage observed since 2010 gets attenuated (or even turns into a flat line) when revaluations of financial assets and liabilities are excluded. Interestingly, we observe higher movements upwards and downwards of the time series excluding revaluations of financial liabilities, as revaluations of own equity tend to be larger than revaluations of financial assets.

While we do not want to prescribe how to account for revaluations in the analysis of corporate leverage, we offer evidence of a non-negligible effect for the euro area. Even if our paper does not consider other jurisdictions, we believe that our findings should equally apply to them. That would signal the importance of raising awareness among users of national accounts for financial stability purposes and of continuing ongoing methodological work to enhance national accounts, in particular in those areas where market values are not easily available and need to be estimated.

(1) By the term 'own equity' we refer to shares and other reserves that appear in the liabilities side of the balance sheet of non-financial corporations under the generic name of 'equity'. We use this label to distinguish them from equity instruments in the asset side of the balance sheet.

(2) In Annex 2 we show a similar, albeit shorter, analysis for the US corporate sector.

1

Introduction

The extent to which corporates use bank loans and debt securities as funding sources, as opposed to shares and retained earnings, determines how financially vulnerable they can be to adverse shocks. Banks can be seen as financial intermediaries, operating between savers, who deposit money in them, and borrowers, who receive a loan from the bank to perform some economic activity. Households and non-financial corporations are typically the two sectors borrowing money from banks. While bank loans are the main source of funding for households to undertake large investments (like the acquisition of a dwelling), non-financial corporations can have up to four main sources of funding. They can opt for bank loans, debt securities, shares and retained earnings (i.e., undistributed profits from past periods) to finance their activities (Jermann and Quadrini, 2012).

From a financial stability perspective, it is important to measure leverage (the ratio between debt and total assets) across sectors. It has been documented that excessive leverage can lead to episodes of high volatility and increase systemic risk. As a result, leverage, also in the financial system, can act as an amplifier of adverse shocks (Kiyotaki and Moore, 1997; Bernanke et al., 1999; Adrian and Boyarchenko, 2012; Brunnermeier and Sannikov, 2014). More recently, Mian et al. (2017) find that positive shocks to household debt tend to precede a short-term upswing in economic activity, followed by a downturn over longer horizons. They find a similar, albeit weaker, effect of corporate leverage in their specification. Also related to the corporate sector, Kalemli-Ozcan et al. (2019) find a link between leverage of non-financial corporations and their level of investment after a crisis, as they do not wish or cannot get bank funding to undertake new investment. Giroud and Mueller (2017) find evidence that highly-leveraged US corporates experienced larger declines in employment during the global financial crisis.

Therefore, authorities with a financial stability mandate usually include the evolution of leverage through the different sectors of an economy in their monitoring activities (International Monetary Fund, 2015; European Systemic Risk Board, 2021). Given the focus of macroprudential policy on aggregated trends, as opposed to the focus of microprudential policy on individual institutions, national sectoral accounts, including who-to-whom and flow of funds, can be used to monitor leverage at the sectoral level (Tissot, 2016; Boh et al., 2019). Actually, the FSB-IMF Data Gaps Initiative, launched in the aftermath of the global financial crisis, called to strengthen sectoral accounts and flow of funds statistics, to better monitor the systemic risks and vulnerabilities, and the interrelationship between the real sector accounts and the financial accounts (Financial Stability Board and International Monetary Fund, 2009). In this regard, Girón and Rodríguez-Vives (2017) propose an interesting framework to assess leverage across sectors over time based on a set of identities in the System of National Accounts.

In this paper, we consider how the valuation of financial assets and liabilities at market prices may influence the evolution of corporate leverage when computed from national accounts. Although non-financial assets are also valued at market values in the System of National Accounts, data on transactions and revaluations is not easily accessible, as is the case of financial assets and liabilities. However, we present a stylised analysis in Annex 1 on how corporate leverage would look like in the euro area when (estimated) revaluations of non-financial assets are excluded too.

It is certainly not our purpose to question the convenience of using market prices for national accounts. We acknowledge, on the one hand, that market values offer an updated view of the price at which the underlying financial instrument could be transferred, bringing it closer to its 'real value'. When financial assets are highly liquid (like cash or listed stocks), their market value provides a fair representation of their value at a given point in time. But, on the other hand, market valuations can be more volatile and, at times, depart from the fundamentals. Taking a broader perspective, there has been a long debate around the most appropriate measurement of financial assets and liabilities: at cost or at market prices (see Laux and Leuz, 2009 and European Systemic Risk Board, 2017, for

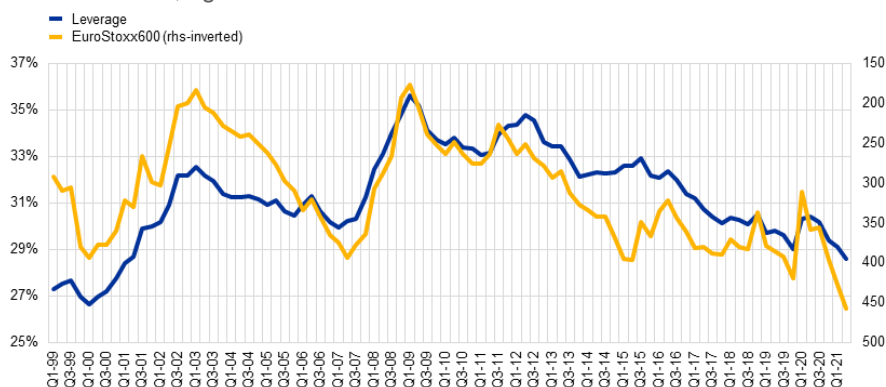
further details), but our contribution is not intended in the context of this debate.³

We want to conceptually discuss how the dynamics of corporate leverage over time could be affected by revaluations (changes in prices) and not only by economic phenomena involving the incurrence of new debt or a change in the size of the balance sheet (changes in volume). In other words, we want to demonstrate that differences in the revaluations of financial assets and liabilities could also explain aggregated trends in corporate leverage. Therefore, we compute corporate leverage considering only transactions of balance sheet items, not revaluations, and compare the resulting time series with the one considering both transactions and revaluations. We start with the analysis of revaluations of financial assets, which appear in the denominator of the leverage ratio, and then move to financial liabilities.

Among financial liabilities, the impact that the revaluations of the own equity of non-financial corporations may have on leverage is methodologically relevant. Chart 1 below shows the evolution of corporate leverage in the euro area and stock prices (with inverted values) since 1999. While not enough to determine causality, the similar evolution of these two variables raises the question as to whether corporate leverage could, to a certain extent, be driven by revaluations of financial assets and liabilities. The determination of the market value of the shares of non-financial corporations, particularly when not listed in a financial market, has been an area of work by scholars in corporate finance in the last decades (Kantor and Pike, 1987; Petersen et al., 2006; Damodaran, 2007). Preparers of national accounts (i.e., statistical offices and central banks) also acknowledge the difficulties in estimating the market value of equity, taking into account that the percentage of non-financial corporations listed in a financial market tends to be small in the total economy,⁴ and are continuously proposing and refining methodologies to overcome these difficulties (see, for example, Sunga, 1987; Banco de España, 2005; Kramulová et al., 2019).

Chart 1. Leverage of euro area non-financial corporations and EuroStoxx 600

Left-hand side: %; right-hand side: index



Sources: European Central Bank, Haver Analytics and author's calculations.

Notes: leverage is defined as loans and debt securities, divided by the sum of financial assets and net fixed assets. Last observation is Q2-2021.

We provide evidence of the influence of the revaluations of financial assets and liabilities on the dynamics of corporate leverage in the euro area since 1999. While taking them into account defines a decreasing path of corporate leverage since the global financial crisis, the picture is different when revaluations of financial assets and liabilities are excluded. The results are shown in this paper for the euro area and the US (the latter is shown in Annex 2) for illustrative purposes, as we want to

(³) The relation between fair value accounting and the excessive leverage in banks that led to the global financial crisis has also been subject to academic research, often looking for causality between these economic phenomena (Laux and Leuz, 2010; Laux and Rauter, 2017). It is certainly not our purpose to find evidence of such causality.

(⁴) For example, listed shares of euro area non-financial corporations represented, at the end of 2021, only 31 % of shares and other equity.

raise awareness about this important methodological issue. Users of national accounts for the purposes of financial stability monitoring should take into account the impact that market values could have on their analysis.

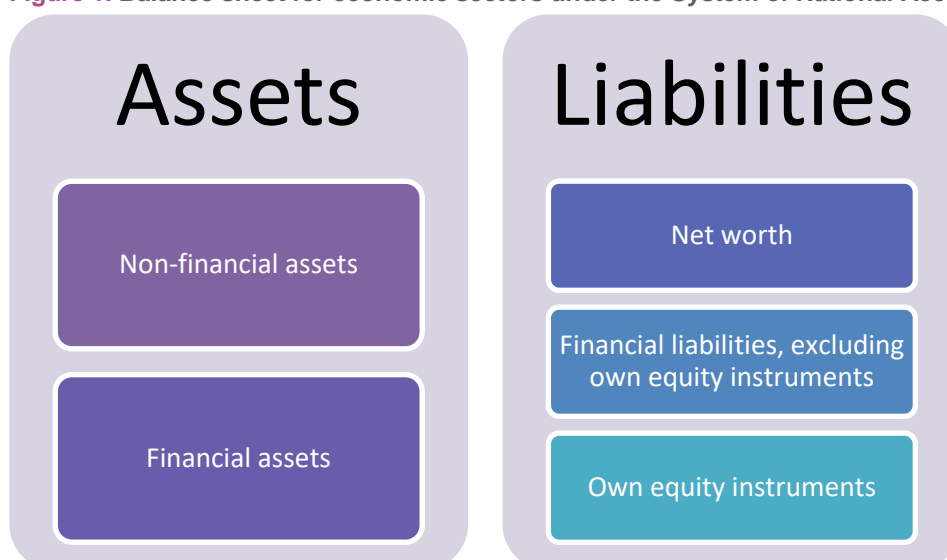
The paper is organised as follows. Section 2 briefly explains the valuation of balance sheet items in national accounts. Section 3 presents the analysis of market valuation of balance sheet items on corporate leverage, using data from the euro area non-financial corporations. Section 4 concludes. Two annexes complement the analysis in Section 3 by estimating transactions of non-financial assets and by considering corporate leverage in the US.

2

Valuation of balance sheet items in the System of National Accounts

The System of National Accounts defines, among others, a balance sheet for the main economic sectors: households, non-financial corporations,⁵ financial corporations, general government, non-profit institutions serving households, and rest of the world. On the asset side, the balance sheet is further broken down into financial and non-financial assets. On the liabilities side, financial liabilities include mainly loans, debt securities issued and own equity instruments, together with other liabilities such as provisions, amounts due to suppliers or pension liabilities. Based on the basic accounting identity, total assets should equal total liabilities (all of them being financial) plus (accumulated) net worth (Figure 1).

Figure 1. Balance sheet for economic sectors under the System of National Accounts



Sources: own elaboration, based on Organisation for Economic Co-operation and Development (2014).

Assets and liabilities in the balance sheet under national accounts are valued at market prices at the date to which the balance sheet relates (Eurostat, 2013). This marks an important difference with accounting standards (such as IFRS or US-GAAP), which usually only require financial assets to be valued at market prices.⁶

For financial assets and liabilities as well as for other non-financial assets, such as real estate and transport equipment, market values are easily available to compilers of national accounts. For financial instruments, 'the market value is that at which financial assets are acquired or disposed of, between willing parties, on the basis of commercial considerations only, excluding commissions, fees and taxes. In determining market values, trading parties also take account of accrued interest'.⁷ In case market values are not available for an asset or a liability, it is stated that '[...] estimates should be made of what the price would be if the assets were acquired on the market on the date to which

(⁵) We also use the term 'corporates' to refer to non-financial corporations.

(⁶) Fixed assets such as property, plant and equipment, and intangible assets, and financial liabilities can be valued at either cost or fair value (market prices), with only few non-financial corporations opting for the second method of valuation. Own equity cannot be valued at market values in accounting standards.

(⁷) See paragraph 7.38 of Eurostat (2013).

the balance sheet relates'.⁸

Changes between the opening and the closing balance sheet positions are attributed to transactions (changes in volume), revaluations of financial assets and liabilities (changes in prices) and other flows (Figure 2). Other flows are typically presented together with revaluations and include changes in the classification and structure of assets and liabilities, and reconciliation accounts.⁹

Figure 2. Stylised view of opening and closing balance sheets and flows



Sources: own elaboration.

Turning to the main categories of financial assets and liabilities, there are some methodological issues related to the computation of their market values. The computation of the market value for listed shares, debt securities and cash are straightforward and does not create any significant methodological issue. For loans, 'the values to be recorded in the balance sheets of both creditors and debtors are the nominal values irrespective of whether the loans are performing or non-performing'.¹⁰ For unlisted shares, market values do not exist and, as such, need to be estimated with 'a reference to the values of quoted shares where appropriate; the value of own funds; or discounting forecast profits by applying an appropriate market price to earnings ratio to the smoothed recent earnings of the institutional unit'.¹¹

In Europe, own equity of the majority of non-financial corporations is not listed in financial markets, so the market value of equity instruments in the liabilities side of the balance sheet of non-financial corporations must be estimated to a large extent. Although the System of National Accounts provides some alternatives to compilers to estimate these market values, the valuation at market prices of unlisted shares of non-financial corporations remains as one of the main methodological issues to which compilers of national accounts are confronted (Organisation for Economic Co-operation and Development, 2014; Banco de España, 2016; International Monetary Fund, 2021). Consequently, the estimation of the market value of unlisted shares could influence the evolution of leverage ratios and other similar metrics when computed from national accounts data. Conceptually, an increase in the market value of the unlisted own shares of a non-financial corporation, which must be estimated using some of the approaches allowed by the System of National Accounts, could lead to a decrease in its leverage, all other things equal.

In addition, the consideration of retained earnings (i.e., the part of the profit not distributed to shareholders as dividends) within the System of National Accounts has also raised methodological concerns. They are mainly related to the different treatment between domestic and foreign investments (see Fischer et al., 2019, for further details) and particularly affects how profits are attributed to the countries in which multinational non-financial corporations operate. But more generally, the consideration of retained earnings is generally problematic. Conceptually, the difference between the entrepreneurial income of the enterprise and the actual distribution of dividends in the accounting year is treated as a transaction, as if it was an acquisition (or withdrawal

⁽⁸⁾ See paragraph 7.34 of Eurostat (2013).

⁽⁹⁾ In theory, there should be a perfect match of the closing balance sheet being equal to the opening balance sheet, plus transactions, revaluations and other flows. However, (minor) discrepancies typically arise because different statistical sources are used to compute national accounts. See also Organisation for Economic Co-operation and Development (2014).

⁽¹⁰⁾ See paragraph 7.70 of Eurostat (2013).

⁽¹¹⁾ See paragraph 7.73 of Eurostat (2013).

if negative) of equity by the owner. But that would be an artificial transaction, which in some circumstances could require an adjustment through the revaluations account in order to reconcile the opening and closing amounts of equity on the liability side of the balance sheet of non-financial corporations.¹²

⁽¹²⁾ See [8. Equity valuation and its implications](#).

3

Gauging the effect of revaluations on corporate leverage

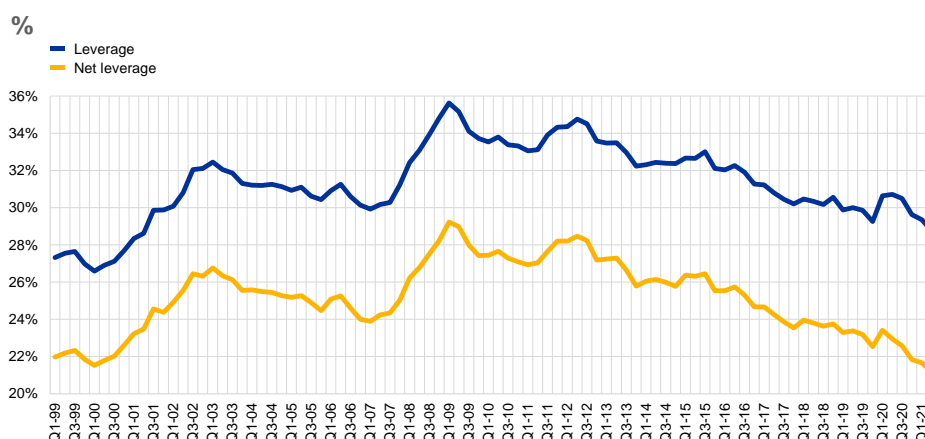
We define leverage and net leverage as follows:

$$\text{Leverage}_t = \frac{\text{Loans}_t + \text{Debt securities}_t}{\text{Total assets}_t} \quad (1)$$

$$\text{Net leverage}_t = \frac{\text{Loans}_t + \text{Debt securities}_t - \text{Cash}_t}{\text{Total assets}_t} \quad (2)$$

On the basis of these definitions, it is possible to appreciate a decrease in leverage and, more markedly, in net corporate leverage in the aftermath of the global financial crisis for the aggregate of euro area non-financial corporations (Chart 2). The observed trend in (net) corporate leverage may be the result of (i) a real decrease of loans and debt instruments by euro area non-financial corporations (changes in volume), (ii) changes in the market values of the balance sheet items used in the calculations (changes in prices), or (iii) a combination of both. Chart 2 also reveals that the accumulation of cash in corporate balance sheets may have started around 2015, as, until that point, the time series of leverage and net leverage exhibit similar profiles.

Chart 2. Leverage and net leverage of euro area non-financial corporations



Sources: European Central Bank, Haver Analytics and author's calculations.

Notes: total assets is approximated as the sum of financial assets and net fixed assets. Last observation is Q2-2021.

We now build new time series for (net) corporate leverage where revaluations (changes in prices) are excluded from the computations. To that purpose, we follow Caprara et al. (2019) and assume that the amount of a balance sheet item in a period is equal to the amount shown in the previous period plus changes in prices and changes in volume:

$$BS_t = BS_{t-1} + P_t + V_t \quad (3)$$

where BS refers to any balance sheet item, P refers to changes in prices (and also to other changes) and V to changes in volume.

On that basis, we decompose the change in an item in the balance sheet as follows:

$$\frac{BS_t - BS_{t-1}}{BS_{t-1}} = \frac{P_t}{BS_{t-1}} + \frac{V_t}{BS_{t-1}} \quad (4)$$

And we create a new time series for the balance sheet item that only takes into account changes in volumes (i.e., transactions):

$$\overline{BS}_{t=2} = BS_{t=1} \left(1 + \frac{V_{t=2}}{BS_{t=1}} \right) \quad (5)$$

$$\overline{BS}_t = \overline{BS}_{t-1} \left(1 + \frac{V_t}{\overline{BS}_{t-1}} \right) \quad (6)$$

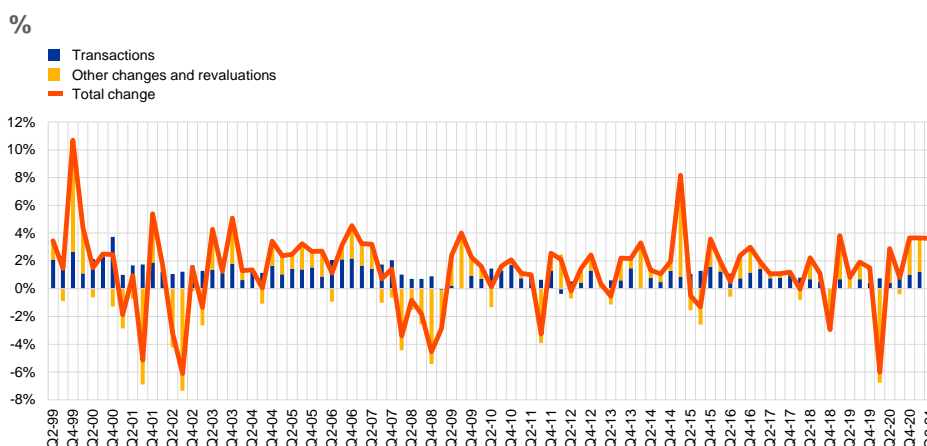
Equation (5) above refers to the first observation, while the Equation (6) covers all subsequent observations.

In the next sections, we apply these calculations to total financial assets (used in the denominator of the leverage ratio) and to the main items in the liabilities side of the balance sheet, with a particular focus on the shares issued by non-financial corporations (i.e., their own equity). We assume that cash, used for the computation of net leverage, can only be measured at fair value.

3.1. Corporate leverage and the revaluation of assets

Following Equation (4), we decompose the change in total financial assets of euro area non-financial corporations in those related to transactions (changes in volume) and those related to revaluations and other movements (changes in prices). Chart 3 shows that, while changes in volume have been relative stable since 1999, other changes and revaluations exhibit large movements in 2001 and 2002, through the global financial crisis, in the first half of 2015 or during the outbreak of the COVID-19 pandemic (first quarter of 2020).

Chart 3. Decomposition of the change in financial assets as a percentage of total financial assets, euro area non-financial corporations



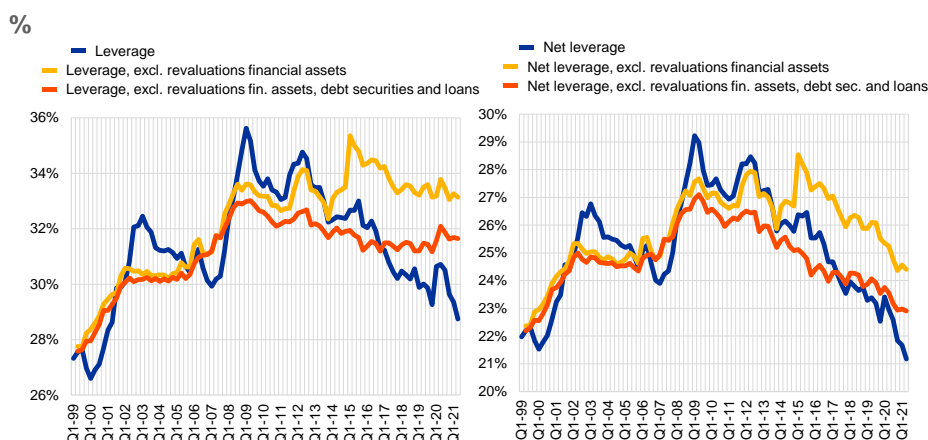
Sources: European Central Bank, Haver Analytics and author's calculations.

Notes: data shown as percentages of the amount of financial assets in the previous quarter. The last observation is Q2-2021.

Turning to Equation (1) and Equation (2), leverage ratios include revaluations of financial and non-financial assets, of loans and of debt securities (the latter in the liabilities side of the balance sheet). We build a time series as specified in Equation (5) and Equation (6) that only takes into account transactions of financial assets (appearing in the numerator of the ratio), of loans and of debt securities (appearing in the denominator of the ratio).

Chart 4 shows the evolution of leverage and net leverage between 1999 and 2021 under three specifications: (i) based on Equation (1) and Equation (2); (ii) excluding revaluations of total financial assets; and (iii) excluding revaluations of total financial assets, of loans and of debt securities.

Chart 4. Leverage and net leverage with and without revaluations of loans and debt securities (liabilities), and financial assets, euro area non-financial corporations



Sources: European Central Bank, Haver Analytics and author's calculations.

Notes: the blue line represents leverage as calculated according to Equation (1) and Equation (2), while the yellow line represents leverage and net leverage, when revaluations of financial assets are excluded. The red lines represent leverage when revaluations of loans, debt securities (both appearing in the numerator of the ratio) and financial assets are excluded.

Against the recent declining trend shown by our baseline specification of corporate leverage, excluding the revaluations of financial assets leads to a more stable evolution of corporate leverage since 2016 (with values slightly below 34 %) and a more nuanced decrease in net terms. In this case, leverage does not show any decreasing trend in the aftermath of the global financial crisis and even peaks around 2015. It is also worth noting that the increase before the global financial crisis is less pronounced. When we also exclude revaluations of loans and debt securities (appearing in the numerator of the ratio), leverage has decreased slowly since 2009 and a similar evolution is seen in net leverage.

3.2. Corporate leverage and the revaluation of liabilities

This section discusses the impact of the revaluation of liabilities in the measurement of corporate leverage. The valuation of financial liabilities at market prices has received less attention but is conceptually challenging. In the accounting domain, a decrease in the market value of debt securities of a non-financial corporation as a result of negative prospects on its solvency over the short-term could indeed lead to a positive entry in its profit and loss account and to a lower value of its liabilities (Gaynor et al., 2017).

In the System of National Accounts, the following identity should hold at all times:

$$Non - financial assets_t + Financial assets_t = Net worth_t + Liabilities_t \quad (7)$$

Liabilities can be further decomposed into shares, loans, debt securities, and other liabilities, so Equation (7) turns into:

$$Non - financial assets_t + Financial assets_t = Net worth_t + Shares_t + Loans_t + Debt securities_t + Other liabilities_t \quad (8)$$

As per Equation (7), we define the ratios of leverage and net leverage with the breakdown of liabilities in the denominator:

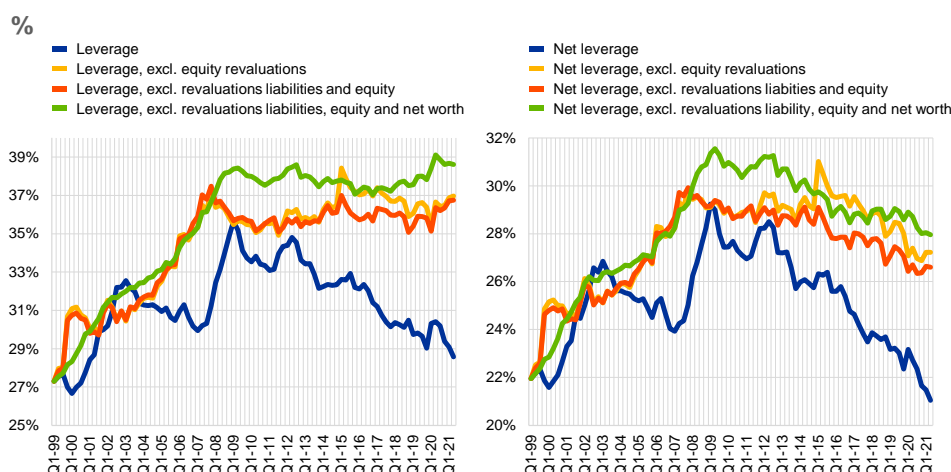
$$\text{Leverage}_t = \frac{\text{Loans}_t + \text{Debt securities}_t}{\text{Net worth}_t + \text{Shares}_t + \text{Loans}_t + \text{Debt securities}_t + \text{Other liabilities}_t} \quad (9)$$

$$\text{Net leverage}_t = \frac{\text{Loans}_t + \text{Debt securities}_t - \text{Cash}_t}{\text{Net worth}_t + \text{Shares}_t + \text{Loans}_t + \text{Debt securities}_t + \text{Other liabilities}_t} \quad (10)$$

Alike to what we have made with financial assets in Section 3.1, we build time series for these balance sheet items in Equation (9) and Equation (10) taking into account only transactions. Loans and debt securities appear in both the numerator and the denominator of our leverage ratio.

Chart 5 below shows the evolution of leverage and of net leverage with and without revaluations of own equity. The declining trend after the global financial crisis observed for leverage disappears and even gives rise to a slightly increasing trend. For net leverage, the declining trend is only observed from 2015 onwards and is less abrupt than in our baseline specification (i.e., when equity revaluations are included). Interestingly, in both cases, the peak of leverage and net leverage during the global financial crisis appears around one year earlier.

Chart 5. Leverage and net leverage with and without revaluations of own equity, liabilities and net worth, euro area non-financial corporations



Sources: European Central Bank, Haver Analytics and author's calculations.

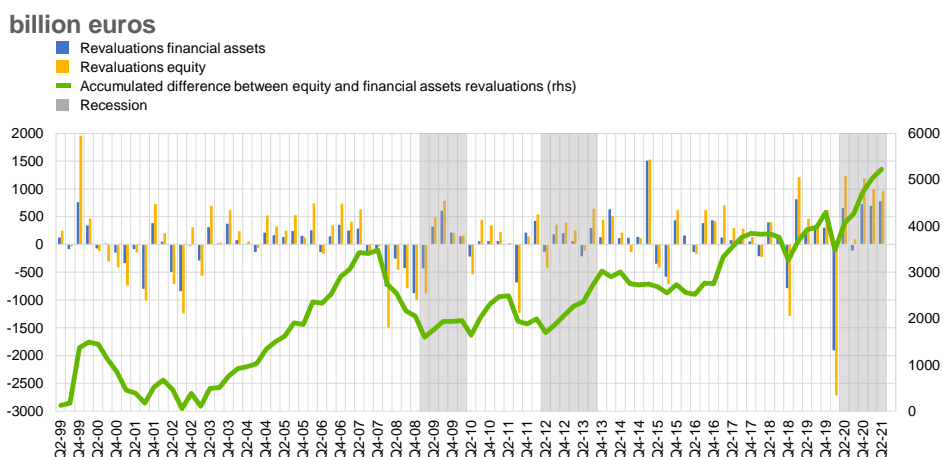
Notes: the blue line represents leverage as calculated according to Equation (1) and Equation (2), while the yellow line represents leverage and net leverage, when revaluations of own equity (recognised as a financial liability) are excluded from the denominator of the ratios. The red line represents leverage and net leverage when revaluations of financial liabilities and of own equity are excluded from the denominator of the ratios and the revaluations of debt securities and loans are excluded from the numerator of the ratio. The green line is similar to the red line, removing revaluations of net worth too. Revaluations are excluded according to Equation (5) and Equation (6).

However, excluding only revaluations of own equity would not offer a comprehensive view, as other financial liabilities (including loans and debt securities) are already at market values. It would be methodologically sounder to consider all financial liabilities without revaluations.¹³

Removing the revaluations of financial liabilities and of net worth from the computation of the leverage and net leverage ratios does not change substantially the trend in comparison to the calculation when only equity revaluations were excluded (Chart 5). That implies that revaluations of own equity tend to be larger than revaluations of financial assets and of other financial liabilities (Chart 6).

⁽¹³⁾ In these calculations, we define net worth as total financial and non-financial assets minus total liabilities.

Chart 6. Revaluations of financial assets and of own equity (liabilities), euro area non-financial corporations



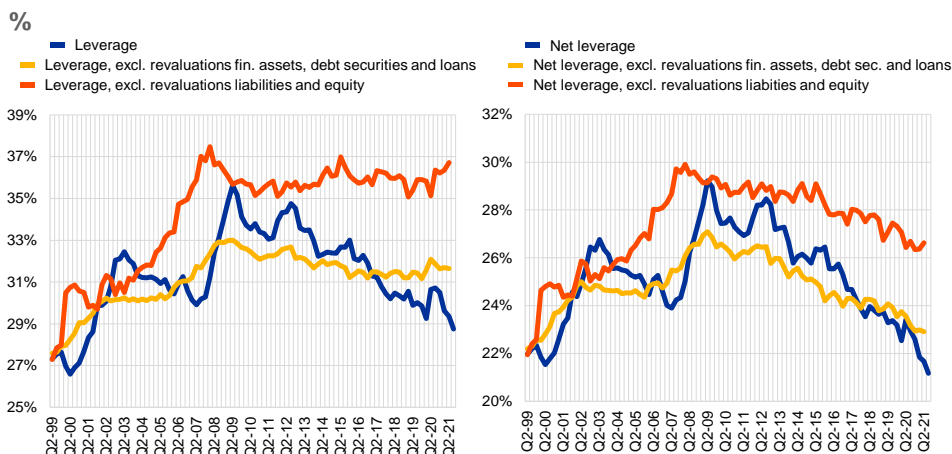
Sources: European Central Bank, Eurostat, Haver Analytics and author's calculations.

Notes: grey periods are those with yearly growth rates of euro area real GDP below zero.

3.3. Discussion of results

In Chart 7, we compile three different measures of (net) corporate leverage: (i) including revaluations, (ii) without revaluations of financial assets, of loans and of debt securities (Section 3.1), and (iii) without revaluations of financial liabilities (Section 3.2).

Chart 7. Leverage and net leverage with and without revaluations of financial assets and liabilities, euro area non-financial corporations



Sources: European Central Bank, Federal Reserve Board, Haver Analytics and author's calculations.

Notes: total assets are approximated as the sum of net fixed assets and financial assets. The yellow line represents the evolution of leverage and net leverage once revaluations of debt securities and loans (numerator of the ratio) and of financial assets (denominator of the ratio) are excluded. The red line represents the evolution of leverage and net leverage once revaluations of debt securities and loans (numerator of the ratio) and of financial liabilities and equity (denominator of the ratio) are excluded. Revaluations are excluded according to Equation (5) and Equation (6).

In terms of trends until the global financial crisis, all time series report a continuous increase in corporate and net corporate leverage. However, the increase is higher when equity revaluations are excluded, because they are larger than revaluations of financial assets (Chart 6).

The time series without revaluations peak earlier (around 2007 or 2008) than the others. That could

indicate a softening effect of market prices on the evolution of leverage, particularly at times where financial markets behave exuberantly. After the peak in leverage in the global financial crisis, the time series without revaluations show a more attenuated decrease than the original ones.

Our analysis shows that the consideration of financial assets and liabilities at market prices in national accounts influences the evolution of corporate leverage, a fundamental variable for macroprudential policy, over time.

4

Conclusions

As highlighted by the FSB-IMF Data Gap Initiative in the aftermath of the global financial crisis, the rich information provided by the System of National Accounts can be useful for the monitoring of financial stability, in order to understand aggregate sectoral trends and interactions between the real economy and the financial system. However, users of this information must be aware of important features of the underlying methodology, which could have an impact in their assessment.

In particular, we show in this paper how the dynamics of corporate leverage vary depending on the consideration (or not) of revaluations of financial assets and liabilities. In this regard, the impact of the revaluations of own equity instruments in the liabilities side of the balance sheet is particularly relevant from a conceptual perspective. The decreasing trend in corporate leverage observed for the euro area since 2010 gets attenuated when revaluations of financial assets and liabilities are excluded, providing evidence of the impact of revaluations on corporate leverage.

When market values reflect the fundamentals of the underlying financial instrument, they can offer a more updated view of the value of financial assets and liabilities, signalling the price at which financial assets and liabilities could be transferred. There are episodes, however, where financial markets exhibit certain exuberance and market values can be seen to depart from fundamentals. We do not take any position in the long debate about use of market values but would like to highlight that users of national accounts for financial stability purposes should be aware of the potential impacts of revaluations in their analysis of corporate leverage.

References

- Adrian, T. and Boyarchenko, N. (2012), [Intermediary leverage cycles and financial stability](#), Federal Reserve Bank of New York Staff Reports, no. 567.
- Banco de España (2005), [Valuation of shares and other equity in the financial accounts of the Spanish economy](#), Notas Estadísticas No. 2.
- Banco de España (2016), [The Central Balance Sheet Data Office \(CBSO\): a source of microdata on non-financial corporations used by the Banco de España in FASE \(Financial Accounts of the Spanish Economy\)](#), Bank of Algeria - IFC Seminar (Developing and improving Sectoral Financial Accounts).
- Bernanke, B., Gertler, M. and Gilchrist, S. (1999), [The financial accelerator in a quantitative business cycle framework](#), Chapter 21 in John B. Taylor and Michael Woodford (eds), Handbook of Macroeconomics, Amsterdam.
- Boh, S., Borgioli, S., Coman, A., Chiriacescu, B., Koban, A., Kusmierczyk, P., Pirovano, M. Schepens, T. and Veiga, J. (2019), [European macroprudential database](#), ECB Statistical Paper Series No. 32.
- Brunnermeier, M. and Sannikov, Y. (2014), [A macroeconomic model with a financial sector](#), American Economic Review, Vol. 104, No. 2, pp. 379-421.
- Caprara, D., De Bonis, R. and Infante, L. (2019), [Household wealth in the main advanced countries](#), presentation at the IFC Workshop on the use of financial accounts, 18-20 March.
- Damodaran, A. (2007), [Valuation approaches and metrics: a survey of the theory and evidence](#), Foundations and Trends® in Finance, Vol. 1: No. 8, pp 693-784.
- European Systemic Risk Board (2017), [Financial stability implications of IFRS 9](#), July.
- European Systemic Risk Board (2021), [Lower for longer – macroprudential policy issues arising from the low interest rate environment](#), June.
- Eurostat (2013), [European System of Accounts \(ESA 2010\)](#).
- Financial Stability Board and International Monetary Fund (2009), [The financial crisis and information gaps](#), Report to the G-20 Finance Ministers and Central Bank Governors, October.
- Fischer, A., Groeger, H., Sauré, P. and Yeşin, P. (2019), [Current account adjustment and retained earnings](#), Journal of International Money and Finance, Vol. 94, pp. 246-259.
- Gaynor, L., McDaniel, L. and Lombardi Yohn, T. (2017), [Fair value accounting for liabilities: The role of disclosures in unraveling the counterintuitive income statement effect from credit risk changes](#), Accounting, Organizations and Society, Vol. 36, Issue 3, pp. 125-134.
- Girón, C. and Rodríguez-Vives, M. (2017), [Leverage interactions: a national accounts approach](#), ECB Statistical Paper Series No. 19.
- Giroud, X. and Mueller, H. (2017), [Firm leverage, consumer demand, and employment losses during the Great Recession](#), Quarterly Journal of Economics, Vol. 132, Issue 1, pp. 271–316.
- International Monetary Fund (2015), [Corporate leverage in Emerging Markets — a concern?](#), Global Financial Stability Report, October, Section 3.
- International Monetary Fund (2021), [D.2 Valuation of Unlisted Equity](#), BPM6 Update Direct Investment Task Team (DITT), IMF Committee on Balance of Payments Statistics.
- Jermann, U. and Quadrini, V. (2012), [Macroeconomic effects of financial shocks](#), American Economic Review, Vol. 102, No. 1: pp. 238-71.
- Kalemli-Ozcan, S., Laeven, L. and Moreno, D. (2019), [Debt overhang, rollover risk, and corporate](#)

- [investment: evidence from the European crisis](#), ECB Working Paper Series No. 2241.
- Kantor, J. and Pike, R. (1987), [Valuing unlisted shares: a dual approach to the major information determinants](#), Managerial and Decision Economics, Vol. 8, No. 3, pp. 221-227.
- Kiyotaki, N. and Moore, J. (1997), [Credit cycles](#), Journal of Political Economy, Vol. 105, No. 2, pp. 211-248.
- Kramulová, J., Vincenc, J. and Houžvičková, H. (2019), [How to value equity in national accounts?](#), Proceedings of the 22nd International Scientific Conference on Applications of Mathematics and Statistics in Economics (AMSE 2019), Atlantis Studies in Uncertainty Modelling, Vol. 2.
- Laux, C. and Leuz, C. (2009), [The crisis of fair-value accounting: Making sense of the recent debate](#), Accounting, Organizations and Society, Vol. 34, Issues 6-7, pp. 826-834.
- Laux, C. and Leuz, C. (2010), [Did fair-value accounting contribute to the financial crisis?](#), Journal of Economic Perspectives, Vol. 24, No. 1, pp. 93-118.
- Laux, C. and Rauter, T. (2017), [Procyclicality of US bank leverage](#), Journal of Accounting Research, Vol. 55, Issue 2, pp. 237-273.
- Mian, A., Sufi, A. and Verner, E. (2017), [Household debt and business cycles worldwide](#), Quarterly Journal of Economics, Vol. 132, Issue 4, pp. 1755-817.
- Organisation for Economic Co-operation and Development (2014), [Understanding national accounts: second edition](#), October.
- Petersen, C., Plenborg, T. and Scholer, F. (2006), [Issues in valuation of privately held firms](#), Journal of Private Equity, Vol. 10, Issue 1, pp. 33-48.
- Sunga, P. (1987), [Adjusting net worth for price changes with reference to the Canadian system of national accounts](#), Review of Income and Wealth, Vol. 33, Issue 1, pp. 83-108.
- Tissot, B. (2016), [Development of financial sectoral accounts](#), IFC Working Paper Series No. 15.

Annex 1. Corporate leverage and revaluations of non-financial assets

Non-financial assets are also valued at market values, and the related revaluations could influence the aggregated trend of corporate leverage as well. However, data on transactions and revaluations of non-financial assets of euro area non-financial corporations is not directly available. In this annex we estimate the size of transactions with non-financial assets, in order to generate a time series without revaluations, according to Equation (5) and Equation (6).

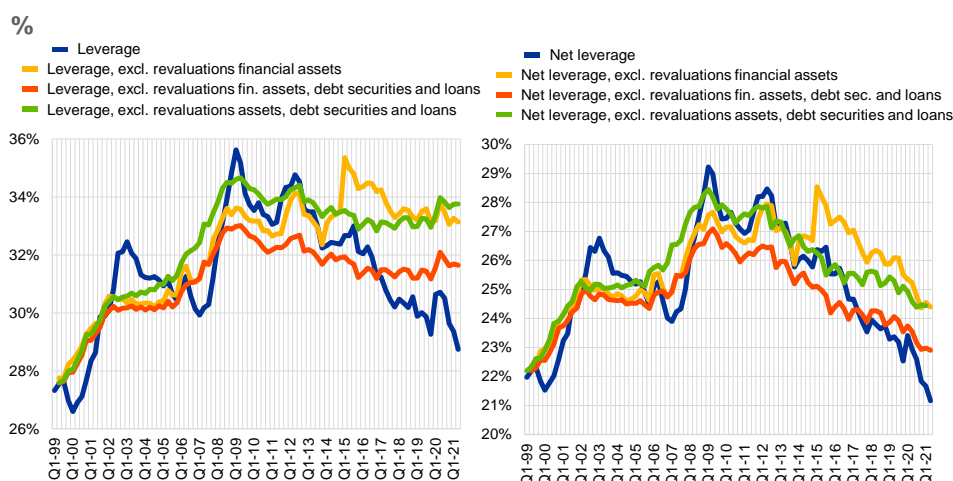
We define transactions with non-financial assets as follows:

$$TNFA_t = GCF_t - CFC_t + \Delta NPA_t \quad (11)$$

where $TNFA$ are transactions of non-financial assets, GCF is the gross capital formation, CFC is the consumption of fixed assets, and ΔNPA the acquisitions less disposals of non-produced non-financial assets.

Taking Chart 4 as starting point, Chart 8 adds the evolution of corporate leverage when revaluations of financial and non-financial assets are excluded from the denominator of the ratio (green lines), based on Equation (11). The related time series would go in parallel to the leverage ratio computed without revaluations of financial assets.

Chart 8. Leverage and net leverage with and without revaluations of loans and debt securities (liabilities), financial and non-financial assets, euro area non-financial corporations



Sources: European Central Bank, Eurostat, Haver Analytics and author's calculations.

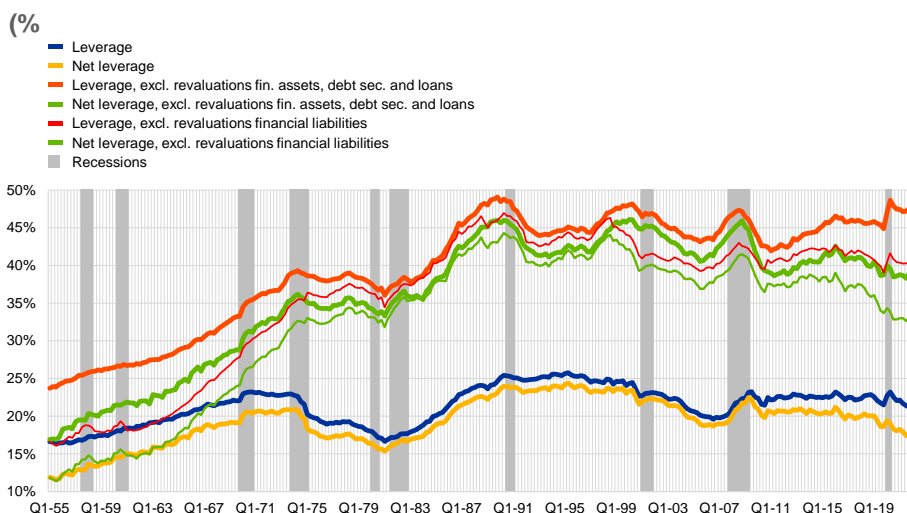
Notes: the blue line represents leverage as calculated according to Equation (1) and Equation (2), while the yellow line represents leverage and net leverage, when revaluations of financial assets are excluded. The red lines represent leverage when revaluations of loans, debt securities (both appearing in the numerator of the ratio) and financial assets are excluded. The green line excludes revaluations of financial and non-financial assets from the denominator of the ratio, as well as revaluation of debt securities and loans from the numerator of the ratio.

Annex 2. Corporate leverage and revaluations in the US

Using data from the flow of funds, it is possible to assess the impact of revaluations of assets and liabilities on the leverage of the US corporate sector. The time series start in 1955, so they provide a longer-term perspective on the phenomenon.

As shown in Chart 9, when revaluations of financial assets and liabilities are included in the computation of leverage ratios, they would be in recent quarters in levels comparable to those observed in the early seventies and during the nineties. Over a short-term perspective, leverage has remained stable since the global financial crisis and net leverage started to decline in 2015, probably as a result of the accumulation of cash by some non-financial corporations. Excluding revaluations from the computation of leverage and of net leverage leads to a rather different picture, with a continuous increase from 1955 to 1988, interrupted briefly in the seventies. Since reaching the maximum value in 1988, there have been a series of 'waves' of leverage peaking shortly before or during the dot-com crisis and the global financial crisis. In the aftermath of the global financial crisis, corporate leverage decreased substantially and then initiated again a continuous increase, accelerated in 2020 by the COVID-19 pandemic. Net leverage showed a similar evolution until 2015, the year when it started to decrease as a result of the increase in the cash holdings of non-financial corporations.

Chart 9. Leverage and net leverage without revaluations of assets and liabilities, US non-financial corporate business



Sources: National Bureau of Economic Research, Federal Reserve Board, Haver Analytics and author's calculations.
Notes: data for sector 103 of the US flow of funds (nonfinancial corporate business). Grey periods represent recessions as identified by the National Bureau of Economic Research. Leverage and net leverage calculated according to Equation (1) and Equation (2), respectively. The thick red and green lines exclude revaluations of debt securities and loans from the numerator of the ratios and revaluations of financial and non-financial assets from the denominator of the ratios, according to Equation (5) and Equation (6), respectively. Non-financial assets are measured at cost, as available in the US flow of funds database. The thin red and green lines exclude revaluations of financial liabilities, according to Equation (5) and Equation (6).

GETTING IN TOUCH WITH THE EU

In person

All over the European Union there are hundreds of Europe Direct information centres. You can find the address of the centre nearest you at: https://europa.eu/european-union/contact_en

On the phone or by email

Europe Direct is a service that answers your questions about the European Union. You can contact this service:

- by freephone: 00 800 6 7 8 9 10 11 (certain operators may charge for these calls),
- at the following standard number: +32 22999696 or
- by email via: https://europa.eu/european-union/contact_en

FINDING INFORMATION ABOUT THE EU

Online

Information about the European Union in all the official languages of the EU is available on the Europa website at: https://europa.eu/european-union/index_en

EU publications

You can download or order free and priced EU publications at: <https://op.europa.eu/en/publications>. Multiple copies of free publications may be obtained by contacting Europe Direct or your local information centre (see https://europa.eu/european-union/contact_en).

EU law and related documents

For access to legal information from the EU, including all EU law since 1952 in all the official language versions, go to EUR-Lex at: <http://eur-lex.europa.eu>

Open data from the EU

The EU Open Data Portal (<http://data.europa.eu/euodp/en>) provides access to datasets from the EU. Data can be downloaded and reused for free, for both commercial and non-commercial purposes.

Market prices and the evolution of corporate leverage in the euro area

Corporate leverage is an important variable for financial stability. The System of National Accounts provides a solid methodology to monitor aggregated trends. In this framework, the valuation of balance sheet items at market prices implies that both changes in volume and changes in prices define the evolution of corporate leverage over time. To demonstrate how revaluations can also explain the dynamics of corporate leverage, we build time series that only consider transactions in financial assets and liabilities. We find that the trends in corporate leverage in the euro area since 1999 would have been different if revaluations had been excluded. Users of national accounts for financial stability purposes should be aware of the impact that market prices can have on corporate leverage. Besides, ongoing methodological work to improve national accounts should continue, in particular in what regards techniques for the estimation of market values of some financial instruments.

For more information

<https://ec.europa.eu/eurostat/>