

Research Brief

73th edition – February 2025



Firms' returns to scale: new evidence from European firm-level data

by Peter McAdam, Philipp Meinen, Chris Papageorgiou and Patrick Schulte

The advantages or disadvantages firms experience as a result of their size, referred to in the economic literature as returns to scale, are of central importance in many economic models. Increasing returns to scale, whereby unit costs decrease as output volume increases, could explain productivity differences between Europe and the United States. We present fresh evidence on the returns to scale of European firms: most exhibit constant returns to scale, but a non-trivial share also show increasing returns to scale.

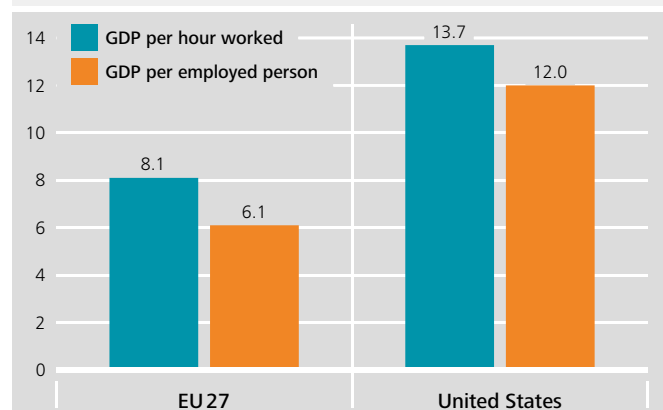
Productivity growth has been markedly higher in the United States than in Europe for some time now. One possible explanation for this is that the European internal market is more fragmented than the US market. Despite decades of efforts, there are still numerous legal, physical and cultural barriers to intra-European trade in goods and services. These obstacles could make it more difficult for firms in Europe to grow and to fully exploit the advantages of greater size – referred to in the economic literature as increasing returns to scale. If a firm exhibits increasing returns to scale, its unit costs decrease as output volume increases, making the firm more profitable, productive and competitive. At constant returns to scale, however, unit costs are independent of output volume. The degree to which there are constant, increasing, or decreasing returns to scale is fundamental not only as an explanatory factor for productivity developments, but also

for a whole range of other economic relationships, such as the emergence of market power.

Growth in labour productivity in the EU and the United States (2013–2023)

Chart 1

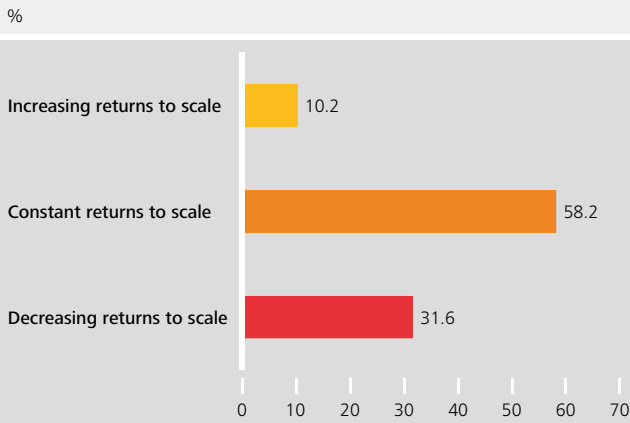
Percentage change 2023 vs. 2013; constant prices



Source: OECD and Bundesbank calculations.
Deutsche Bundesbank

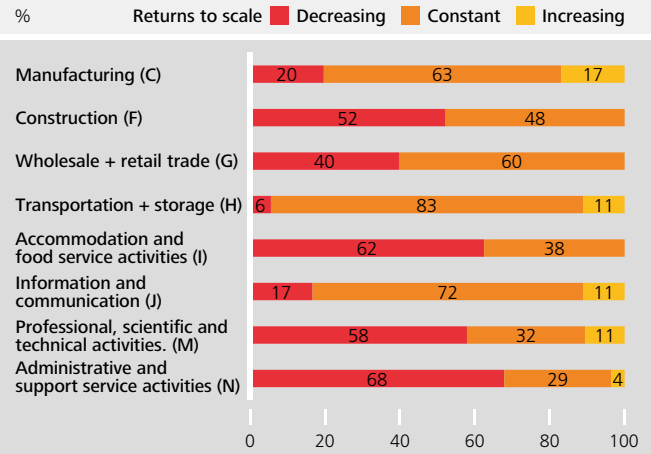
As a result of digitalisation, in particular, it is conceivable that minimal growth constraints will be an important factor in business success and that firms will more often exhibit increasing returns to scale. For example, the use of digital technologies frequently entails high fixed costs but comparatively low variable costs, which can make their use more efficient in larger firms. In addition, digital technologies often benefit

Share of industries with decreasing, constant or increasing returns to scale* Chart 2a



* The chart shows the share of 4-digit industries in the sectors C, F, G, H, I, J, M and N that exhibit decreasing, constant or increasing returns to scale. Deutsche Bundesbank

Share of industries with decreasing, constant or increasing returns to scale by sector Chart 2b



Deutsche Bundesbank

from network effects, where utility increases along with user numbers. Social media platforms are a case in point: their benefits for each individual user grow as more users join.

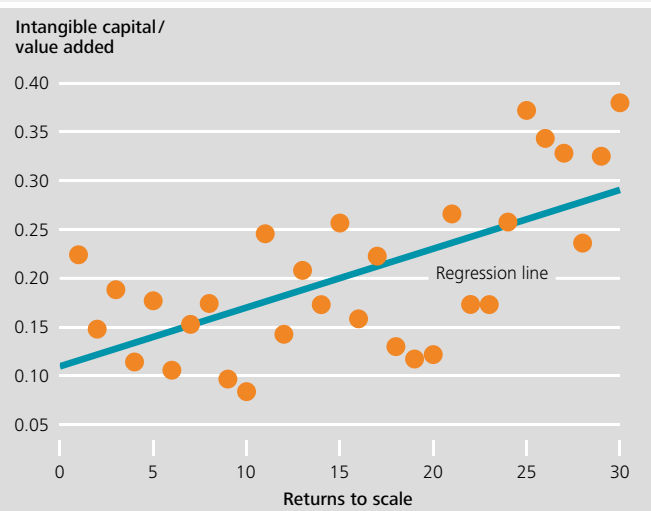
Against this backdrop, we provide new, more comprehensive evidence on European firms’ returns to scale. Based on administrative firm-level data from five euro area countries (Belgium, France, Italy, Portugal, Spain), we estimate production functions for almost all sectors of the economy (at the 4-digit, 2-digit and 1-digit NACE levels) over a recent period of time (2008 to 2018), and derive returns to scale from them. By contrast, previous studies typically only had access to data for individual sectors (such as manufacturing), less recent time periods and individual countries (primarily the United States). In addition, we apply a recently developed estimation technique to estimate production functions, which eliminates the shortcomings of other common estimators in identifying parameters. We also extend the estimation procedure in order to allow for imperfect competition.

According to our results, the majority of economic sectors typically exhibit constant returns to scale. However, a non-trivial share also exhibit decreasing or increasing returns to scale. This applies to the main results at least, and could be due to a distortion of estimation coefficients. If the estimation procedures are altered to allow for the possibility of imperfect competition between firms, the share of economic sectors with declining returns to scale largely disappears. By contrast, the share of sectors with rising returns to scale increases somewhat. Especially in manufacturing, the transport sector and the IT sector, there are numerous industries with increas-

ing returns to scale. In service industries, on the other hand, there are relatively often decreasing returns to scale.

The results also point to a positive relationship between industries’ returns to scale and their use of intangible capital (not only items such as software and databases, but also expenditure on research and development). This is in line with the hypothesis that digitalisation is associated with increasing returns to scale. We also identify a positive relationship between industries’ returns to scale and their trade intensity.

Returns to scale and intangible capital* Chart 3



* In this chart, the 370 studied 4-digit industries are allocated to 30 groups of equal size according to the size of their estimated returns to scale. For these groups of industries, the average use of intangible capital per unit of value added is calculated and plotted on the y-axis. On the x-axis, the 30 groups are plotted in ascending order according to the size of their returns to scale. Deutsche Bundesbank

Looking at European and US business statistics also illustrates that, despite the overall markets generally being of a similar size, firms are typically significantly smaller in Europe than in the United States. According to the U.S. Census Bureau, US firms have an average of 20 employees; according to Eurostat, by contrast, EU firms average only five employees. There are

also large differences in firms' market capitalisation. These differences are broad-based across the various economic sectors. However, they are particularly evident in the IT industry, where, according to our results, the share of sectors with increasing returns to scale is also relatively high.

Conclusion

All in all, our results indicate that the majority of firms in Europe show constant returns to scale, but a non-trivial share also exhibit increasing returns to scale. While the research paper does not explicitly investigate the causes of the differences in productivity growth between the EU and the United States, based on our results, it seems quite conceivable that the fragmentation of the European internal market could be dampening the growth of European firms. This applies, at least, to the industries in which, according to our estimates, firms exhibit increasing returns to scale. Here, fragmentation could be preventing firms from fully exploiting returns to scale. These relationships therefore suggest, not least, a need to further deepen the European internal market. This could not only promote growth, but also strengthen the innovative power and competitiveness of European firms at the global level.



Peter McAdam
Economist at the Research
Department,
European Central Bank



Philipp Meinen
Economist at Directorate General
Economics,
Deutsche Bundesbank



Chris Papageorgiou
Economist at the Research
Department,
International Monetary Fund



Patrick Schulte
Economist at Directorate General
Economics,
Deutsche Bundesbank

News from the Research Centre

Publications

“Time-varying return correlation, news shocks, and business cycles” by Norbert Metiu (Deutsche Bundesbank) and Esteban Prieto Fernandez (Deutsche Bundesbank) will be published in the *European Economic Review*.

“The Hockey Stick Phillips Curve and the Effective Lower Bound” by Philipp Lieberknecht (Deutsche Bundesbank) and Gregor Boehl (Universität Bonn) will be published in the *Journal of Economic Dynamics and Control*.

Events

24 – 25 April 2025

„Spring Conference on Expectations of Households and Firms”, Eltville

Disclaimer:

The views expressed here do not necessarily reflect the opinion of the Deutsche Bundesbank or the Eurosystem.