

## [Market Power and Innovation in the Intangible Economy](#)

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This paper offers a joint explanation for three trends that have been central in the recent macroeconomic debate: the slowdown of productivity growth, the fall in business dynamism, and the rise of market power.

Productivity growth has declined across advanced economies since the mid-2000s. In the U.S. for example, growth averaged less than half its long-term rate between 2005 to 2018. Business dynamism, which is the process of firms growing, shrinking, emerging, and failing, has been declining for the last 30 years. In France, for example, both the start-up rate and the rate at which workers reallocate to new employers has declined by a third. Recent research on market power has shown that the mark-up that firms charge increased steadily over the same time frame. Similarly, market concentration has gradually increased in both the U.S. and in Europe.

This paper claims that the trends in productivity growth, business dynamism, and market power can be explained by the rise of intangible inputs, such as information technology. A key difference between intangible and traditional (tangible) inputs is that intangibles scale; they can be duplicated at close to zero marginal cost. This implies that when intangible inputs are used to produce a good, the cost structure of production changes. Firms need to invest in the development and maintenance of intangible inputs, but face minimal additional cost of using these intangibles when production is scaled up. The rise of intangibles therefore shifts production away from variable costs and towards fixed costs. I confirm this notion using income and balance sheet information from tax data on the universe of French firms. With a new measure of fixed costs, I show that the share of fixed costs in total costs has increased from 10 to 14.5%, and that investments in software and IT systems are positively correlated with this share.

I embed scalable intangible inputs in a model with endogenous growth and heterogeneous firms. Firms produce one or multiple products, that are added or lost through creative destruction. They invest in research and development (R&D) to produce higher quality versions of goods that other firms produce. Successful innovation causes the innovator to become the new producer, while the

incumbent loses the good. Firm-level innovation along this process drives aggregate growth through the step-wise improvement of random goods.

Intangible inputs change the innovation process in the model, because they introduce a trade-off between quality and price. If some firms are able to deploy intangible inputs at lower adoption costs, they are able to reduce their marginal costs by a greater fraction, which allows them to sell at lower prices. If a firm with less intangible-adoption develops a higher quality version of a good that one of these firms sells, the incumbent could undercut the innovator on price. Only if the quality difference is sufficiently large to offset the gap in marginal costs would the innovator become the new producer. The presence of firms with a high take-up of intangible inputs, therefore, deters other firms from entering new markets and from developing higher quality products. Paradoxically, the rise of highly intangible firms can therefore negatively affect economic growth.

I calibrate the model using the French tax data, and find that the rise of intangibles explains a considerable fraction of the productivity growth slowdown. In the baseline calibration, the rise of intangibles causes steady-state growth to decline by 0.6 percentage points, while reallocation and entry decline by a third. Mark-ups increase by 14 percentage points from 1.19 to 1.33, closely in line with the empirical increase from 1.18 to 1.29. Firms with high intangibles ‘disrupt’ sectors across the economy by investing more in research and development, which causes economic activity to concentrate disproportionately around these firms. As the economy transitions to the new balanced growth path, there is an initial increase in productivity as firms deploy more intangible inputs. This does not lead to an increase in wages, however, as the higher productivity is offset by higher mark-ups. Firms without an increase in intangible input efficiency have less incentive to innovate, as they are unable to offer a sufficiently low price if they enter new markets. Mark-ups also offset the effect of the decline in marginal costs on prices, which could explain why the last decade has been simultaneously characterized by rising mark-ups and low inflation.