Markups and the Manufacturing Productivity Slowdown

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After being a strong performer for years, U.S. manufacturing productivity growth slowed after 2011. Lashkari and Pearce (2024) report that U.S. manufacturing labor productivity grew at an average of 3.4 percent per year from 1987 to 2007 and fell to –0.5 percent from 2010 to 2022, a slowdown of 3.9 percentage points per year. This decline is widespread, with nearly all sub-industries showing a slowdown.

At the same time, there is concern that markups have increased. Markups are important to productivity measurement, since they can create a wedge between input elasticities, needed to calculate multifactor productivity (MFP), and revenue shares, the data used to calculate those elasticities. A sizeable literature has suggested that difficulties in measuring the modern economy have contributed to falling measured productivity. (See Syverson (2017) for a discussion.)

Markups may be a symptom of process that is slowing productivity. Some theories have linked increasing market power to slow economic growth, which implies a correlation between markups and slow productivity growth (Gutierrez and Philippon 2017).

How much of slowdown is due to measurement issues in presence of markups? This paper estimates markups using a model to estimate the user cost of capital to split capital payments into regular returns and economic profit. These markups allow us to recover the input elasticities and correct estimates of MFP.

I do not find that the slowdown is due to mismeasurement. In fact, correcting for markups tends to strengthen the slowdown. Markups mean that the output elasticity of labor is understated. During the period of rapid productivity growth, labor input fell while output increased. The productivity slowdown features labor input growth has been faster than output growth. The markup correction increases the impact of labor input changes.

I find that fast productivity growth is associated with capital deepening and increasing markups. The process of capital deepening and increasing markups stops with the productivity slowdown. This suggests that markups were a consequence of dynamic growth and new technology rather than stagnation.

I. Productivity Measurement with Markups

MFP of value added is growth in value less weighted factors of production labor L and capital K, where the weights are reflect output elasticities of those inputs α_l, α_k.

$$\Delta MFP = \Delta Y - \alpha_L \Delta L - \alpha_K \Delta K \quad (1)$$

Weights should reflect input elasticities, but we only observe revenue shares. In the presence of markups, these are not the same. To see this, consider labor share LS. It can be expressed as a function of markups and underlying elasticity: $LS = \alpha_L/\mu$

With markups ($\mu > 1$), contribution of labor understated since the elasticity of labor is lower than labor share. Under perfect competition there is no difference since $\mu = 1$.

Recent work has suggested that markups are significant and growing which gives the possibility that productivity is mismeasured. A challenge to evaluating this theory is to separately identify the output elasticity of labor and the markup. The underlying problem is that, while it is straightforward to calculate the payments to labor, one needs to split the remaining payments between capital and profits. The payments to capital equal the capital stock times the user costs of capital. While the capital stock is reported in NIPA, the user costs are not. We use the calibrated model to measure the user cost.

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II. Calibration

The exercise requires splitting capital payments into regular capital returns and profit. Markups cannot be read directly from the data. I use the growth model of Farhi and Gourio (2018) to back out the user cost of capital that is used to do this split. The model features disaster risk and monopolistic competition. This allows the model to have industry-specific risky rates of return and markups. For brevity, this section provides a summary of this model. Farhi and Gourio (2018) provide a full treatment for interested readers.

The model generates equations that allow us to estimate the elasticities of production and markups. I calibrate the model to several sectors and solve for the balanced growth path (BGPs) in two sub-period before and after the break in productivity in 2011. The advantage of focusing on different BGPs is that we can solve analytically for the parameter values of interest, allowing us to directly connect the model to the data.

On the BGP, markups are a function of capital-output ratio $p_K K/p_Y Y$, investment-capital ratio $p_X X/p_K K$ and dividend yield ratio Π/p_F, where Π is profit; p_Y, p_K, and p_X are the price of output, capital and investment respectively; and p_F is the value of owning a firm.

$$\frac{1}{\mu} = \frac{R p_K K + wL}{p_Y Y}. \tag{2}$$

where the rate of return R is

$$R = \frac{p_X X}{p_K K} + \frac{(1+\gamma_T)\Pi}{p_F}.$$

Trend growth γ_T is the average growth rate of real value added during the years in which no rare disaster shocks materialize. I drop 2008-09 and 2020 to avoid the Great Recession and Covid shocks respectively.

I implement the calibration for two sub-periods: 1997 to 2010 and 2011 to 2023. This is the maximum time series for which industry data are reported with a consistent classification system. I split at 2011 since that is the year that Lashkari and Pearce (2024) identify as the break point in productivity growth.

The data for the calibration are taken from the U.S. NIPA and financial data collected by Kenneth French. The Data Appendix provides details of data sources and calculations.

I examine manufacturing and the durable/non-durables manufacturing split. I also look at the total private industries. The full set of data are available for these sectors. Proprietor's income, key for adjusting capital payments, are not available for lower levels of aggregation.

III. Results

The main exercise is to compare MFP estimates using the output elasticities recovered from the model with those using the revenue shares in the data. I feed in the same factor inputs into the model using these two sets of parameters. Table 1 reports the labor elasticities and markups from the model as well as labor shares.

Manufacturing does not show increasing markups. Manufacturing markups are nearly constant, increasing slightly from 1.24 to 1.25. This stability is seen within the manufacturing sub-sectors. The relatively high markups in manufacturing reflect a high degree of double marginalization due to the very high intermediate inputs share. Accounting for double marginalization to put markups on a gross output basis reduces markups significantly. For example, first period non-durable markups fall from 1.46 to 1.15. See Basu (2019) and Bridgman and Herrendorf (2022) for a full discussion of the impact of double marginalization.

Markups change the level of the output elasticity of labor, but not the trend. In both cases, there is significant capital deepening in both measures of output elasticity.

I feed in input and output data to calculate MFP using these parameters. I use the BEA's real value added by industry as the measure of output and full time equivalent persons employed and the quantity index of net capital stocks as the labor and capital inputs. Table 2 reports average annual growth rates using the model estimates of output elasticities ("Adjusted MFP") and those using revenue shares ("Revenue MFP").

I do not find that the slowdown is due to mismeasurement. In fact, correcting for markups tends to strengthen the slowdown. Manufacturing MFP falls 0.6 percentage points more across the sub-periods. This effect is seen in both

TABLE 1—ESTIMATED PARAMETERS

Variable	Mfg	Durables	Non-durables	Private Industries
α_L (1997-2010)	0.71	0.74	0.67	0.71
α_L (2011-23)	0.64	0.69	0.57	0.70
μ (1997-2010)	1.24	1.12	1.46	1.17
μ (2011-23)	1.25	1.13	1.44	1.21
LS (1997-2010)	0.57	0.66	0.46	0.61
LS (2011-23)	0.51	0.61	0.40	0.57

Note: Source: Author's calculations.

TABLE 2—ESTIMATED PRODUCTIVITY GROWTH (PERCENT)

Variable	Mfg	Durables	Non-durables	Private Industries
Adjusted MFP growth(1997-2010)	4.7	6.3	2.4	1.7
Adjusted MFP growth (2011-23)	0.1	0.9	-0.8	0.9
Revenue MFP growth(1997-2010)	4.0	5.9	1.3	1.4
Revenue MFP growth (2011-23)	0.0	0.9	-1.1	0.9
Adjusted MFP Change	-4.6	-5.4	-3.2	-0.8
Revenue MFP Change	-4.0	-5.0	-2.4	-0.5

Note: Source: Author's calculations.

durable and non-durable manufacturing.

Markups mean that the output elasticity of labor is understated. During the period of rapid productivity growth, labor input fell while output increased. The productivity slowdown features labor input growth has been faster than output growth. The markup correction increases the impact of labor changes, so exacerbates the slowdown.

I find that fast productivity growth is associated with capital deepening and increasing markups. Labor share fell 11 percentage points from 2002 to 2011, but showed no decline from 2011 to 2023.

This suggests that markups were a consequence of dynamic growth and new technology, as in Autor et al. (2020), rather than stagnation, as in Gutierrez and Philippon (2017). Going back to the 1950s, Bridgman and Herrendorf (2022) find that goods production (which manufacturing dominates) had falling output elasticity of labor and capital deepening. I find that this process ends after 2011.

IV. Conclusion

This paper examines whether mismeasurement due to markups is responsible for the decline in U.S. manufacturing productivity growth. It estimates markups using a model to estimate the user cost of capital to split capital payments into regular returns and economic profit. I do not find that the slowdown is due to mismeasurement. Correcting for markups tends to strengthen the slowdown. Labor input growth has been faster than output growth. The markup correction increases the impact of labor input changes. The results are consistent with the slowdown resulting from slower technical change in investment products.

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Data Appendix

A1. National Accounts Data

Capital data are from Bureau of Economic Analysis (2024*a*) Tables 3.1ESI (Current cost capital stocks $p_K K$), 3.2ESI (Real capital stocks K), and 3.7ESI (Current cost investment $p_X X$).

Production and price data are from Bureau of Economic Analysis (2024*b*) Tables 1.1.4 (price index p_Y), 6.5D (labor input L), 6.12D (proprietor's income), 'Components of Value Added by Industry' (Nominal value added, compensation of employees, and indirect business taxes), and 'Real Value Added by Industry' (real output, used to calculate γ_T).

Labor share is calculated as the ratio of compensation of employees COE to value added Y adjusted for ambiguous income indirect business taxes IBT and proprietor's income $PropInc$: $LS = COE/(Y - IBT - PropInc)$.

A2. Financial Data

Price-Dividend data are taken from Kenneth French's data website, available at `mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html`. I use the October 2025 38 industry portfolio dataset.

Non-durable manufacturing is sectors Food, Smoke, Txtls, Apprl, Paper, Print, Chems, Ptrlm, Rubbr, Lethr, and Glass.

Durable manufacturing is sectors Wood, Chair, Metal, MtlPr, Machn, Elctr, Cars, Instr, and Manuf.

Private industry is all sectors less sectors Money, Govt, and Other.

Annual returns are measured as "Average Weighted Returns-Annual" less "Average Weighted Returns (ex. Dividend)-Annual."

Individual industry data are aggregated as follows. Industry market value is monthly "Average Firm Size" times "Firms in Portfolio." Industry market weight is the ratio of industry market value to its sector market value. Following the dataset's methodology, I use the June value as that year's weight.