

To Augment Or Not To Augment? A Conjecture On Asymmetric Technical Change

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Abstract. Recent empirical evidence for the U.S. points to a non-increasing share of labor in income and complementarity between capital and labor. According to standard macroeconomic theory, these facts imply that productivity growth should be labor-augmenting. Analyzing post-war U.S. data, we however find that technical progress is rather evenly distributed across capital- and labor-intensive industries. To reconcile standard theory with the evidence, we stress inflation measurement errors in the data. If aggregate inflation is annually overstated by as little as a third of a percentage point, technical progress is already over 50 percent higher in labor-intensive industries than in capital-intensive industries.

1. Standard Economic Theory

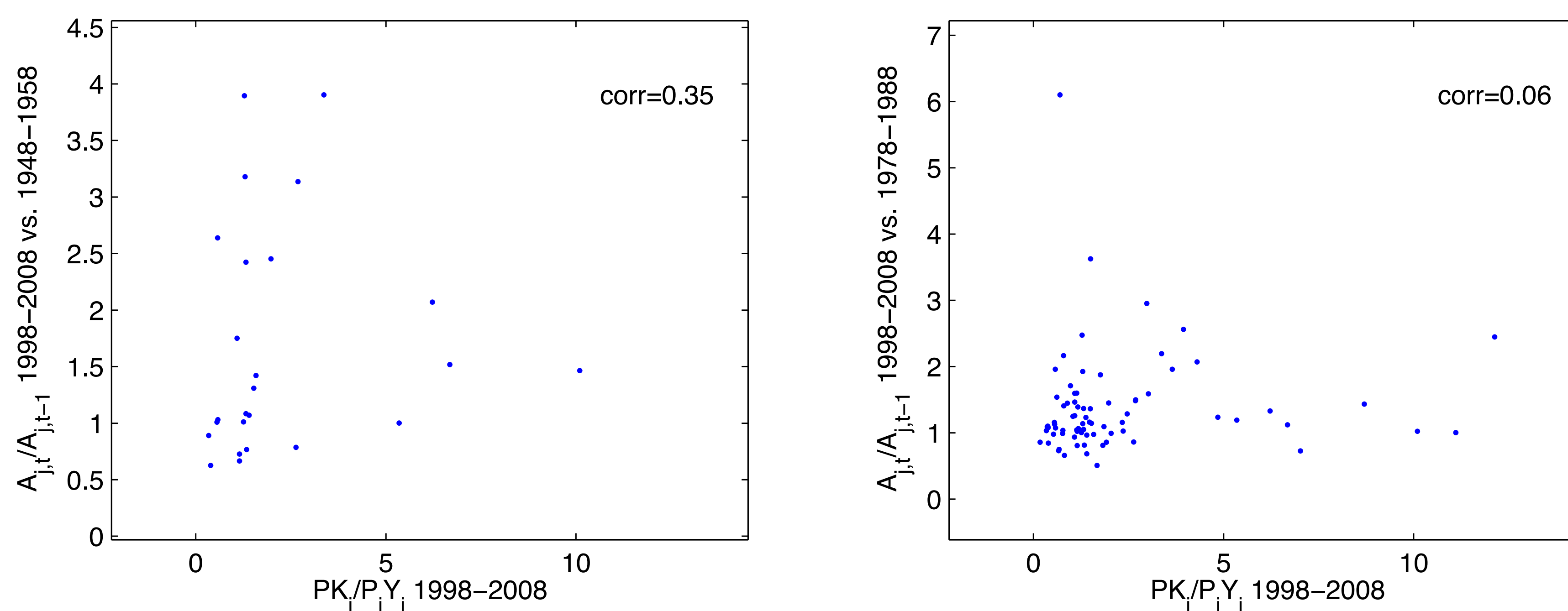
technical progress should be high in labor intensive industries

$$Y_t = \left(\gamma_1^{\frac{1}{\epsilon}} Y_{1,t}^{\frac{\epsilon-1}{\epsilon}} + (1 - \gamma_1)^{\frac{1}{\epsilon}} Y_{2,t}^{\frac{\epsilon-1}{\epsilon}} \right)^{\frac{\epsilon}{\epsilon-1}}$$

$$Y_{1,t} = A_{1,t} K_{1,t}^{\alpha_1} L_{1,t}^{1-\alpha_1}, \quad \text{and} \quad Y_{2,t} = A_{2,t} K_{2,t}^{\alpha_2} L_{2,t}^{1-\alpha_2}$$

2. Empirical Evidence

technical progress is rather evenly distributed across industries



3. Our Explanation

removing the output inflation bias tilts productivity toward the labor intensive industries

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	adj. (pp)	$\frac{Y_{\tau,t-1}}{Y_{\tau,t}}$ (%)	$\frac{K_{\tau,t-1}}{K_{\tau,t}}$ (%)	$\frac{L_{\tau,t-1}}{L_{\tau,t}}$ (%)	$g_{A_{\tau}}$ (%) BEA	$\frac{g_{A_1}}{g_{A_2}}$ BEA	$g_{A_{\tau}}$ (%) BLS	$\frac{g_{A_1}}{g_{A_2}}$ BLS
A. no adjustment								
labor intensive	0.00	17.78	23.14	34.19	1.15		1.14	
capital intensive	0.00	18.77	21.24	71.83	1.15	1.00	1.24	0.92
capital/aggregate	0.00							
B. capital intensive 0.0pp, labor intensive 0.5-0.9pp								
labor intensive	0.50	13.96	19.99	34.19	1.58		1.56	
capital intensive	0.00	18.77	18.35	71.83	0.96	1.64	1.06	1.47
capital/aggregate	0.30							
labor intensive	0.70	12.67	18.85	34.19	1.75		1.73	
capital intensive	0.00	18.77	17.30	71.83	0.89	1.98	0.99	1.75
capital/aggregate	0.42							

Notes: The table presents the authors' calculations based on data drawn from the U.S. Bureau of Economic Analysis (BEA) and U.S. Bureau of Labor Statistics (BLS). $\tau \in \{1,2\}$ equals 1 for the labor-intensive sector and 2 for the capital-intensive sector. For the initial period, we take $t-1 = 1948-1958$, while we set the end period to $t = 1998-2008$. $Y_{\tau,t-1}/Y_{\tau,t}$, $K_{\tau,t-1}/K_{\tau,t}$, and $L_{\tau,t-1}/L_{\tau,t}$ denote the real output, real capital stock, and labor of 1948-1958 expressed as percentages (%) of their respective 1998-2008 values. $g_{A_{\tau}}$ denotes estimates of the compound annual productivity growth rate in percent (%) based on Cobb-Douglas production functions. pp denotes the percentage point inflation adjustment. The table shows inflation adjustments for output prices in the labor-intensive sector, output prices in the capital-intensive sector, capital prices (which are treated symmetrically across sectors), and aggregate output prices. Capital and aggregate output prices are characterized by the same rate of inflation adjustment.