# New BEA-BLS Estimates of the Industry-level Sources of U.S. Economic Growth between 1987 and 2016

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#### Abstract

This article describes new historical statistics for the BEA-BLS integrated industry-level production account. The dataset includes KLEMS and integrated MFP measures that are consistent with the official BEA GDP by Industry statistics and now covers 1987-2016. The most important source of economic growth over the period was the accumulation of capital input. More than three quarters of the contribution of capital was driven by the accumulation of capital inputs in the service sector. The next most important source of economic growth over the period was the accumulation of labour input. Growth in labour input in the services sectors accounted for almost all the economy-wide contribution of labor input. MFP growth accounted for about twenty percent of aggregate economic growth. Of this, the manufacturing sector contributed more than half of this

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growth, but almost all of this was due to growth in MFP of the computer electronic products industry. Finally, the new dataset shows that the decline in the aggregate income share paid to labour in the manufacturing sector was mostly due to a decrease in the share of income paid to workers without a college degree. In contrast, workers with a college degree accounted for most of the increase in the income share of labour in the service sectors.

This article describes recently released historical statistics for the BEA-BLS integrated industry-level production account. Release of this new dataset adds more than a decade of historical data to the time series of KLEMS data and enhances the usefulness of the production account by allowing analysis of economic trends over a longer period. The dataset presented covers 1987-2016, whereas the previous data covered only 1998-2015.

These statistics were prepared as part of an ongoing collaboration between the Bureau of Economic Analysis (BEA) and the Bureau of Labor Statistics (BLS). An important feature of the account is that it covers the total economy and is constructed to be consistent with the U.S. national accounts. There were two main challenges in assembling the new history presented in this article: the first was the conversion of historical SIC data to be consistent with NAICS industry classifications, and the second was a change in the reporting of educational attainment in data that was used to estimate labour composition.

These new historical data provide a view of the sources of economic growth at the industry level over roughly three decades of economic history. The data reveal that about half of economic growth over this period was due to the accumulation of capital inputs. About 30 per cent was due to growth in labour input, while the remainder (about 20 per cent) was due to growth in multifactor productivity (MFP)<sup>2</sup> The industry dataset shows that the aggregate growth in capital input was driven by capital services growth in the trade; information; and finance, insurance, and real estate sectors. The preponderance of the contribution of labour input was due to an increase of labour in the services industries, while most of aggregate MFP growth was accounted for by MFP growth in the computer and electronic manufacturing and trade

<sup>2</sup> It is noteworthy that the estimates presented in this article differ from the official MFP growth estimates produced by the BLS for the business sector. For example, the BLS estimates that business sector MFP grew by 0.86 per cent per year over the 1987-2016 period, while MFP growth for the total economy is estimated to be 0.43 per cent per year for the same period. The difference is mostly attributable to the scope of the accounts (business versus total economy) but also reflects other details. See Fleck *et al.*(2012) for a broader discussion.

sectors.

The longer time series of data more clearly shows the shift from manufacturing to the services sector and the sources of this change from the input side of the production account. For example, more than three quarters of the contribution of aggregate capital input over the period as a whole was driven by the accumulation of capital inputs in the service sector and almost all of the aggregate contribution of labour input was accounted for by labour input growth in the services sectors. MFP growth in manufacturing was strong compared to its contributions of labour and capital inputs, but this was mostly as a result of MFP growth in the computer and electronics product industry.

The conceptual framework that underpins the estimates is identical throughout the time series. However, more limited data availability requires that different techniques be employed to prepare estimates in the earlier periods. The primary purpose of this article is to describe the insights gained from longer time series and the methodology underpinning these new estimates.<sup>3</sup>

The article is divided into four main sections. Section 1 describes the conceptual framework that underpins the full set of statistics. Section 2 describes the source data and methodologies used to prepare the data for the period prior to 1997. Section 3 describes the results. Section 4 concludes.

### **Conceptual Framework**

To prepare these statistics, we assume a generic production function relating industry gross output to five factor inputs using the function Q =F(K, L, E, M, S, t). Assuming constant returns to scale, perfect competition, and factor payments equal to marginal product, the gross-output growth model can be written as:

$$\begin{split} \frac{d\ln Q}{dt} &= (\frac{\partial \ln Q}{\partial \ln K} \cdot \frac{d\ln K}{d\ln t}) + \\ (\frac{\partial \ln Q}{\partial \ln L} \cdot \frac{d\ln L}{d\ln t}) + (\frac{\partial \ln Q}{\partial \ln E} \cdot \frac{d\ln E}{d\ln t}) + \\ (\frac{\partial \ln Q}{\partial \ln M} \cdot \frac{d\ln M}{d\ln t}) + (\frac{\partial \ln Q}{\partial \ln S} \cdot \frac{d\ln S}{d\ln t}) + \\ (\frac{\partial \ln Q}{\partial \ln t}) + (\frac{\partial \ln Q}{\partial \ln S} \cdot \frac{d\ln S}{d\ln t}) + \\ (\frac{\partial \ln Q}{\partial \ln t}) + (\frac{\partial \ln Q}{\partial \ln S} \cdot \frac{d\ln S}{d\ln t}) + \\ (\frac{\partial \ln Q}{\partial \ln t}) + (\frac{\partial \ln Q}{\partial \ln S} \cdot \frac{d\ln S}{d\ln t}) + \\ (\frac{\partial \ln Q}{\partial \ln t}) + (\frac{\partial \ln Q}{\partial \ln S} \cdot \frac{d\ln S}{d\ln t}) + \\ (\frac{\partial \ln Q}{\partial \ln S} \cdot \frac{d\ln S}{d\ln S}) + \\ (\frac{\partial \ln Q}{\partial \ln S} \cdot \frac{d\ln S}{d\ln S}) + \\ (\frac{\partial \ln Q}{\partial \ln S} \cdot \frac{d\ln S}{d\ln S} \cdot \frac{d\ln S}{d\ln S}) + \\ (\frac{\partial \ln Q}{\partial \ln S} \cdot \frac{d\ln S}{d\ln S} \cdot \frac{d\ln S}{d\ln S}) + \\ (\frac{\partial \ln Q}{\partial \ln S} \cdot \frac{d\ln S}{d\ln S} \cdot \frac{d\ln S}{d\ln S}) + \\ (\frac{\partial \ln Q}{\partial \ln S} \cdot \frac{d\ln S}{d\ln S} \cdot \frac{d\ln S}{d\ln S} \cdot \frac{d\ln S}{d\ln S}) + \\ (\frac{\partial \ln Q}{\partial \ln S} \cdot \frac{d\ln S}{d\ln S} + \\ (\frac{\partial \ln Q}{\partial \ln S} \cdot \frac{d\ln S}{d\ln S}$$

Q	=	Gross Output	(1)
Κ	=	Capital Input	

- L = Labour Input
- E = Intermediate Energy Inputs
- M = Intermediate Material Inputs
- M = Intermediate Purchased Services Inputs

t = time

which can be rearranged to measure

<sup>3</sup> See Fleck et al. (2014) for a more detailed discussion of the methodologies and source data that underpin the statistics for the more recent period.

(unobserved) multifactor productivity growth as follows:

$$\frac{d\ln Q}{dt} = \frac{\partial \ln Q}{\partial \ln t} - \left(\frac{\partial \ln Q}{\partial \ln K} \cdot \frac{d\ln K}{d\ln t}\right) - \left(\frac{\partial \ln Q}{\partial \ln L} \cdot \frac{d\ln L}{d\ln t}\right) - \left(\frac{\partial \ln Q}{\partial \ln E} \cdot \frac{d\ln E}{d\ln t}\right) - \left(\frac{\partial \ln Q}{\partial \ln M} \cdot \frac{d\ln M}{d\ln t}\right) - \left(\frac{\partial \ln Q}{\partial \ln S} \cdot \frac{d\ln S}{d\ln t}\right) - \left(\frac{\partial \ln Q}{\partial \ln S} \cdot \frac{d\ln S}{d\ln t}\right) - \left(\frac{\partial \ln Q}{\partial \ln S} \cdot \frac{d\ln S}{d\ln t}\right) - \left(\frac{\partial \ln Q}{\partial \ln S} \cdot \frac{d\ln S}{d\ln t}\right) - \left(\frac{\partial \ln Q}{\partial \ln S} \cdot \frac{d\ln S}{d\ln t}\right) - \left(\frac{\partial \ln Q}{\partial \ln S} \cdot \frac{d\ln S}{d\ln t}\right) + \left(\frac{\partial \ln Q}{\partial \ln S} \cdot \frac{d\ln S}{d\ln t}\right) + \left(\frac{\partial \ln Q}{\partial \ln S} \cdot \frac{d\ln S}{d\ln t}\right) + \left(\frac{\partial \ln Q}{\partial \ln S} \cdot \frac{d\ln S}{d\ln t}\right) + \left(\frac{\partial \ln Q}{\partial \ln S} \cdot \frac{d\ln S}{d\ln t}\right) + \left(\frac{\partial \ln Q}{\partial \ln S} \cdot \frac{d\ln S}{d\ln t}\right) + \left(\frac{\partial \ln Q}{\partial \ln S} \cdot \frac{d\ln S}{d\ln t}\right) + \left(\frac{\partial \ln Q}{\partial \ln S} \cdot \frac{d\ln S}{d\ln t}\right) + \left(\frac{\partial \ln Q}{\partial \ln S} \cdot \frac{d\ln S}{d\ln t}\right) + \left(\frac{\partial \ln Q}{\partial \ln S} \cdot \frac{d\ln S}{d\ln t}\right) + \left(\frac{\partial \ln Q}{\partial \ln S} \cdot \frac{d\ln S}{d\ln t}\right) + \left(\frac{\partial \ln Q}{\partial \ln S} \cdot \frac{d\ln S}{d\ln t}\right) + \left(\frac{\partial \ln Q}{\partial \ln S} \cdot \frac{d\ln S}{d\ln t}\right) + \left(\frac{\partial \ln Q}{\partial \ln S} \cdot \frac{d\ln S}{d\ln t}\right) + \left(\frac{\partial \ln Q}{\partial \ln S} \cdot \frac{d\ln S}{d\ln t}\right) + \left(\frac{\partial \ln Q}{\partial \ln S} \cdot \frac{d\ln S}{d\ln t}\right) + \left(\frac{\partial \ln Q}{\partial \ln S} \cdot \frac{d\ln S}{d\ln t}\right) + \left(\frac{\partial \ln S}{\partial \ln S} \cdot \frac{d\ln S}{d\ln t}\right) + \left(\frac{\partial \ln S}{\partial \ln S} \cdot \frac{d\ln S}{d\ln t}\right) + \left(\frac{\partial \ln S}{\partial \ln S} \cdot \frac{d\ln S}{d\ln t}\right) + \left(\frac{\partial \ln S}{\partial \ln S} \cdot \frac{d\ln S}{d\ln t}\right) + \left(\frac{\partial \ln S}{\partial \ln S} \cdot \frac{d\ln S}{d\ln t}\right) + \left(\frac{\partial \ln S}{\partial \ln S} \cdot \frac{d\ln S}{d\ln t}\right) + \left(\frac{\partial \ln S}{\partial \ln S} \cdot \frac{d\ln S}{d\ln t}\right) + \left(\frac{\partial \ln S}{\partial \ln S} \cdot \frac{d\ln S}{d\ln t}\right) + \left(\frac{\partial \ln S}{\partial \ln S} \cdot \frac{d\ln S}{d\ln t}\right) + \left(\frac{\partial \ln S}{\partial \ln S} \cdot \frac{d\ln S}{d\ln t}\right) + \left(\frac{\partial \ln S}{\partial \ln S} \cdot \frac{d\ln S}{d\ln t}\right) + \left(\frac{\partial \ln S}{\partial \ln S} \cdot \frac{d\ln S}{d\ln t}\right) + \left(\frac{\partial \ln S}{\partial \ln S} \cdot \frac{d\ln S}{d\ln t}\right) + \left(\frac{\partial \ln S}{\partial \ln S} \cdot \frac{d\ln S}{d\ln t}\right) + \left(\frac{\partial \ln S}{\partial \ln S} \cdot \frac{d\ln S}{d\ln t}\right) + \left(\frac{\partial \ln S}{\partial \ln S} \cdot \frac{d\ln S}{d\ln t}\right) + \left(\frac{\partial \ln S}{\partial \ln S} \cdot \frac{d\ln S}{d\ln t}\right) + \left(\frac{\partial \ln S}{\partial \ln S} \cdot \frac{d\ln S}{d\ln t}\right) + \left(\frac{\partial \ln S}{\partial \ln S} \cdot \frac{d\ln S}{d\ln t}\right) + \left(\frac{\partial \ln S}{\partial \ln S} \cdot \frac{d\ln S}{d\ln t}\right) + \left(\frac{\partial \ln S}{\partial \ln S} \cdot \frac{d\ln S}{d\ln t}\right) + \left(\frac{\partial \ln S}{\partial \ln S} \cdot \frac{d\ln S}{d\ln t}\right) + \left(\frac{\partial \ln S}{d\ln t}\right)$$

With the above assumptions, the unknown elasticities can be replaced with the observable factor share,  $v_i$ , for each input. Shown below is the factor share for capital input:

$$\frac{\partial \ln Q}{\partial K} = \frac{P_K K}{P_K K + P_L L + P_E E + P_M M + P_S S} \tag{3}$$

where

$P_K =$	Price of	Capital
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 $P_L$  = Price of Labour

- $P_E$  = Price of Intermediate Energy Inputs
- $P_M$  = Price of Intermediate Materials Inputs
- $P_S$  = Price of Intermediate Purchased Services Inputs

The assumption of constant returns to scale ensures that the factor shares for all inputs sum to one:

$$V_K + V_L + V_E + V_M + V_S = 1 \quad (4)$$

In discrete time, the input weights are two-year averages of the cost shares for each input in years t and t - 1, where  $\tilde{v} = \frac{1}{2}v_{i,t} + \frac{1}{2}v_{i,t-1}$ .

All of this information can be combined to rewrite MFP growth for an industry as the residual difference between growth in output and growth in the combined inputs:

$$\Delta MFP = \Delta \ln Q - \tilde{v}_K \Delta \ln K -$$
$$\tilde{v}_L \Delta \ln L - \tilde{v}_E \Delta \ln E - \quad (5)$$
$$\tilde{v}_M \Delta \ln M - \tilde{v}_S \Delta \ln S$$

Finally, it is worth noting that the above production function applies at the level of each industry. That is, individual industries face industryspecific output and input prices and these are reflected in the growth accounting model.

The MFP index is computed by dividing an index of real gross output by an index of combined real inputs. The combined index of real inputs is computed using a Tornqvist index number formula to aggregate real intermediate inputs by industry for energy, materials, and purchased services, real labour input, and real capital input weighted by average cost shares.

The above framework describes the approach to measuring the industrylevel sources of growth, but an important objective of this article is to construct aggregate measures from the bottom up. To aggregate the sources of growth by industry to economywide totals we use the "direct aggregation" approach discussed in (Jorgenson, Ho, and Stiroh, 2005). The details of the direct aggregation approach are beyond the scope of this article, but the basic idea is to weight the industry-level input and MFP contributions by "Domar" weights. Direct aggregation across industries can be expressed with the following formula:

$$\Delta \ln V = \sum_{j} \left( \frac{\tilde{y}_{j}}{\tilde{w}_{v}j} \right) \tilde{w}_{K} j \Delta \ln K_{j}$$

$$+ \sum_{j} \left( \frac{\tilde{y}_{j}}{\tilde{w}_{v}} \right) \tilde{w}_{L} \Delta \ln L_{j} \quad (6)$$

$$+ \sum_{j} \left( \frac{\tilde{y}_{j}}{\tilde{w}_{v}} \right) \Delta \ln MFP_{j}$$

where  $\Delta \ln V$  is aggregate valueadded growth. The right-hand side decomposes this to the weighted sum of the contributions of capital, labour, and MFP growth by industry. For completeness:  $\tilde{y}_j$  is nominal value added in industry j as a share of aggregate value added and  $\tilde{w}_{vj}$  is the value added share in gross output in industry j. The other terms are defined as in Equation 5; and the tilde indicates average share in period t and t-1. All of the equations are implemented for each individual year in the time series.<sup>4</sup>

# Data

A main objective of this article is to implement the above framework in a way that is consistent with the U.S. national accounts. That is, the sources of growth from the bottom up across industries and factors of production should be consistent with the GDP accounts. In this section, we briefly describe the basic data sources and how we make them internally consistent so that components "add up" to the official GDP estimates. The growth accounting framework requires industry-level data on gross output, intermediate inputs, capital, and labour in current and constant Details on the data conprices. struction and the new estimates constructed are given in the Appendix.<sup>5</sup>

Data on industry gross output and intermediate inputs by industry are drawn from BEA's GDP by Industry statistics, thus are consistent with the GDP accounts by construction. That is, in equation (5),  $\Delta \ln V$  comes directly from the official GDP by industry statistics. Only total intermediate is published in the industry ac-

<sup>4</sup> That is, for each t from 1987 to 2016. This can be contrasted to obtaining a growth rate from 1987 to 2016 using only these two years of data.

 $<sup>5\</sup> Available\ at:\ http://www.csls.ca/ipm/36/Garner_etal_appendix.pdf).$ 

counts. The Appendix describes work to split total intermediate into energy, materials, and services such that they add back up to the published total intermediate inputs. Because the output and intermediate input data that we use to implement equation (5) is consistent with the GDP accounts, industry value added, which is constructed by double deflation, is also consistent with the industry accounts; and when we sum (appropriately weighted) value added contributions across industries, we obtain aggregate value added growth that is consistent with the official U.S. accounts.

Capital inputs by industry come primarily from the BLS Productivity Program. Capital services conceptually measure the service flow from capital assets. A central notion in the construction of capital measures is the concept of "productive" capital stock, or the stock measured as "efficiency units." Conceptually, productive stock represents the amount of new investment required to produce the same capital services actually produced by existing assets of all vintages. Thus, capital services are assumed to be proportional to productive stock at the asset level by industry. To construct industry-level measures of capital input, each asset is weighted by its share of capital compensation, i.e. share in capital

income. These shares are estimated as the price of capital input by asset times its productive stock divided by the total capital income in the industry. The price of the capital input is estimated by the user cost method used by the BLS Productivity Program. To ensure consistency between the BLS capital input data, and the BEA GDP by industry data, the account constructed uses the quantity of capital input from the BLS productivity program for each industry, and the capital compensation underlying the integrated BEA-BLS production account.

Labour inputs combine hours data from the BLS and a labour composition adjustment from the BEA. In order to create a constant quality index of labour input, hours worked are weighted to account for substitution between heterogeneous types of labour. The need for this adjustment reflects the assumption that the marginal product of a skilled worker is higher than that of an unskilled worker, implying that replacing hours worked by an unskilled worker with an equal number of hours worked by a skilled worker will increase economic output without an increase in MFP. Given the framework described above, it is important to capture the change in the characteristics of the workforce as a change in labour input, or a change in the composition of labour input would manifest as an increase in MFP. This change in labour input due to shifts in worker characteristics is referred to as the labour composition effect.

In addition to the new historical data, this new dataset includes revised data for 1997-2015 and new estimates for 2016. Minor revisions throughout this period are due to the incorporation of updated data on capital and labour inputs from the BLS productivity program published on March 21, 2018. In addition, revisions in 2014 and 2015 reflect BEA's annual update to the industry accounts published on November 2, 2017.

Finally, it is worth noting why the data covers 1987-2016 when BEA's GDP by Industry accounts data covers 1947-2016. The primary reason for this is that a significant amount of additional detail is necessary to estimate the production account and this underlying data are not available at the time of writing. For example, labour and capital compensation controls are not available before 1987. The Current Population Survey (CPS) micro data that are used to estimate the labour composition are not available before 1964, and the sector detail available in the BEA GDP by Industry data is more limited before 1964 as well. Future work will examine extending the data before 1987.

# Results

The major advantage of the longer time series of integrated KLEMS (K-capital, L-labour, E-energy, Mmaterials, and S-purchased services) data is that it permits analysis of longer-term economic trends. The description of these trends is what we focus on in the presentation of our results.<sup>6</sup> Over the last three decades, this includes the information technology (IT) revolution and increased globalization of the production pro-The dataset described above cess. is an important tool for identifying the structural change that has taken place between 1987 and 2016, particularly at the industry level. This section describes industry-level sources of growth, including the industrylevel contributions of capital, labour, and multifactor productivity to economic growth, as well as some aspects of structural change over this longer time period. To facilitate this discussion, results are mainly focused on nine sectors that reflect major industry groupings, rather than the 63 in-

<sup>6</sup> The dataset that we use is posted here: https://www.bea.gov/data/special-topics/integrated-industry-level-production-account-klems so that alternative decompositions can be calculated with the publicly available data.

<sup>7</sup> This is the same industry classification used by Jorgenson and Schreyer (2013).

#### Table 1: Sources of Industry Output Growth in the United States, 1987-2016

Jama and the strength of the strength of and the		Output Growth	Capital Contribution	Labor Contribution	Intermediate Contribution	MFP Growth
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Oland generation1.210.080.180.061.41Singer extricting for mining1.460.210.540.560.58Singer extricting for mining0.300.310.310.310.31Construction0.300.410.300.340.48Wood polating0.300.410.370.350.88Parany netaling interime0.300.410.300.310.31Construction interime interime0.310.350.350.350.35Extension equipation0.560.400.310.350.35Construction equipation equipation0.560.400.310.350.35Construction equipation equipation0.570.400.310.370.92Construction equipation equipation0.560.400.310.310.310.31Construction equipation equipation0.560.400.310.310.310.310.31Construction equipation0.560.600.310.310.310.310.310.310.310.31Construction equipation0.560.600.31	Forestry, fishing, and related activities	0.11	0.42	0.99	-0.49	-0.81
Maine, corey of and gen0.920.420.430.71Unitars0.310.740.630.510.51Unitars0.310.740.630.510.64Wood products0.510.640.720.530.64Wood products0.600.720.740.750.84Primary tortah0.900.910.910.910.91Maching opclate0.700.930.910.910.91Maching opclate0.700.910.930.910.91Maching opclate0.750.940.920.910.91Maching opclate0.750.940.930.910.91Maching opclate0.750.940.930.910.91Partine opclate0.750.940.930.910.91Partine opclate0.750.940.930.910.91Partine opclate0.950.930.910.910.910.91Partine opclate0.950.930.910.910.910.91Partine opclate0.950.920.910.910.910.91Partine opclate0.950.920.910.910.910.91Partine opclate0.950.920.910.910.910.91Partine opclate0.950.920.910.910.910.91Partine opclate0.950.920.910.910.910.91Parti	Oil and gas extraction	1.29	-0.08	-0.08	0.06	1.40
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Unities0.310.740.060.450.400Wood products0.150.640.4210.880.441Wood products0.400.4710.400.880.88Prinary unital0.400.400.400.430.88Excitational products1.400.710.300.410.720.310.32Compater and detexine products0.810.710.430.310.320.320.32Excitation signification0.740.72 </td <td>Support activities for mining</td> <td>1.46</td> <td>0.21</td> <td>0.45</td> <td>-0.56</td> <td>1.36</td>	Support activities for mining	1.46	0.21	0.45	-0.56	1.36
Cantartaina0.930.719.720.430.84Noon bolic mined products0.300.14-0.670.050.84Name balls mined products0.300.14-0.670.050.84Finany actia1.840.150.050.940.04Comport and obtrainic products0.640.05-0.400.530.54Comport and obtrainic products0.640.050.080.030.04Comport and obtrainic products0.640.030.030.030.03Comport and obtrainic products1.040.230.090.030.01More Valcek, bolies and traker, and part2.370.000.320.000.030.01Finantian and straker and part1.310.660.230.010.030.01Textile and botic products0.370.090.220.010.030.01Paper and botaner and the products0.370.010.030.030.01Paper and botaner and the products0.370.030.030.030.01Parting and relating products0.360.030.030.030.030.030.03Parting and relating products0.340.03 <td< td=""><td>Utilities</td><td>0.31</td><td>0.74</td><td>0.03</td><td>0.05</td><td>-0.50</td></td<>	Utilities	0.31	0.74	0.03	0.05	-0.50
Wood products0.150.060.2410.080.241Primary parkal0.900.4070.300.180.88Primary parkal0.900.4010.000.4010.00Machinery1.000.000.010.030.58Computer and electracic poolocs0.760.760.780.78Exertical equipants, appliance, and0.740.720.780.78More vinders, backs and traitery, and parts2.550.240.021.760.82Constructure catter equipants1.760.640.210.740.72Fendatore and eloted products0.160.330.330.03Micellances manderstating products1.760.610.730.76Food and beernage and bedroe rand alloy ponducts1.760.010.740.750.71Part and and bedroe rand alloy ponducts1.770.210.710.210.710.21Printing and related ponducts1.760.010.730.610.710.72Printing and related ponducts1.770.210.710.720.710.72Printing and related ponducts1.760.710.720.710.72Printing and related ponducts1.760.710.720.710.72Printing and related ponducts1.770.720.710.720.710.72Printing and related ponducts1.740.750.730.710.720.71Printi	Construction	0.39	0.21	0.52	0.34	-0.68
Nomental products0,90,4-0.070,050.08Eheriart nerd products1.180.180.050.090.01Computer and octronic products5.60.600.490.030.58Excitnal org protocn and parts7.50.240.021.70.29Computer and octronic products1.840.230.281.70.28Computer and solution conjugated1.840.230.281.70.28Construction conjugated1.840.230.281.70.28Construction conjugated1.960.100.551.440.10Macellancos mandochtring1.750.460.210.410.10Paperal and balar products0.260.011.740.750.61Paperal and balar products0.250.010.750.610.750.61Paperal and balar products0.250.010.070.000.830.750.51Paperal and balar products0.250.100.070.000.830.750.51Paperal and balar products0.250.100.070.010.530.61Paperal and balar products0.260.070.030.750.51Paperal and balar products0.250.020.710.530.61Paperal and balar products0.260.070.030.710.53Pating and radioal products0.260.070.030.710.53 <td< td=""><td>Wood products</td><td>0.15</td><td>0.06</td><td>-0.24</td><td>0.58</td><td>-0.24</td></td<>	Wood products	0.15	0.06	-0.24	0.58	-0.24
Primary metals0.90.070.300.180.08Debrated metal probres1600.30-0.041.00-0.14Medinery1600.30-0.040.03.50Excitad explanent, aplianco, and0.140.02-0.390.130.23Comporate1000.020.03-0.230.23Orber transportation1.040.02-0.330.030.03Debrations, and hand products0.060.06-0.330.030.01Redeavers manderischer products1.000.050.090.03-0.174.21Redeavers manderischer products2.050.00-1.74-1.750.01Apper products2.050.00-1.74-1.750.01Apper products1.291.12-0.010.07-0.21Printing and relate support activities2.750.01-0.750.01Retariam and products1.291.12-0.010.01-0.03Printing and relate support activities2.850.040.030.020.01Retariam and ond products1.370.290.020.010.030.01Retariam and and products1.380.290.030.010.030.01Retariam activities2.860.040.030.020.030.01Retariam activities2.860.040.030.020.030.01Retariam activities2.860.040.03	Nonmetallic mineral products	0.20	0.14	-0.07	0.05	0.08
Enducation products1.160.180.050.090.04Computer and settinaic products5.560.560.490.535.56Externaic orgunators, and0.410.710.230.310.33settinaic and location conjugators1.540.240.221.760.42Other transportation equipaters1.640.230.230.01Maced and product1.640.230.240.010.01Maced and product and pool to the conjugators1.750.660.210.410.750.44Ord and benergy and baloes pool to the conjugators1.760.660.230.410.40Apperia and and and and pool to the conjugators0.760.460.230.410.44Opper onderis1.760.460.210.410.760.42Paper and and products0.750.100.430.410.750.41Paper and and products0.850.400.470.430.430.43Parkan and rabide mpool ta civities0.870.420.440.750.430.43Parkan and products1.370.400.430.430.430.430.430.43Parkan and products0.870.420.440.440.760.420.440.440.760.420.44Parkan and rabide products0.770.420.760.420.440.760.440.760.440.760.440.76	Primary metals	0.49	-0.07	-0.30	0.18	0.68
Machaery1000.30-0.44100-0.48Compute and lectronic products0.40.7-0.390.130.58Electrical oprignent, appliance, and parts2.550.240.021.760.82Other transportation equipanet1.040.230.280.330.030.00Derivative and related products0.16-0.330.030.000.030.070.030.070.030.070.030.070.030.070.030.070.030.070.030.070.030.070.030.070.030.070.030.070.030.070.030.070.030.070.030.070.030.010.050.000.040.050.000.010.050.000.010.050.000.010.050.000.010.050.000.010.030	Fabricated metal products	1.18	0.18	0.05	0.99	-0.04
Computer and obtering inplanes, and tectring arguing regulation, and toor vehicle, holes and trailers, and parts5.560.400.0210.750.423Motor vehicle, holes and trailers, and parts1.570.400.230.281.370.428Pariture and relation products1.040.230.280.210.410.47Bod and beersog and tobactor products1.060.160.430.4170.46Data and beersog and tobactor products1.000.051.440.00Appared and shafers and that products0.250.00-1.74-1.750.44Paratag and vehicle and aller products0.250.00-0.290.17-0.21Paratag and vehicle and aller products0.250.10-0.070.000.81Chanking and products0.250.10-0.070.000.81Chanking and vehicle and products0.370.070.430.01Chanking and products1.370.200.070.030.10Chanking and products1.370.200.070.330.01Chanking and products1.370.020.370.340.01Chanking and products1.370.240.430.410.330.31Chanking and trade2.380.040.331.130.81Chanking and trade2.380.040.331.130.81Chanking and trade and	Machinery	1.09	0.30	-0.04	1.00	-0.18
Betria epignener, applanes, and0.140.770.390.130.330.23Moter vitables, bodies and tunkes, and parts2.550.240.621.760.42Moter vitables, locaties conjuncent1.040.260.330.030.03Bisedhancon manifecturing1.750.460.210.410.77Root and leverage and toknor products1.090.050.090.934.17Paper products-2.950.09-1.74-1.750.64Apperd and leverage and toknor products4.250.09-0.270.014.21Proting and redied products4.250.09-0.270.010.01Proting and redied products1.291.12-0.010.674.03Proting and redied products1.370.290.020.710.03Proting and redied products1.370.290.020.710.31Proting and redied products1.370.290.270.030.18 <tr< td=""><td>Computer and electronic products</td><td>6.56</td><td>0.56</td><td>-0.49</td><td>0.53</td><td>5.96</td></tr<>	Computer and electronic products	6.56	0.56	-0.49	0.53	5.96
comportation equipment1.040.240.021.760.22Other transportation equipment1.040.230.281.370.48Dimitation call call products1.750.460.210.410.77Decid and bestrage and tobacco product1.900.900.930.171.75Tecide mails and sectip products0.250.000.471.750.46Opperad and bestrage and tables products0.250.000.020.170.21Paperad and bestrage and tables products0.250.000.010.350.47Paperad and bestrage and products0.250.000.010.030.05Patista and trade products1.270.100.070.030.030.05Patista and trade products0.311.120.430.820.04Patista and trade products0.320.010.331.310.01Patista and trade products0.990.400.05-0.030.010.01Patista and trade products0.990.400.05-0.030.010.01Patista and trade products0.990.400.05-0.030.010.01Patista and trade products0.990.400.05-0.030.021.02Patista and trade products0.990.400.05-0.030.020.02Patista and trade products0.990.400.05-0.030.020.02Patista and	Electrical equipment, appliances, and	0.14	0.17	-0.39	0.13	0.23
Mote vehicles, losis and tunes, and parts2.550.240.021.760.42Pariature and haded products0.160.16-0.330.030.03Moclameses manufacturing1.750.460.210.410.67Peod and boverage and tokneo products1.000.250.090.93-0.17Porte in mike and text product mike-2960.00-1.74-1.750.64Appear and loakne and alido products-2960.00-0.17-0.21-0.21Printing and related apport activities0.770.01-0.03-0.03-0.03Pears products1.281.12-0.010.01-0.03-0.03Pastes and rubber products1.370.290.020.71-0.35-0.04Pastes and rubber products1.370.290.020.71-0.35-0.01-0.07Pastes and rubber products1.370.290.020.07-0.35-0.01-0.07Relati Tarle2.990.350.400.13-0.18-0.02-0.02-0.02Pastes and rubber products2.990.350.40-0.33-0.18-0.02Relati tarle2.990.350.40-0.33-0.18-0.02Pastes and rubber production-0.440.120.03-0.42-0.14Relati tarle2.900.350.40-0.73-0.02-0.22Pastes taraportation0.441.120.03-0.42-0.24<	components					
Oher transportation equipment1640.23-0.281.37.048Perindra cal aled polators1100.250.090.330.01Micollaxous manufacturing1.750.460.210.410.67Textle mille and textle polators mills-1.90-0.10-0.85-1.440.49Paper and lander polators0.250.09-0.200.17-0.51Paper and lander and milder polators0.850.10-0.670.090.81Chemised products1.370.290.020.71-0.33Patistis and rubber polators1.370.290.020.71-0.33Windskale tack3.311.120.430.820.94Netsisal and polators0.990.400.05-0.030.370.78Vindskale tack3.311.120.430.840.311.38Windskale tack2.580.040.331.380.340.34Naki transportation2.580.040.331.380.340.34Traket transportation1.600.611.760.420.44Papeler transportation0.411.1050.570.42Papeler tansportation0.411.050.570.42Papeler tansportation0.600.511.640.55Papeler tansportation0.610.570.420.44Papeler tansportation0.610.570.420.44Papeler tansportation </td <td>Motor vehicles, bodies and trailers, and parts</td> <td>2.55</td> <td>0.24</td> <td>0.02</td> <td>1.76</td> <td>0.52</td>	Motor vehicles, bodies and trailers, and parts	2.55	0.24	0.02	1.76	0.52
Parnitar and related products0.160.630.330.03Meedlances manufacturing1.750.460.210.410.67Food and beerage and tokace products1.900.050.430.17Apper and leader and allied products2.950.00-1.741.750.54Paper products0.770.010.03-4.750.51Parting and related support activities0.550.10-0.070.000.81Cennical products0.550.10-0.070.000.81Parting and related support activities1.370.290.020.71-0.33Pattes and rubber products1.370.290.020.710.33Relat Inde2.930.860.370.601.00Relat Inde2.930.860.370.601.00Meter transportation2.890.350.400.311.31Traka transportation2.890.350.400.370.32Traka transportation2.890.350.400.320.340.34Charles products2.890.300.700.501.84Order transportation3.310.200.710.320.35Pathe transportation and upport activities2.841.400.570.680.37Traka transportation and upport activities2.841.400.570.560.340.31Pathe transportation and upport activities2.850.30	Other transportation equipment	1.04	0.23	-0.28	1.37	-0.28
Masellaneous manifecturing1.750.660.210.410.67Food and beerong products1.000.250.090.331.477Textile rail shall cettle products2.550.001.741.750.54Paper products0.4250.000.4741.750.51Paper products0.770.014.0530.670.000.85Petrodeurs and coal products0.850.100.070.000.85Patist and rubber products1.291.120.410.710.453Patist and rubber products3.311.720.430.820.94Ari transportation0.990.400.050.430.75Ari transportation0.990.400.050.430.311.10Water stansportation1.600.411.050.740.42Pather stan drubut puscept transportation2.580.440.331.330.31Transportation0.600.411.050.740.42Pather transportation0.600.670.570.450.44Uber transportation and support activities2.551.000.670.320.45Uber transportation service1.722.840.000.200.320.51Uber transportation and storger2.571.000.070.551.38Uber transportation and storger2.771.970.490.410.570.45Uber transport	Furniture and related products	0.16	0.16	-0.33	0.33	0.00
Food and beyenge and tokers products1.00.250.000.43-1.440.49Apper and lealter and alled products-2.950.00-1.74-1.740.720.74Paper products0.250.00-0.290.17-0.210.740.750.63Petratign and eload support activities0.770.01-0.630.050.050.05Petratign and eload support activities1.291.12-0.010.071-0.53Plasties and rubber products1.291.12-0.040.820.94Real Turk2.330.860.370.780.91Art transportation1.040.07-0.730.601.03Turk transportation1.040.07-0.730.601.03Turk transportation0.040.050.030.210.14Turk transportation0.040.050.030.240.51Turk transportation0.040.100.032.130.14Under toxisportation and storager transportation0.041.050.770.42Public transportation and storager transportation2.510.240.560.350.490.13Undersboxism0.510.520.290.350.680.130.680.13Undersboxismig and toxisme2.511.400.570.680.630.920.530.55Define transportation0.100.120.032.151.440.55 <t< td=""><td>Miscellaneous manufacturing</td><td>1.75</td><td>0.46</td><td>0.21</td><td>0.41</td><td>0.67</td></t<>	Miscellaneous manufacturing	1.75	0.46	0.21	0.41	0.67
Textle mills and textle product mills-1.90-0.10-0.85-1.74-1.75-0.51Paper and lock products-0.250.00-1.74-1.75-0.51Paper products-0.770.01-0.53-0.75-0.51Petride and related support activities0.850.10-0.670.000.81Chemical products1.291.12-0.010.71-0.53Patists and rubber products3.311.720.430.820.94Muckased trade3.311.120.430.850.030.070.001.00Art transportation0.990.400.05-0.030.100.040.050.030.010.03Mult transportation2.580.040.030.130.031.000.010.020.020.010.03Pradit transportation0.041.100.03-2.430.840.550.240.550.440.330.130.840.55Unchar transportation0.041.100.03-2.430.840.550.240.55 <td< td=""><td>Food and beverage and tobacco products</td><td>1.10</td><td>0.25</td><td>0.09</td><td>0.93</td><td>-0.17</td></td<>	Food and beverage and tobacco products	1.10	0.25	0.09	0.93	-0.17
Apper and lather and allor products-2.50.00-1.74-1.750.54Prioring and related support activities-0.770.01-0.53-0.770.01Prioring and related support activities-0.770.01-0.53-0.71-0.53Chanical products1.370.290.020.71-0.53Plastaris and rubber producta3.31-1.12-0.430.820.94Retail take2.330.860.370.780.91Retail take2.330.860.370.780.91Retail take2.580.040.03-1.13-1.18Traviat and ground passenger transportation2.890.350.49-1.730.81Traviat and ground passenger transportation-0.411.120.03-2.430.84Other transportation and support activities2.590.201.352.04-0.34Plabling industries, except internet3.910.302.032.032.03Plabling industries, except internet3.910.302.032.032.03Plabling industries, except internet3.910.300.06-1.33Productating and brange5.910.300.060.13-0.13Plabling industries2.451.400.570.620.53Data processing, internet with second internet with seco	Textile mills and textile product mills	-1.90	-0.10	-0.85	-1.44	0.49
Paper products0.250.090.290.170.21Printing and related support activities0.570.010.070.000.81Petrolem and coal products1.520.12-0.010.710.53Plastics and rubber products1.370.200.020.710.53Plastics and rubber products3.311.120.010.710.53Plastics and rubber products2.330.860.370.780.91Ari transportation0.990.400.05-0.030.57Rail transportation2.580.440.331.131.08Track transportation2.580.420.33-0.41Thack transportation-0.441.120.03-2.430.84Other transportation-0.441.120.03-2.430.84Other transportation-0.441.120.03-2.430.84Other transportation-0.441.120.03-2.430.84Other transportation-0.441.120.03-2.151.44Publishing industris-2.551.400.570.08-0.19Rotiz game and solar game distristion-2.251.400.570.080.19Data processing, internet publishing, no.122.361.090.002.290.38Data processing, internet publishing, no.122.711.270.400.640.37Pander tada distristic-2.721.030.06 <td< td=""><td>Apparel and leather and allied products</td><td>-2.95</td><td>0.00</td><td>-1.74</td><td>-1.75</td><td>0.54</td></td<>	Apparel and leather and allied products	-2.95	0.00	-1.74	-1.75	0.54
Printing and related support activities0.770.01-0.33-0.730.51Petrolem and coal products1291.12-0.010.71-0.53Plastiss and rubber products1.370.290.020.710.35Wholesale trade2.330.860.370.780.91Ari transportation0.900.400.05-0.030.57Rait transportation0.900.400.05-0.030.57Rait transportation1.440.07-0.730.601.10Whot transportation2.580.640.331.131.08Trast and ground passenger transportation1.600.411.100.57-0.42Pplein transportation-0.441.120.03-2.430.84Other transportation and stropper activities2.550.021.352.04-0.56Warchooxing and storage-5110.300.070.551.38(includes softwaro)1.100.070.68-0.19Decodesting and telecomminations4.721.500.002.290.53Data processing, internet vibilism7.722.281.090.640.37Data processing, internet vibilism2.731.370.490.640.37Data processing, internet vibilism2.731.270.490.640.37Predeal Reserve basks, condit intermediation,1.521.870.200.680.340.23 <tr< td=""><td>Paper products</td><td>-0.25</td><td>0.09</td><td>-0.29</td><td>0.17</td><td>-0.21</td></tr<>	Paper products	-0.25	0.09	-0.29	0.17	-0.21
Petrolem and coal products0.850.000.070.000.81Pladits and rubber products1.221.120.010.710.53Pladits and rubber products3.311.120.030.620.44Retail trade2.930.860.370.780.91Air transportation0.990.400.050.030.57Rait transportation1.640.070.730.601.10Wate transportation2.580.440.331.131.08Truck transportation1.600.411.650.57-0.42Pladits transportation0.441.120.032.430.84Other transportation and support activities2.550.021.352.44-0.56Uher transportation and support activities2.551.400.570.68-0.19Broadcasting and tocage5.910.300.670.68-0.19Broadcasting and tocage7.122.581.093.62-0.17All or therm conditions excess7.122.581.093.62-0.17Data processing, internet publishing,7.122.581.093.62-0.13Card dev findmition services7.711.570.300.68-1.33and relatic activitis5.911.611.590.200.58Data processing, internet publishing,7.121.270.300.640.31Card dev findmition services7.721.27	Printing and related support activities	-0.77	0.01	-0.53	-0.75	0.51
Chemical products1.291.12-0.010.71-0.53Plastiss and rubber products1.370.290.020.710.35Wholesale trade3.311.120.430.820.94Reall trade2.930.860.370.780.91Air transportation1.040.07-0.730.001.10Water transportation2.890.350.491.730.31Tradit and ground pascenger transportation1.000.411.050.57-0.42Pjeline transportation and support activities2.850.021.352.04-0.55Waterhousing and storage5.910.302.032.151.44Publishing industries, except internet3.100.902.032.151.44Publishing industries, except internet3.100.902.030.951.88(include software)0.950.58Data processing, internet publishing7.122.581.093.020.41Data processing, internet publishing7.122.581.093.020.37Data processing, internet publishing7.122.581.093.020.37Data processing, internet publishing7.122.581.093.020.37Picenal Reserve banks, credit intermediation,7.271.570.300.68-1.33and related activities2.780.150.460.310.21	Petroleum and coal products	0.85	0.10	-0.07	0.00	0.81
Plastis1.370.290.020.710.35Molosale trade3.311.120.430.820.94Retal transportation0.990.400.65-0.030.67Air transportation1.040.07-0.730.601.10Water transportation2.880.040.331.131.08Tradis and ground passenger transportation2.890.411.050.57-0.42Pipeline transportation2.890.350.401.730.31Tradis and ground passenger transportation-0.441.120.03-2.430.54Other transportation and support activities2.850.021.352.04-0.56Warehonsing and storage5.910.302.032.151.44Dishibing industries, except internet3.310.900.070.051.38(includes software)1.400.570.68-0.19Dista ground passenging internet publishing,7.122.881.090.32-0.15Data processing, internet publishing,1.521.870.300.68-1.33and related activities2.780.110.072.350.26Evandistrist2.721.390.060.940.33Instrance2.721.390.060.940.33Renda and losing services and lessers of3.633.991.131.520.71Evandistrist2.771.570.49 <td< td=""><td>Chemical products</td><td>1.29</td><td>1.12</td><td>-0.01</td><td>0.71</td><td>-0.53</td></td<>	Chemical products	1.29	1.12	-0.01	0.71	-0.53
Wholeselt rade3.311.120.430.820.94Alt ransportation0.900.400.05-0.030.57Rail transportation1.040.07-0.730.601.10Water transportation2.580.040.331.131.08Trads transportation2.890.350.491.730.31Trads transportation1.600.411.050.57-0.42Pipeline transportation-0.441.120.63-2.430.84Other transportation and support activities2.850.021.352.04-0.56Warchonsing and storage5.910.300.070.551.38Uirachous contrantio5.910.300.070.68-0.19Publishing industries, corego internet3.310.900.002.290.58Uirachous coftware1.722.581.000.62-0.17Broad casting and telecommunications4.771.900.002.290.58Data processing, internet publishing,7.122.581.093.62-0.17and related activities1.571.663.192.10Securities, commolity contracts, and6.490.151.1663.192.10Insurance carriers and related activities2.771.270.490.640.37Finds, trasts, and other financial vhitels2.780.110.072.250.26Contract services0.990.68 <t< td=""><td>Plastics and rubber products</td><td>1.37</td><td>0.29</td><td>0.02</td><td>0.71</td><td>0.35</td></t<>	Plastics and rubber products	1.37	0.29	0.02	0.71	0.35
Retal trade2330.860.370.780.91Ait transportation0.990.400.05-0.030.57Rait transportation2.880.040.031.131.08Transit ransportation2.890.050.491.730.31Transit and ground passenger transportation1.000.411.160.57-0.42Phefine transportation0.00-0.441.120.03-2.430.84Other transportation and support activities2.850.021.352.04-0.56Warehousing and storage5.910.302.032.2151.44Other transportation and support activities2.851.000.070.051.38(includes software)	Wholesale trade	3.31	1.12	0.43	0.82	0.94
Air transportation0.990.400.05-0.030.57Water transportation1.040.07-0.730.001.10Water transportation2.580.040.331.131.08Truck transportation2.690.350.491.730.31Trust and ground passenger transportation-0.441.120.03-2.430.84Other transportation and support activities2.850.021.352.04-0.56Warehousing and storage5.910.302.032.151.44Publishing industries, except internet3.00.000.290.58Data processing, internet publishing,7.122.581.093.62-0.19Broadcasting and teccommunications7.711.900.002.900.58Data processing, internet publishing,7.122.581.003.62-1.33and other information servicesFederal Neerwer basks, credit intermediation,1.521.570.300.68-1.33and related activities2.771.270.490.640.370.26Real state2.721.390.660.430.332.27Funds, trasts, and other financial vehicles2.721.590.680.78-1.22Computer systems design and related activities2.771.270.490.640.370.26Computer systems design and related services7.980.181.53	Retail trade	2.93	0.86	0.37	0.78	0.91
Kal trasportation1.040.07-0.730.001.10Water trasportation2.580.040.331.131.08Trust maportation2.690.350.491.730.31Trust and ground passenger transportation0.041.120.032.430.84Other transportation and support activities2.850.021.352.04-0.56Warehousing and storage5.910.302.032.151.44Disbling industries, except internet3.310.000.070.951.38(includes software)	Air transportation	0.99	0.40	0.05	-0.03	0.57
Water transportation2.880.040.331.131.08Trush transportation2.890.550.491.730.31Transi and ground passenger transportation4.041.120.03-2.430.84Pipeline transportation and support activities2.850.021.352.04-0.56Warehousing and storage5.910.302.032.151.44Publishing industries, except internet3.090.070.951.38(includes software)	Rail transportation	1.04	0.07	-0.73	0.60	1.10
True transportation2.890.550.491.730.31Trues transportation1.600.411.050.57-0.42Pjeline transportation-0.441.120.03-2.430.84Other transportation and support activities2.850.021.352.04-0.56Warchousing and storage5.910.302.032.151.44Publishing industries (corept internet3.310.900.070.951.38(includes software)	Water transportation	2.58	0.04	0.33	1.13	1.08
Transt and ground passenger transportation1.000.411.030.51-0.42Pipeline transportation0.441.120.03-2.430.84Other transportation and support activities2.850.021.352.04-0.56Warehousing and storage5.910.302.032.151.44Publishing industries, except internet3.310.900.070.951.38(includes software) </td <td>Truck transportation</td> <td>2.89</td> <td>0.35</td> <td>0.49</td> <td>1.73</td> <td>0.31</td>	Truck transportation	2.89	0.35	0.49	1.73	0.31
''penine transportation         -0.44         1.12         0.03         -2.43         0.84           Other transportation and support activities         2.85         0.02         1.35         2.04         -0.56           Warehousing and storage         5.91         0.30         2.03         2.15         1.44           Publishing industries, except internet         3.31         0.90         0.07         0.95         1.38           (includes software)	Transit and ground passenger transportation	1.60	0.41	1.05	0.57	-0.42
Other transportation and support activities2.850.021.352.04-0.36Warehousing and storage5.910.302.032.151.44Publishing industries, escept internet3.310.900.070.951.38(includes software) </td <td>Pipeline transportation</td> <td>-0.44</td> <td>1.12</td> <td>0.03</td> <td>-2.43</td> <td>0.84</td>	Pipeline transportation	-0.44	1.12	0.03	-2.43	0.84
Warehousing and storage         5.91         0.30         2.13         2.13         1.44           Publishing industries, except internet         3.31         0.90         0.07         0.55         1.38           (includes software)	Other transportation and support activities	2.85	0.02	1.35	2.04	-0.56
Problem in influence         3.31         0.30         0.30         0.35         1.38           Motion picture and sound recording industries         2.45         1.40         0.57         0.68         -0.19           Broadcasting and telecommunications         4.77         1.90         0.00         2.29         0.58           Data processing, internet publishing,         7.12         2.58         1.09         3.62         -0.17           and other information services	Warehousing and storage	5.91	0.30	2.03	2.15	1.44
Inclusion source         International source <thinternational source<="" th="">         International</thinternational>	(includes software)	0.01	0.90	0.07	0.95	1.58
Anotom pecune and solural recording industings         2.43         1.40         0.37         0.08         -0.13           Broadcasting and telecommunications         4.77         1.90         0.00         2.29         0.58           Data processing, internet publishing,         7.12         2.58         1.09         3.62         -0.17           and other information services	(includes software)	0.45	1.40	0.57	0.69	0.10
Drotaticating and reacommunications4.771.500.002.290.58Data processing, interret publishing, and other information services7.122.581.093.62-0.17and other information services	Presidential and telecommunications	2.40	1.40	0.57	0.08	-0.19
Data processing, memer primaming,         1.12         2.03         1.03         3.02         -0.11           and other information services         -	Data processing internet publishing	9.77	2.58	1.00	2.23	0.17
and other mormations services         1.52         1.87         0.30         0.68         -1.33           and related activities         2         1.87         0.60         3.19         2.10           investments	and other information corridge	1.12	2.38	1.09	3.02	-0.17
Patherin Reserve banks, French International, Parken Reserve Banks, Parken Rese	Endoral Reserve hanks, and it intermediation	1.59	1.97	0.20	0.68	1.99
Market activities         6.49         0.15         1.06         3.19         2.10           investments	and related activities	1.02	1.07	0.50	0.00	-1.55
Section Control of Marker, andSolidSo	Securities commodity contracts and	6.49	0.15	1.06	3.10	2 10
Insurance carriers and related activities         2.77         1.27         0.49         0.64         0.37           Funds, trusts, and other financial vehicles         2.78         0.11         0.07         2.35         0.26           Real estate         2.72         1.39         0.06         0.94         0.33           Rental and leasing services and lessors of         3.63         3.99         0.18         1.73         -2.27           intangible assets         -         -         -         -         -         -         -         -         -         -         -         -2.27           Intagible assets         -         -         -         -         -2.27         -         -         -         -2.27         -         -         -         -2.27         -         -         -         -         -2.27         -         -         -         -         -         -2.27         -	investments	0.10	0.10	1.00	0.15	2.10
Manual Contract derivation         2.11         1.21         0.10         0.04         0.05           Funds, trusts, and other financial vehicles         2.78         0.11         0.07         2.35         0.26           Real estate         2.72         1.39         0.06         0.94         0.33           Rental and leasing services and lessors of         3.63         3.99         0.18         1.73         -2.27           intangible assets	Insurance carriers and related activities	9.77	1.97	0.49	0.64	0.37
Index, thus, this other humber $1.0$ $0.11$ $0.01$ $0.03$ $1.26$ $0.126$ Real estate $2.72$ $1.39$ $0.06$ $0.94$ $0.33$ Rental and leasing services and lessors of $3.63$ $3.99$ $0.18$ $1.73$ $-2.27$ intangible assets $1.22$ $0.68$ $0.68$ $0.78$ $-1.22$ Computer systems design and related services $7.98$ $0.18$ $4.53$ $2.51$ $0.77$ Miscellaneous professional, scientific, and $3.69$ $0.80$ $1.38$ $1.64$ $-0.13$ technical services $3.06$ $0.29$ $1.57$ $2.27$ $-1.07$ Administrative and support services $4.66$ $0.76$ $1.77$ $2.01$ $0.12$ Waste management and remediation services $2.67$ $0.32$ $1.00$ $1.75$ $-0.41$ Educational services $2.96$ $0.22$ $1.45$ $1.53$ $-0.23$ Ambulatory health care services $3.35$ $0.22$ $1.79$ $1.58$ $-0.24$ Hospitals and Nursing and residential care $2.77$ $0.26$ $1.15$ $1.86$ $-0.51$ Social assistance $3.68$ $0.68$ $1.03$ $1.79$ $0.18$ Accommodation $2.11$ $0.69$ $0.28$ $0.84$ $0.30$ related activities $2.28$ $0.18$ $0.62$ $1.23$ $0.25$ Other services, except government $1.74$ $0.43$ $0.51$ $1.10$ $-0.29$ Other services, except government $1.74$ $0.43$	Funds trusts and other financial vehicles	2.77	0.11	0.07	2 35	0.26
And leasing services and lessors of       3.63       3.99       0.18       1.73       -2.27         intangible assets	Real estate	2.72	1.39	0.06	0.94	0.33
intangible assets       1	Rental and leasing services and lessors of	3.63	3.99	0.18	1.73	-2.27
Legal services0.920.680.680.781.22Computer systems design and related services7.980.184.532.510.77Miscellaneous professional, scientific, and3.690.801.381.64-0.13technical services </td <td>intangible assets</td> <td></td> <td></td> <td></td> <td></td> <td></td>	intangible assets					
O         O         N         4.53         2.51         0.77           Miscellaneous professional, scientific, and         3.69         0.80         1.38         1.64         -0.13           technical services            - <td>Legal services</td> <td>0.92</td> <td>0.68</td> <td>0.68</td> <td>0.78</td> <td>-1.22</td>	Legal services	0.92	0.68	0.68	0.78	-1.22
Miscellaneous professional, scientific, and       3.09       0.80       1.38       1.64       -0.13         Miscellaneous professional, scientific, and       3.09       0.80       1.38       1.64       -0.13         technical services       1       1.57       2.27       -1.07         Administrative and support services       4.66       0.76       1.77       2.01       0.12         Waste management and remediation services       2.67       0.32       1.00       1.75       -0.41         Educational services       2.96       0.22       1.45       1.53       -0.23         Ambulatory health care services       3.35       0.22       1.79       1.58       -0.24         Hospitals and Nursing and residential care       2.77       0.26       1.15       1.86       -0.51         Social assistance       3.69       0.10       2.53       1.60       -0.54         Performing arts, spectator sports, museums, and       3.73       0.08       1.19       1.86       0.61         related activities       -       -       -       -       -       -       -         Amusements, gambling, and recreation industries       3.68       0.68       1.03       1.79       0.18	Computer systems design and related services	7.98	0.18	4.53	2.51	0.77
technical servicesManagement of companies and enterprises3.060.291.572.27-1.07Administrative and support services4.660.761.772.010.12Waste management and remediation services2.670.321.001.75-0.41Educational services2.960.221.451.53-0.23Ambulatory health care services3.350.221.791.58-0.24Hospitals and Nursing and residential care2.770.261.151.86-0.51Social assistance3.690.102.531.60-0.54Performing arts, spectator sports, museums, and3.730.081.191.860.61related activities	Miscellaneous professional, scientific, and	3.69	0.80	1.38	1.64	-0.13
Management of companies and enterprises         3.06         0.29         1.57         2.27         -1.07           Administrative and support services         4.66         0.76         1.77         2.01         0.12           Waste management and remediation services         2.67         0.32         1.00         1.75         -0.41           Educational services         2.96         0.22         1.45         1.53         -0.23           Ambulatory health care services         3.35         0.22         1.79         1.58         -0.24           Hospitals and Nursing and residential care         2.77         0.26         1.15         1.86         -0.51           Social assistance         3.69         0.10         2.53         1.60         -0.54           Performing arts, spectator sports, museums, and         3.73         0.08         1.19         1.86         0.61           relate activities         -         -         -         -         -         -           Amusements, gambling, and recreation industries         3.68         0.68         1.03         1.79         0.18           Accommodation         2.11         0.69         0.62         1.23         0.25           Other services, except government	technical services					
Administrative and support services       4.66       0.76       1.77       2.01       0.12         Waste management and remediation services       2.67       0.32       1.00       1.75       -0.41         Educational services       2.96       0.22       1.45       1.53       -0.23         Ambulatory health care services       3.35       0.22       1.79       1.58       -0.24         Hospitals and Nursing and residential care       2.77       0.26       1.15       1.86       -0.51         Social assistance       3.69       0.10       2.53       1.60       -0.54         Performing arts, spectator sports, museums, and       3.73       0.08       1.19       1.86       0.61         relate activities	Management of companies and enterprises	3.06	0.29	1.57	2.27	-1.07
Waste management and remediation services         2.67         0.32         1.00         1.75         -0.41           Educational services         2.96         0.22         1.45         1.53         -0.23           Ambulatory health care services         3.35         0.22         1.79         1.58         -0.24           Hospitals and Nursing and residential care         2.77         0.26         1.15         1.86         -0.51           Social assistance         3.69         0.10         2.53         1.60         -0.54           Performing arts, spectator sports, museums, and         3.73         0.08         1.19         1.86         0.61           related activities         .         .         .         .         .         .         .         .           Accommodation         2.11         0.69         0.28         0.84         0.30         .	Administrative and support services	4.66	0.76	1.77	2.01	0.12
Educational services         2.96         0.22         1.45         1.53         -0.23           Ambulatory health care services         3.35         0.22         1.79         1.58         -0.24           Hospitals and Nursing and residential care         2.77         0.26         1.15         1.86         -0.51           Social assistance         3.69         0.10         2.53         1.60         -0.54           Performing arts, spectator sports, museums, and         3.73         0.08         1.19         1.86         0.61           related activities         .	Waste management and remediation services	2.67	0.32	1.00	1.75	-0.41
Ambulatory health care services         3.35         0.22         1.79         1.58         -0.24           Hospitals and Nursing and residential care         2.77         0.26         1.15         1.86         -0.51           Social assistance         3.69         0.10         2.53         1.60         -0.54           Performing arts, spectator sports, museums, and         3.73         0.08         1.19         1.86         0.61           related activities            1.03         1.79         0.18           Accommodation         2.11         0.69         0.28         0.84         0.30           Food services and drinking places         2.28         0.18         0.62         1.23         0.25           Other services, except government         1.74         0.43         0.51         1.10         -0.29           Federal         0.72         0.37         -0.17         0.46         0.07           State and local         1.90         0.45         0.64         0.73         0.08	Educational services	2.96	0.22	1.45	1.53	-0.23
Hospitals and Nursing and residential care         2.77         0.26         1.15         1.86         -0.51           Social assistance         3.69         0.10         2.53         1.60         -0.54           Performing arts, spectator sports, museums, and         3.73         0.08         1.19         1.86         0.61           related activities	Ambulatory health care services	3.35	0.22	1.79	1.58	-0.24
Social assistance         3.69         0.10         2.53         1.60         -0.54           Performing arts, spectator sports, museums, and         3.73         0.08         1.19         1.86         0.61           related activities	Hospitals and Nursing and residential care	2.77	0.26	1.15	1.86	-0.51
Performing arts, spectator sports, museums, and         3.73         0.08         1.19         1.86         0.61           related activities	Social assistance	3.69	0.10	2.53	1.60	-0.54
related activities         Amusements, gambling, and recreation industries       3.68       0.68       1.03       1.79       0.18         Accommodation       2.11       0.69       0.28       0.84       0.30         Food services and drinking places       2.28       0.18       0.62       1.23       0.25         Other services, except government       1.74       0.43       0.51       1.10       -0.29         Federal       0.72       0.37       -0.17       0.46       0.07         State and local       1.90       0.45       0.64       0.73       0.88	Performing arts, spectator sports, museums, and	3.73	0.08	1.19	1.86	0.61
Amusements, gambling, and recreation industries         3.68         0.68         1.03         1.79         0.18           Accommodation         2.11         0.69         0.28         0.84         0.30           Food services and drinking places         2.28         0.18         0.62         1.23         0.25           Other services, except government         1.74         0.43         0.51         1.10         -0.29           Federal         0.72         0.37         -0.17         0.46         0.07           State and local         1.90         0.45         0.64         0.73         0.88	related activities					
Accommodation         2.11         0.69         0.28         0.84         0.30           Food services and drinking places         2.28         0.18         0.62         1.23         0.25           Other services, except government         1.74         0.43         0.51         1.10         -0.29           Federal         0.72         0.37         -0.17         0.46         0.07           State and local         1.90         0.45         0.64         0.73         0.08	Amusements, gambling, and recreation industries	3.68	0.68	1.03	1.79	0.18
Food services and drinking places         2.28         0.18         0.62         1.23         0.25           Other services, except government         1.74         0.43         0.51         1.10         -0.29           Federal         0.72         0.37         -0.17         0.46         0.07           State and local         1.90         0.45         0.64         0.73         0.08	Accommodation	2.11	0.69	0.28	0.84	0.30
Other services, except government         1.74         0.43         0.51         1.10         -0.29           Federal         0.72         0.37         -0.17         0.46         0.07           State and local         1.90         0.45         0.64         0.73         0.08	Food services and drinking places	2.28	0.18	0.62	1.23	0.25
Federal         0.72         0.37         -0.17         0.46         0.07           State and local         1.90         0.45         0.64         0.73         0.08	Other services, except government	1.74	0.43	0.51	1.10	-0.29
State and local 1.90 0.45 0.64 0.73 0.08	Federal	0.72	0.37	-0.17	0.46	0.07
	State and local	1.90	0.45	0.64	0.73	0.08

Notes: Average annual log growth rate in percentage points. A contribution is a share-weighted log growth rate. Aggregate value added growth is the aggregate of share weighed industry value added growth. Sector aggregates are the sum of contributions over the underlying industries. A contribution in individual year t uses the log growth rate in period t and the average of the nominal shares in year t and t-1, and these contributions are then averaged over the sample periods presented in this table. Source: Authors' calculations.

dustries described above.  $^7$ 

Industry-level sources of output growth for the entire 1987-2016 are shown in Table 1. Over this period, the three fastest growing industries were IT: computer systems design; data processing, internet publishing, and other information services; and computer and electronic products manufacturing, reflecting not only the importance of IT hardware, but also the related systems development and the shift towards cloud computing. The textile and paper manufacturing industries contracted over the period.

Since the Great Recession, imports in these industries have shown robust growth, likely reflecting increased competition from foreign products and other shifts in demand toward cheaper substitutes. Relatively strong growth in rental and leasing; broadcasting and telecommunications; and data processing was driven by capital investments, while growth in computer systems design; social assistance; and warehousing and storage was driven by growth in labour inputs, reinforcing the importance of looking at the input side when analyzing the sources of growth. Between 1987 and 2016, the computer and electronic products; securities, commodity contracts, and investments; and warehousing and storage had the largest growth in MFP.

Table 2 presents sector contribu-

tions to aggregate value-added growth and shows many familiar facets of economic growth over the last 30 years. Between 1987 and 2016, manufacturing contributed 0.34 percentage point to aggregate value-added growth of 2.38 per cent per year on average. The importance of including the new historical data is evident in this table because this contribution was skewed heavily towards the first part of the period; manufacturing contributed 0.45 percentage point to growth between 1987-95 and 0.84 percentage point during the IT-Investment boom of 1995-2000 and has fallen off since.

Between 2000 and 2007 manufacturing contributed 0.32 percentage point to aggregate growth and -0.01between 2007 and 2016. Importantly, the manufacturing sector includes the relatively rapidly growing computer and electronic industry; excluding this industry the contribution of manufacturing to aggregate growth was 0.20 percentage point in 1987-95 and -0.08 percentage point in 2007-2016. Over the same period, value added generated by services industries increased in importance. In particular, the information industries; finance, insurance, real estate, rental and leasing; and other services accounted for about 46 per cent of real economic growth in the 1987-1995 period and 74 per cent of real growth in

	1987-2016	1987-1995	1995-2000	2000-2007	2007-2016	2007-2009	2009-2016
		Contrib	outions				
Value-Added	2.38	2.65	4.22	2.34	1.14	-1.56	1.91
Agriculture, Forestry, Fishing,	0.08	0.04	0.05	0.06	0.14	0.25	0.11
Hunting, Mining							
Transportation, Warehousing,	0.07	0.16	0.10	0.02	0.02	-0.17	0.08
Utilities							
Construction	0.00	0.03	0.13	-0.04	-0.06	-0.48	0.06
Manufacturing	0.34	0.45	0.84	0.32	-0.01	-0.64	0.18
Computer and electronic	0.24	0.25	0.62	0.17	0.07	0.09	0.06
products							
Trade	0.41	0.54	0.90	0.33	0.09	-0.61	0.29
Information	0.20	0.17	0.20	0.30	0.14	0.03	0.17
Finance, Insurance, Real Estate,	0.50	0.46	0.89	0.57	0.27	0.02	0.34
Rental and Leasing							
Other Services	0.57	0.60	0.89	0.49	0.44	-0.12	0.60
Government	0.19	0.20	0.21	0.28	0.11	0.17	0.09
		<b>C1</b>					
		Sha	res				
Shares in Nominal Value-Added	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Agriculture, Forestry, Fishing,							
Hunting, Mining	2.7	2.6	2.1	2.4	3.3	3.2	3.3
Transportation, Warehousing,							
Utilities	4.7	5.3	4.8	4.3	4.3	4.3	4.4
Construction	4.0	3.9	4.1	4.6	3.7	4.0	3.6
Manufacturing	13.9	16.7	15.4	12.7	11.6	11.6	11.6
Computer and electronic products	1.7	1.9	2.1	1.5	1.5	1.5	1.5
Trade	11.9	12.5	12.7	11.8	11.2	11.1	11.2
Information	4.6	4.5	4.7	4.7	4.5	4.7	4.5
Finance, Insurance, Real Estate,							
Rental and Leasing	18.6	17.5	18.5	19.3	19.0	18.6	19.1
Other Services	23.0	20.8	22.5	23.4	24.8	24.6	24.8
Government	16.7	16.2	15.3	16.9	17.6	17.8	17.5

# Table 2: Sector Contributions to Aggregate Value-Added Growth in the United States

Notes: Average annual log growth rate in percentage points. A contribution is a share-weighted log growth rate. Aggregate value added growth is the aggregate of share weighed industry value added growth. Sector aggregates are the sum of contributions over the underlying industries. A contribution in individual year t uses the log growth rate in period t and the average of the nominal shares in year t and t-1, and these contributions are then averaged over the sample periods presented in this table. Source: Authors' calculations.

the 2007-2016 period.

The bottom portion of table 2 includes the nominal value-added shares of each of the major sectors and conveys a similar story. The nominal value-added share encompasses payments to labour and capital services and shows how income is distributed throughout the economy. Factors of production in the manufacturing sectors earned 16.7 per cent of aggregate income in 1987-1995, but only 11.6 per cent of income in 2009-2016, reflecting the overall decline in the share of manufacturing in the economy. Other services produced 20.8 per cent of income between 1987 and 1995, but this increased to 24.8 per cent over the 2009-2016 period. The value-added share in finance, insurance, real estate, rental and leasing also increased, from 17.5 per cent in the early periods to about 19.0 per cent in the later period.

Capital Injutt           Aggregate         1.19         1.25         1.91         1.35         0.62         0.64         0.61           Agriculture, Forestry, Fishing,         1         0.00         0.00         0.00         0.03         0.01         0.04           Transportation, Warehousing,         0.01         0.02         0.01         0.05         0.03         0.04         0.04           Construction         0.02         0.01         0.05         0.05         -0.01         -0.02         -0.01           Mandacturing         0.14         0.17         0.26         0.07         0.11         0.13         0.10           Information         0.14         0.17         0.31         0.22         0.10         1.05         0.05         -0.02         0.00           Finance, Insurance, Real Estate,         0.14         0.13         0.22         0.13         0.09         0.15         0.07           Government         0.10         0.09         0.88         0.13         0.09         0.15         0.07           Government         0.10         0.01         -0.01         0.02         0.01         -0.03         0.02           Aggregate         0.76         1.
Aggregate         1.19         1.25         1.91         1.35         0.62         0.64         0.61           Agriculture, Forestry, Fishing,
Aggregate       0.01       0.00       0.00       0.03       0.01       0.04         Agriculture,Forestry,Fishing,       0.01       0.00       0.00       0.03       0.01       0.04         Transportation, Warehousing,       0.01       0.02       0.01       0.05       0.03       0.04       0.03       0.04         Construction       0.02       0.01       0.05       0.05       -0.01       -0.02       -0.01         Manufacturing       0.14       0.17       0.26       0.07       0.11       0.13       0.10         Trade       0.17       0.17       0.31       0.22       0.08       -0.02       0.10         Information       0.14       0.17       0.31       0.22       0.08       -0.02       0.10         Information       0.14       0.13       0.22       0.08       -0.02       0.10         Finance, Insurance, Real Estate,       Rental and Leasing       0.42       0.49       0.70       0.52       0.11       0.12       0.01         Other Services       0.16       0.16       0.24       0.20       0.09       0.15       0.07         Government       0.10       0.09       0.08       0.13
Agreement of every is many framework of the services       0.01       0.00       0.00       0.00       0.00       0.01       0.04         Transportation, Warehousing,       Utilities       0.04       0.04       0.05       0.03       0.04       0.03       0.04         Construction       0.02       0.01       0.05       0.05       -0.01       -0.02       -0.01         Manufacturing       0.14       0.17       0.26       0.07       0.11       0.13       0.10         Information       0.14       0.13       0.22       0.08       -0.02       0.10         Other Services       0.16       0.16       0.24       0.20       0.09       0.15       0.07         Government       0.10       0.09       0.08       0.13       0.09       0.15       0.07         Aggregate       0.76       1.09       1.33       0.43       0.40       -1.30
Transportation, Warehousing,       0.01       0.04       0.05       0.03       0.04       0.04         Construction       0.02       0.01       0.05       0.03       0.04       0.03       0.04         Manufacturing       0.14       0.17       0.26       0.07       0.11       0.13       0.10         Manufacturing       0.14       0.17       0.26       0.07       0.11       0.13       0.10         Information       0.14       0.13       0.22       0.08       -0.02       0.10         Information       0.14       0.13       0.22       0.08       -0.02       0.10         Information       0.14       0.13       0.22       0.13       0.09       0.10       0.09         Finance, Insurance, Real Estate,             0.10       0.09       0.15       0.07         Government       0.10       0.09       0.08       0.13       0.09       0.15       0.07         Aggregate       0.76       1.09       1.33       0.43       0.40       -1.30       0.88         Agriculture, Forestry,             0.
Autoportation, Friedmann, Friedm
Construction         0.02         0.01         0.05         0.05         0.01         0.02         0.01         0.05         0.05         0.01         0.02         0.01           Manufacturing         0.14         0.17         0.26         0.07         0.11         0.13         0.10           Trade         0.17         0.17         0.31         0.22         0.08         -0.02         0.01           Information         0.14         0.13         0.22         0.08         -0.02         0.01           Information         0.14         0.13         0.22         0.08         -0.02         0.00           Finance, Insurance, Real Estate,         .
Construction         0.02         0.01         0.03         0.03         0.01         0.02         0.01           Manufacturing         0.14         0.17         0.26         0.07         0.11         0.13         0.10           Trade         0.17         0.17         0.31         0.22         0.08         -0.02         0.10           Information         0.14         0.13         0.22         0.13         0.09         0.10         0.09           Finance, Insurance, Real Estate,             0.16         0.16         0.24         0.20         0.09         0.15         0.07           Government         0.10         0.09         0.08         0.13         0.09         0.15         0.07           Government         0.10         0.09         0.08         0.13         0.09         0.15         0.07           Government         0.10         0.09         0.88         0.13         0.09         0.15         0.07           Kagregate         0.76         1.09         1.33         0.43         0.40         -1.30         0.88           Agriculture, Forestry,         Fishing, Hunting, Mining         0.00         -0.01
Animateriang       0.11       0.17       0.12       0.01       0.11       0.10       0.10         Trade       0.17       0.17       0.31       0.22       0.08       -0.02       0.10         Information       0.14       0.13       0.22       0.13       0.09       0.10       0.09         Finance, Insurance, Real Estate,
Inter         0.11         0.11         0.11         0.12         0.02         0.02         0.02         0.03           Information         0.14         0.13         0.22         0.13         0.09         0.10         0.09           Finance, Insurance, Real Estate,
Information       0.14       0.13       0.22       0.15       0.03       0.16       0.05         Finance, Insurance, Real Estate,       Rental and Leasing       0.42       0.49       0.70       0.52       0.11       0.12       0.11         Other Services       0.16       0.16       0.24       0.20       0.09       0.15       0.07         Government       0.10       0.09       0.08       0.13       0.09       0.15       0.07         Labour Input         Aggregate       0.76       1.09       1.33       0.43       0.40       -1.30       0.88         Agriculture, Forestry,       Fishing, Hunting, Mining       0.00       -0.01       -0.02       0.01       -0.03       0.02         Transportation, Warehousing,       Utilities       0.03       0.07       0.04       0.00       0.03       -0.07       0.06         Construction       0.04       0.04       0.16       0.07       -0.04       -0.41       0.06         Manufacturing       -0.04       0.07       0.03       -0.21       -0.04       -0.41       0.06         Information       0.01       0.04       0.11       -0.05       -0.01       -0.08
Rental and Leasing       0.42       0.49       0.70       0.52       0.11       0.12       0.11         Other Services       0.16       0.16       0.24       0.20       0.09       0.15       0.07         Government       0.10       0.09       0.08       0.13       0.09       0.15       0.07         Aggregate       0.76       1.09       1.33       0.43       0.40       -1.30       0.88         Agriculture, Forestry,       Fishing, Hunting, Mining       0.00       -0.01       -0.02       0.01       -0.03       0.02         Transportation, Warehousing,       Utilities       0.03       0.07       0.04       0.00       0.03       -0.07       0.06         Construction       0.04       0.04       0.16       0.07       -0.04       -0.41       0.06         Manufacturing       -0.04       0.07       0.03       -0.21       -0.04       -0.20       0.08         Information       0.01       0.04       0.16       0.07       -0.04       -0.01       0.06         Manufacturing       -0.04       0.07       0.03       -0.21       -0.04       -0.20       0.08         Information       0.01       0.04 </td
Itemar and Leasing       0.42       0.49       0.10       0.02       0.11       0.12       0.11         Other Services       0.16       0.16       0.24       0.20       0.09       0.15       0.07         Government       0.10       0.09       0.08       0.13       0.09       0.15       0.07         Aggregate       0.76       1.09       1.33       0.43       0.40       -1.30       0.88         Agriculture, Forestry,       Fishing, Hunting, Mining       0.00       -0.01       -0.02       0.01       -0.03       0.02         Transportation, Warehousing,       Utilities       0.03       0.07       0.04       0.00       0.03       -0.07       0.06         Construction       0.04       0.07       0.03       -0.21       -0.04       -0.40       0.06         Manufacturing       -0.04       0.07       0.03       -0.21       -0.04       -0.41       0.06         Trade       0.07       0.13       0.12       0.04       0.02       -0.20       0.08         Information       0.01       0.04       0.11       -0.05       -0.01       -0.08       0.01         Finance, Insurance, Real Estate,       Utilites
Other services         0.10         0.10         0.24         0.20         0.09         0.13         0.01           Government         0.10         0.09         0.08         0.13         0.09         0.15         0.07           Aggregate         0.76         1.09         1.33         0.43         0.40         -1.30         0.88           Agriculture, Forestry,         Fishing, Hunting, Mining         0.00         -0.01         -0.01         0.02         0.01         -0.03         0.02           Transportation, Warehousing,         Utilities         0.03         0.07         0.04         0.00         0.03         -0.07         0.06           Construction         0.04         0.04         0.16         0.07         -0.04         -0.40         0.06           Manufacturing         -0.04         0.07         0.03         -0.21         -0.04         -0.41         0.06           Trade         0.07         0.13         0.12         0.04         0.02         -0.20         0.08           Information         0.01         0.04         0.11         -0.05         -0.01         -0.08         0.01           Finance, Insurance, Real Estate,         Image         0.48         0
Aggregate       0.76       1.09       1.33       0.43       0.40       -1.30       0.88         Agriculture, Forestry,       Fishing, Hunting, Mining       0.00       -0.01       -0.01       0.02       0.01       -0.03       0.02         Transportation, Warehousing,       Utilities       0.03       0.07       0.04       0.00       0.03       -0.07       0.06         Construction       0.04       0.07       0.03       -0.21       -0.04       -0.40       0.06         Manufacturing       -0.04       0.07       0.03       -0.21       -0.04       -0.41       0.06         Information       0.01       0.04       0.11       -0.05       -0.01       -0.08       0.01         Finance, Insurance, Real Estate,       Utilities       0.07       0.07       0.16       0.08       0.02       -0.15       0.07         Other Services       0.48       0.60       0.61       0.39       0.39       -0.06       0.52
Labour Input         Aggregate       0.76       1.09       1.33       0.43       0.40       -1.30       0.88         Agriculture, Forestry,
Aggregate         0.76         1.09         1.33         0.43         0.40         -1.30         0.88           Agriculture, Forestry,         -         -         -         0.01         -0.01         0.02         0.01         -0.03         0.02           Transportation, Warehousing,         -         -         -         -         0.03         0.07         0.04         0.00         0.03         -0.07         0.06           Construction         0.03         0.07         0.04         0.00         -0.03         -0.00         0.06           Manufacturing         -0.04         0.07         0.03         -0.21         -0.04         -0.41         0.06           Trade         0.07         0.13         0.12         0.04         0.02         -0.20         0.08           Information         0.01         0.04         0.11         -0.05         -0.01         -0.08         0.01           Finance, Insurance, Real Estate,         -         -         -         -         0.07         0.07         0.16         0.08         0.02         -0.15         0.07           Other Services         0.48         0.60         0.61         0.39         0.39         -0.06
Agriculture, Forestry,         Fishing, Hunting, Mining       0.00       -0.01       -0.01       0.02       0.01       -0.03       0.02         Transportation, Warehousing,       0.03       0.07       0.04       0.00       0.03       -0.07       0.06         Construction       0.04       0.04       0.16       0.07       -0.04       -0.40       0.06         Manufacturing       -0.04       0.07       0.03       -0.21       -0.04       -0.41       0.06         Trade       0.07       0.13       0.12       0.04       0.02       -0.20       0.08         Information       0.01       0.04       0.11       -0.05       -0.01       -0.08       0.01         Finance, Insurance, Real Estate,       U       U       0.07       0.16       0.08       0.02       -0.15       0.07         Other Services       0.48       0.60       0.61       0.39       0.39       -0.06       0.52
Fishing, Hunting, Mining         0.00         -0.01         -0.01         0.02         0.01         -0.03         0.02           Transportation, Warehousing,         0.03         0.07         0.04         0.00         0.03         -0.07         0.06           Construction         0.04         0.04         0.16         0.07         -0.04         -0.40         0.06           Manufacturing         -0.04         0.07         0.03         -0.21         -0.04         -0.41         0.06           Trade         0.07         0.13         0.12         -0.04         -0.20         0.08           Information         0.01         0.04         0.11         -0.05         -0.01         -0.08         0.01           Finance, Insurance, Real Estate,         U         U         U         0.07         0.16         0.08         0.02         -0.15         0.07           Other Services         0.48         0.60         0.61         0.39         0.39         -0.06         0.52
Transportation, Warehousing,         Utilities       0.03       0.07       0.04       0.00       0.03       -0.07       0.06         Construction       0.04       0.04       0.16       0.07       -0.04       -0.40       0.06         Manufacturing       -0.04       0.07       0.03       -0.21       -0.04       -0.41       0.06         Trade       0.07       0.13       0.12       0.04       0.02       -0.20       0.08         Information       0.01       0.04       0.11       -0.05       -0.01       -0.08       0.01         Finance, Insurance, Real Estate,       U       U       U       0.07       0.16       0.08       0.02       -0.15       0.07         Other Services       0.48       0.60       0.61       0.39       0.39       -0.06       0.52
Utilities         0.03         0.07         0.04         0.00         0.03         -0.07         0.06           Construction         0.04         0.04         0.16         0.07         -0.04         -0.40         0.06           Manufacturing         -0.04         0.07         0.03         -0.21         -0.04         -0.41         0.06           Trade         0.07         0.13         0.12         0.04         0.02         -0.20         0.08           Information         0.01         0.04         0.11         -0.05         -0.01         -0.08         0.01           Finance, Insurance, Real Estate,              0.07         0.16         0.08         0.02         -0.15         0.07           Other Services         0.48         0.60         0.61         0.39         0.39         -0.06         0.52
Construction         0.04         0.04         0.16         0.07         -0.04         -0.40         0.06           Manufacturing         -0.04         0.07         0.03         -0.21         -0.04         -0.41         0.06           Trade         0.07         0.13         0.12         0.04         0.02         -0.20         0.08           Information         0.01         0.04         0.11         -0.05         -0.01         -0.08         0.01           Finance, Insurance, Real Estate,             0.07         0.16         0.08         0.02         -0.15         0.07           Other Services         0.48         0.60         0.61         0.39         0.39         -0.06         0.52
Manufacturing         -0.04         0.07         0.03         -0.21         -0.04         -0.41         0.06           Trade         0.07         0.13         0.12         0.04         0.02         -0.20         0.08           Information         0.01         0.04         0.11         -0.05         -0.01         -0.08         0.01           Finance, Insurance, Real Estate,              0.07         0.16         0.08         0.02         -0.15         0.07           Other Services         0.48         0.60         0.61         0.39         0.39         -0.06         0.52
Trade         0.07         0.13         0.12         0.04         0.02         -0.20         0.08           Information         0.01         0.04         0.11         -0.05         -0.01         -0.08         0.01           Finance, Insurance, Real Estate,
Information         0.01         0.04         0.11         -0.05         -0.01         -0.08         0.01           Finance, Insurance, Real Estate,
Finance, Insurance, Real Estate,         0.07         0.07         0.16         0.08         0.02         -0.15         0.07           Other Services         0.48         0.60         0.61         0.39         0.39         -0.06         0.52
Rental and Leasing         0.07         0.07         0.16         0.08         0.02         -0.15         0.07           Other Services         0.48         0.60         0.61         0.39         0.39         -0.06         0.52
Other Services         0.48         0.60         0.61         0.39         0.39         -0.06         0.52
Government 0.08 0.09 0.11 0.10 0.03 0.11 0.01
NED
MIF F
Aggregate         0.43         0.31         0.98         0.55         0.13         -0.90         0.42
Agriculture, Forestry, Fishing,
Hunting, Mining         0.07         0.06         0.07         0.04         0.10         0.27         0.05
Transportation, Warehousing,
Utilities 0.00 0.05 0.01 0.00 -0.04 -0.13 -0.02
Construction         -0.06         -0.02         -0.09         -0.15         -0.01         -0.06         0.01
Manufacturing 0.24 0.21 0.55 0.46 -0.07 -0.36 0.01
Trade         0.17         0.24         0.47         0.08         0.00         -0.39         0.11
Information 0.05 0.00 -0.13 0.22 0.06 0.02 0.08
Finance, Insurance, Real Estate,
Rental and Leasing 0.01 -0.10 0.03 -0.03 0.14 0.05 0.16
Other Services         -0.07         -0.16         0.04         -0.10         -0.04         -0.21         0.01
Government 0.02 0.02 0.02 0.04 -0.01 -0.10 0.01
Aggregate Value Added Growth 2.38 2.65 4.22 2.34 1.14 -1.56 1.91

#### Table 3: Contributions of Capital and Labour Input and Multifactor Productivity by Sector to Aggregate Value-Added Growth in the United States

Notes: Average annual log growth rate in percentage points. A contribution is a share-weighted log growth rate. Aggre-gate value added growth is the aggregate of share weighed industry value added growth. Sector aggregates are the sum of contributions over the underlying industries. A contribution in individual year t uses the log growth rate in period t and the average of the nominal shares in year t and t-1, and these contributions are then averaged over the sample period a presented in this table. periods presented in this table. Source: Authors' calculations.

Table 3 shows the sector-level sources of growth. Over the entire period, growth in capital input was the predominant source of economic growth, followed by growth of labour input and then growth in MFP. Growth in capital input in the finance and trade industries accounted for about half of the total contribution of capital input. However, breaking down the contributions of capital growth across the time periods reveals important differences between the sources of growth in the later period (2009-2016) in relation to the earlier period (1987-1995). The choice of periods to compare is somewhat arbitrary, but comparisons of the 2009--2016 period to the 1987-1995 period reveal the extent and sources of the slow recovery after the financial crisis, even in comparison to the slow growth period before the IT investment boom. The most striking difference is in the contribution from the finance, insurance, real estate, rental and leasing which fell from 0.49 percentage point between 1987-1995 to 0.11 percentage point in 2009-2016; this mostly reflects the lingering effects of the housing crisis in the real estate sector. The only sector to have a larger contribution of capital input in the 2009-2016 period was the agriculture, forestry, fishing, hunting, mining sector, emphasizing the overall slowdown in capital investment in

the recovery period.

More than half of the contribution of labour input over the entire period was accounted for by growth in labour input in the other services industries. Comparing the contribution of labour input by sector in the later period to the earlier period is not particularly illuminating, but we will see below that the industry data reveal significant shifts in the distribution of labour income by sector.

Finally, growth in MFP was dominated by MFP growth in manufacturing (mostly computers and electronic products) and the trade sectors over the 1987-2016 time period. MFP growth in manufacturing was much faster in the 1987-1995 period than in the 2009-2016 period. In contrast, the MFP contributions of the finance, insurance, real estate, rental and leasing and the other services industry were significantly higher in the later period.

It is worth summarizing a few of the main trends that the 1987-2016 KLEMS data reveal. Over this period, output growth shifted from manufacturing to services, and income shares shifted as well. Economic growth during the period of the ongoing recovery from 2009-2016 was significantly slower than the 1987-1995 period before the IT boom; this was driven mostly by slower capital and labour input growth. MFP growth was actually faster in the 2009-2016 period in comparison with the 1987--1995 period. The growth in other services was driven mostly by labour input growth and a recovery of MFP from negative early in the period to slightly positive towards the end of the period.

We now focus on one particular component of structural change over the last 30 years: the industry sources of the change in the distribution of income. It is relatively well known that the share of value added accruing to labour has been in decline. We present new information on the industry sources of this decline with the charts. Each component of income (whether it is total labour income, or college-educated labour, for example) is presented as a share of nominal aggregate value added.

Chart 1 shows the change in the share of capital and labour by sector in nominal aggregate value added. To reinforce the concepts, for this and the subsequent figures, the shares are defined as compensation to the factor of production in each sector divided by aggregate nominal value added. Over the 1987-2016 period, the aggregate total economy capital share increased from 38.6 per cent of income in 1987 to 45.5 per cent of income in 2016. Chart 1 indicates that this shift was not proportionate across sectors. For example, while the income share paid to labour generated in the manufacturing sector fell by a significant margin, it increased by almost as much in the other services sector. Thus, the shift in output from manufacturing to other services actually counterbalanced the aggregate trend of a falling labour share. In the trade sector, the share of aggregate income accruing to capital increased while that accruing to labour fell, providing evidence that an industry's expansion does not necessarily produce proportional gains for labour and the owners of capital.

Charts 2 and 3 provide more information on the changes in the share of aggregate income accruing to labour by sector. Chart 2 shows that even though the aggregate labour share fell over the period, the share of income accruing to college-educated labour (those with a Bachelor of Arts degree and above) increased significantly over the period, so that the decline in the aggregate labour share was entirely due to a decline in the share of income paid to workers without a college degree.

Chart 3 presents the decomposition by gender. Over the period, the share of income accruing to men fell from 44.2 per cent to 36.6 per cent between 1987 and 2016. This was driven mainly by large declines (relative to women) in the manufacturing, trade, and government sectors. With the shift towards services, the shares of in-



Chart 1: Changes in the Input Shares of Aggregate Value Added in the United States, 1987-2016

Source: Authors' calculations.





Source: Authors' calculations.



Chart 3: Changes in the Labour Shares of Aggregate Value Added in the United States, 1987-2016

Source: Authors' calculations.

come paid to both men and women in the services sector increased, and the service sector was the largest driver of increase in the aggregate share of income paid to female workers. This is interesting in light of the findings in Ngai and Petrongolo (2017) that the shift to services has narrowed the gender pay gap.<sup>8</sup>

The change in the capital share was not proportionate across industries and types of capital. For example, chart 4 shows significant increases to the share of income paid to capital in the finance, insurance, real estate, rental and leasing well as in the other services sectors. Within these sectors, a significant portion of the increase was attributed to the share of IT capital. In contrast, in the construction and manufacturing sectors, there was little change in the share of aggregate income paid to IT capital. In the manufacturing sector, the share of capital income attributed to research and development actually increased, thus the decline in the overall capital income share in manufacturing

<sup>8</sup> The finding of Ngai and Petrongolo (2017) focuses on wage rates, while the information that presented here is about aggregate income shares. While they are not directly comparable, both suggest that shift to services is an important component in how wages and income have evolved.



Chart 4: Changes in the Capital Shares of Aggregate Value Added in the United States, 1987-2016

Source: Authors' calculations.

was driven by a decrease in the share of income accruing to other types of capital.

# Conclusion

The purpose of this article was to present an extended time series of integrated KLEMS-based production accounts for the United States. The longer time series yields important data on the evolution of U.S. economic growth over the last three decades. The account shows the shift from manufacturing towards services and the importance of isolating the effects of the computer and electronics product industry when studying the overall manufacturing sector (Houseman, 2018). The KLEMS approach shows not only which industries are contributing to growth, but the industry-level sources of growth. The most important source of economic growth over the period was the accumulation of capital input. Of the 1.19 percentage point that capital input contributed to growth over the period, the services industries account for 0.89 percentage point. Aggregate labour input accounted for another 0.76 percentage point of economic growth between 1987 and 2016. Of this, the other services industries sector alone accounted for 0.48 percentage point, demonstrating the relative importance of labour in service producing industries. Finally, MFP growth accounted for 0.43 percentage point of aggregate economic growth. Almost all of this was accounted for by MFP growth in the manufacturing and trade sectors; within manufacturing almost all of the MFP growth was due to growth in MFP of the computer electronic products industry.

The account demonstrates the importance of structural change at the industry level in the evolution of the allocation of income between capital and labour. The share of aggregate income accruing to labour in the manufacturing sector shrank substantially over the period, while the share of income accruing to labour increased substantially in the services industries. In the manufacturing sector, this was mostly due to a decline in the share of income paid to workers without a college degree, while workers with a college degree accounted for the large majority of the increase in the income paid to labour in the service sectors.

The new estimates presented in this article are an important milestone because extending the account to cover 1987-1997 involved overcoming significant obstacles including the change in industrial classification between NAICS and SIC and changes in the reporting of educational attainment from years of school to attainment measures. However, this is not the final step in the development of Important next steps the account. could include extending the account even further back in time to span the entire period covered by BEA's GDP by industry accounts starting in 1947 and resolving existing difference in the measures of labour composition produced by BLS for the official MFP estimates and those produced by BEA for this set of accounts.

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