

SUPPLEMENT TO “LABOR SHARE DECLINE AND INTELLECTUAL  
PROPERTY PRODUCTS CAPITAL”  
(*Econometrica*, Vol. 88, No. 6, November 2020, 2609–2628)

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APPENDIX A: THE DATA

ALL DATA SERIES are retrieved from the National Income and Product Accounts for the period 1929–2018 and Fixed Assets Accounts for the period 1901–2018. All data series for the international analysis are described in Section F of this supplement.

*National Income and Product Accounts (NIPA-BEA).*

1. NIPA 1.3.5: GVA for Private Business ( $GVA^B$ ), GVA for Households and Institutions ( $GVA^{HH}$ ), GVA for General Government ( $GVA^{Gov}$ ).
2. NIPA 1.7.5: Gross Domestic Product (GDP), Gross National Product (GNP), Consumption of Fixed Capital (CFC), Statistical Discrepancy (SDis).
3. NIPA 1.12: Compensation of Employees (CE), Proprietors' Income (PI), Rental Income (RI), Corporate Profits (CP), Net Interest (NI), Taxes on Production (Tax), Subsidies (Sub), Business Current Transfer Payments (BCTP), Current Surplus of Government Enterprises (GE).
4. NIPA 1.13: Noncorporate Sector: Compensation of Employees ( $CE^{NC}$ ), Taxes on production and imports less subsidies plus business current transfer payments ( $TS^{NC}$ ), and Proprietors' income ( $PI^{NC}$ ); Households and Institutions: Compensation of Employees ( $CE^{HH}$ ) and Taxes on production and imports less subsidies plus business current transfer payments ( $TS^{HH}$ ); General Government: Compensation of Employees ( $CE^{Gov}$ ).
5. NIPA 1.14: Non-financial Corporate Sector: Gross Value Added ( $GVA^{NF}$ ), Compensation of Employees ( $CE^{NF}$ ), Net Operating Surplus ( $NOS^{NF}$ ), Consumption of Fixed Capital ( $CFC^{NF}$ ), Taxes on production and imports less subsidies ( $TS^{NF}$ ); Financial Corporate Sector: Gross Value Added ( $GVA^F$ ), Compensation of Employees ( $CE^F$ ), Net Operating Surplus ( $NOS^F$ ), Consumption of Fixed Capital ( $CFC^F$ ), Taxes on production and imports less subsidies ( $TS^F$ ).

*Fixed Assets Accounts (FAT-BEA).*

1. FAT 1.3: Current-Cost Depreciation of Fixed Assets: Government IPP ( $DEP^{G,IPP}$ ).

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2. FAT 1.5: Investment in Fixed Assets and Consumer Durable Goods: Private Nonresidential Structures ( $I^{P,ST,Nres}$ ), Private Nonresidential Equipment ( $I^{P,EQ,Nres}$ ), Private Intellectual Property Products ( $I^{P,IPP}$ ), Government Nonresidential Structures ( $I^{G,ST,Nres}$ ), Government Nonresidential Equipment ( $I^{G,EQ,Nres}$ ), Government Intellectual Property Products ( $I^{G,IPP}$ ).
3. FAT 2.4: Current-Cost Depreciation of Private Fixed Assets: Nonprofit institutions serving households IPP ( $DEP^{NP,IPP}$ ), Software for Private ( $DEP^{P,SFT}$ ), Research and Development for Private ( $DEP^{P,RD}$ ), Entertainment, Literary and Artistic Originals for Private ( $DEP^{P,AO}$ ).
4. FAT 2.7: Investment in Private Fixed Assets: Residential Equipment ( $I^{P,EQ,Res}$ ), Residential Structures ( $I^{P,ST,Res}$ ), Software ( $I^{P,SFT}$ ), Research and Development ( $I^{P,RD}$ ), Entertainment, Literary and Artistic Originals ( $I^{P,AO}$ ).
5. FAT 4.7: Aggregate Investment in Nonfinancial Corporation ( $I^{NF}$ ), Financial Corporation ( $I^F$ ), Households ( $I^{HH}$ ), Nonprofit institutions serving households (NPISHs) ( $I^{NP}$ ); IPP Investment in Nonfinancial Corporation ( $I^{NF,IPP}$ ), Financial Corporation ( $I^{F,IPP}$ ), Households ( $I^{HH,IPP}$ ), Nonprofit institutions serving households (NPISHs) ( $I^{NP,IPP}$ ).
6. FAT 7.3: Current-Cost Depreciation of Government Fixed Assets: Software ( $DEP^{G,SFT}$ ), Research and Development ( $DEP^{G,RD}$ ).
7. FAT 7.5: Investment in Government Fixed Assets: Software ( $I^{G,SFT}$ ), Research and Development ( $I^{G,RD}$ ).

## APPENDIX B: AGGREGATE INVESTMENT AND ITS COMPONENTS: TANGIBLE AND IPP

Investment accounts in structures include nonresidential and residential structures; see Table 5.4.5 in NIPA. Nonresidential structures include (i) commercial and health care (i.e., office buildings, except those constructed at manufacturing sites and those constructed by power utilities for their own use, hospitals and medical buildings, multi-merchandise shopping, food and beverage establishments, warehouses, and other commercial), (ii) manufacturing, (iii) power and communication, (iv) mining exploration, shafts and wells (i.e., petroleum and natural gas and mining), and (v) other structures (religious, education and vocational, lodging, amusement and recreation, transportation, farm, other, brokers' commissions on sale of structures, and net purchases of used structures). Residential structures include (i) permanent site (i.e., single-family and multifamily structures) and (ii) other structures (i.e., manufactured homes, dormitories, improvements, brokers' commissions and other ownership transfer costs and net purchases of used structures). Second, the investment accounts in equipment include (i) information processing (i.e., computers and peripheral equipment, communication equipment, medical instruments, nonmedical instruments, photocopy and related equipment, and office and accounting equipment), (ii) industrial equipment (i.e., fabricated metal products, engines and turbines, metalworking machinery, special industry machinery, general industrial equipment, including materials handling, electrical transmission, distribution, and industrial apparatus), (iii) transportation equipment (i.e., trucks, buses, and truck trailers, autos, aircrafts, ships and boats, railroad equipment), and (iv) other equipment (i.e., furniture and fixtures, agricultural machinery, construction machinery, mining and oil-field machinery, service industry machinery, electrical equipment, and other) less sales of equipment scrap (excluding autos); see Table 5.5.5 in NIPA. Third, the investment accounts in IPP include (i) software (i.e., prepackaged—excluding software embedded, or

bundled, in computers and other equipment, custom and own account), (ii) R&D in businesses manufacturing (i.e., pharmaceutical and medicine manufacturing, chemical manufacturing, semiconductor and other electronic components, motor vehicles, bodies and trailers, and parts, aerospace products and parts, and other manufacturing), in business nonmanufacturing (i.e., scientific research and development series, and all other non-manufacturing) and in nonprofit institutions serving households (NPISH) (i.e., universities and colleges, and other nonprofit institutions), and (iii) entertainment, literary and artistic originals (i.e., theatrical movies, long-lived television programs, books, music and other); see Table 5.6.5 in NIPA.<sup>S1</sup>

The levels of nominal investment by types are shown in panel (a) and by subcategory of IPP in panel (b) of Figure B-1. In 1929, the nominal investments in structures and equipment are 12 billion USD and 6 billion USD, respectively, and that in IPP capital is negligible. By 2018, the investments in structures and equipment have reached 1711 billion USD and 1375 billion USD, respectively, and that in IPP capital 1140 billion USD. By subcategory of IPP capital, there were almost no investments in software, R&D, and artistic originals in 1929. The R&D investment gradually increases since the beginning of 1950s and software investment starts to increase around mid-1970s with a sharp increase after 1995. By 2018, the R&D and software investments have reached 613.5 billion USD and 437.3 billion USD, respectively, while the investment in artistic originals remains roughly around one fifth of software investment.

The shares of aggregate investment of each type of capital and subcategory of IPP capital are plotted in panels (c) and (d) in Figure B-1. The share of investment in structures decreases from roughly 64% to 40% between the late 1920s and 2018. The share of investment in equipment also decreases over time but at a lower pace, from 40% in the late 1940s to 32.5% in 2018. This decline in the share of tangible investment is offset by the rise of the share of IPP investment. The share of IPP investment increases from roughly 3.7% of the total investment in the late 1920s to 27% in 2018. The rise of IPP investment share from the late 1940s is mainly driven by R&D investment (from 6% in 1947 to 13% in 1967) and the rise of share after 1980 is mainly driven by the software investment (from 2% in 1980 to 10% in 2018). The artistic originals investment share is relatively flat over the entire sample period, around 2%. Clearly, the United States is undergoing a structural shift toward a more IPP-investment intensive economy.

The investment share in terms of GDP of each type of capital and subcategory of IPP capital is plotted in panels (e) and (f) in Figure B-1. The investment shares of structures and equipments are both volatile before the late 1947 due to Great Depression and WWII. The investment share of structures declines from 12% in the 1950s to 7% in 2012, while the investment share of equipment remains relatively constant at around 8% until 2000 and gradually declines thereafter. In contrast, IPP investment share rises from 0.7% in 1929 to 5.5% in 2018. This implies that the IPP investment grows faster than GDP growth in the U.S. from 1929–2018. The rise of IPP investment share is mainly driven by R&D and software as in the share of aggregate investment in panel (f).

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<sup>S1</sup>The BEA incorporates mineral exploration in structures since at least the 1999 BEA revision, whereas other countries include this type of investment in intangible capital in national accounts. The BEA did not reclassify the mineral exploration to IPP at the 2013 comprehensive revision because they did not have enough information to disentangle exploration drilling (conceptually an investment in R&D) from production drilling (conceptually an investment in structures).

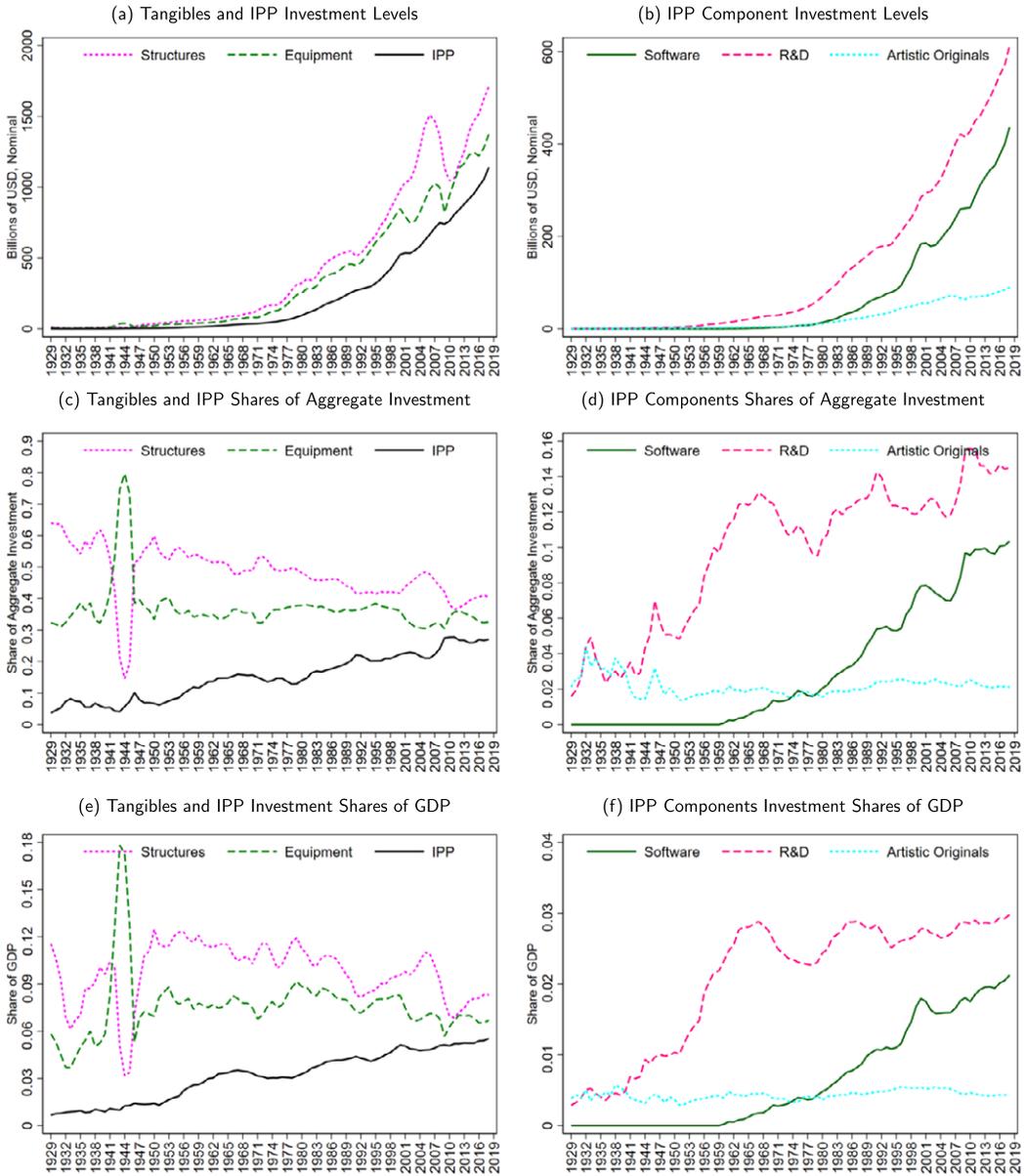


FIGURE B-1.—Tangible and IPP investment, BEA 1929–2018.

## APPENDIX C: ALTERNATIVE MEASURES OF THE LABOR SHARE

First, we conduct robustness exercises of our main findings by comparing the corporate LS with the “asset-basis” LS constructed by the Bureau of Labor Statistics (BLS). Second, as an external validation exercise, we also compare our pre-1999 and pre-2013 counterfactual accounting LS with the LS constructed using vintage data released before the 1999 revision and before the 2013 revision, respectively.

### C.1. *The BLS Labor Share*

In a recent analysis of the U.S. LS, [Elsby, Hobijn, and Sahin \(2013\)](#) discussed in detail the two main LS constructs provided by the BLS. The headline measure of the LS provided by the BLS, available from the Major Sector Productivity Costs division, corrects for the amount of ambiguous income (mainly, proprietors' income) using the ratio of self-employed to employed in the U.S. economy. This carries the implicit assumption that the wages earned (per unit of work) by the employed is identical to that of the self-employed, basically  $LS = \frac{CE}{Y} \left( \frac{N+SE}{N} \right)$  where CE is the compensation of employees, Y is output, N is the number of employees, and SE is the number of self-employed. However, [Elsby, Hobijn, and Sahin \(2013\)](#) noted that, under this definition of the LS, the total amount of labor income in the proprietors' sector can and does exceed (from 1981 to 1991) the total amount of proprietors' income, which implies the pathological phenomenon that LS exceeds 1 in the proprietors' sector or that the capital share (or the marginal product of capital) is negative in that sector.

In light of this result, [Elsby, Hobijn, and Sahin \(2013\)](#) suggested two preferred measures of LS. The first is the economy-wide basic measure which corresponds to our benchmark LS described in Section 3 in the main paper.<sup>S2</sup> The second is the BLS measure available from the Major Sector Multifactor Productivity (MSMP) division that is constructed under the assumption that the returns to capital (user-cost based) are the same for proprietors' income as for the rest of the economy. This BLS LS constructed from the MSMP division is labeled as the “asset basis” BLS LS. Interestingly, the MSMP division at the BLS uses the returns to capital from the corporate sector to impute the returns to capital to proprietors' income (see [Bureau of Labor Statistics \(2007\)](#)), which implies that the “asset basis” BLS LS and the corporate LS must bear resemblance, a conjecture that is largely confirmed by Figure C-1 that plots the two measures side by side. Therefore, our findings for the corporate sector LS described in Section 3 in the main paper also apply to the “asset basis” LS provided by the BLS.

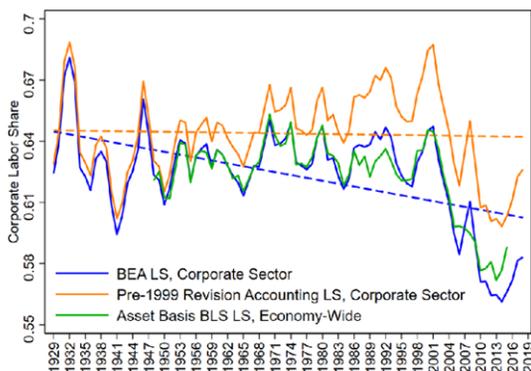


FIGURE C-1.—Corporate labor share (BEA) and asset-basis labor share (BLS).

<sup>S2</sup>A more common practice in the macroeconomic literature is to split the components of national income that cannot be unambiguously attributed to capital or labor (mainly proprietors' income) by using the factor shares of the unambiguous income of the economy ([Cooley and Prescott \(1995\)](#), [Gomme and Rupert \(2004, 2007\)](#), [Ríos-Rull and Santaeulàlia-Llopis \(2010\)](#), [Koh and Santaeulàlia-Llopis \(2017\)](#)), which is discussed in Section D of this supplement.

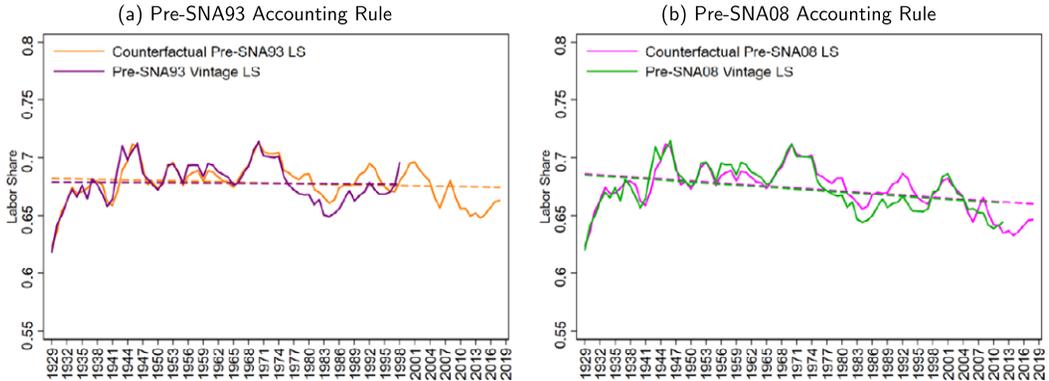


FIGURE C-2.—Counterfactual accounting LS and Vintage LS.

### C.2. The Vintage Labor Share

In this section, we conduct an external validation exercise by comparing our pre-1999 counterfactual accounting LS that treats IPP as expense (Section 3 in the main paper) with a LS constructed using vintage BEA data released before March 1999 (i.e., before software investment made it into national accounts) from the Archives Library of the St. Louis Federal Reserve Bank. This comparison is plotted in panel (a) of Figure C-2. The two labor shares are trendless and show remarkably similar fluctuations. This externally validates our counterfactual accounting LS construct that undoes the accounting changes in the treatment of IPP using post-2013 revision data only. In panel (b) of Figure C-2, we conduct the same exercise but with the pre-2013 accounting rule that treats software as investment and R&D (and artistic originals) as expense. Again, the two labor shares are remarkably similar.

## APPENDIX D: AN ECONOMY-WIDE LABOR SHARE—SPLITTING AMBIGUOUS INCOME INTO CAPITAL INCOME AND LABOR INCOME, 1947–2018

We have shown that IPP entirely accounts for not only the long-run decline of our benchmark LS, but also the long-run decline of corporate LS in the section on institutional analysis in the paper. We show in this section another widely used LS that we showed in our previous version of the paper. This alternative construct of LS focuses on the shorter sample periods, 1947–2018, for which the BEA releases quarterly national income data series. The LS, using an economy-wide definition standard in the business cycle literature (Cooley and Prescott (1995)), splits the components of national income that cannot be unambiguously attributed to capital or labor (mainly proprietors' income) by using the factor shares of the unambiguous income of the economy:

1. Unambiguous Capital Income (UCI) = Rental Income + Corporate Profits + Net Interest + Current Surplus Government Enterprises + Taxes on Production – Subsidies – (Sales & Excise Taxes) + Business Current Transfers Payments + Statistical Discrepancy.
2. Unambiguous Income (UI) = UCI + Depreciation (DEP) + Compensation of Employees (CE).
3. Proportion of Unambiguous Capital Income to Unambiguous Income:  $\theta = \frac{UCI+DEP}{UI}$ .
4. Ambiguous Income (AI) = Proprietors' Income + Sales & Excise Taxes.
5. Ambiguous Capital Income (ACI) =  $\theta \times AI$ .

Then, capital income (or GOS adjusted for ambiguous income) is computed as

$$\text{GOS} = \text{UCI} + \text{DEP} + \text{ACI}, \quad (\text{A-1})$$

and our benchmark accounting LS is

$$\text{LS} = 1 - \text{Capital Share} = 1 - \frac{\text{GOS}}{Y}, \quad (\text{A-2})$$

where  $Y$  is the gross domestic product (GDP), that is, the sum of ambiguous and unambiguous income and depreciation. Because the IPP reclassification does not affect net foreign factor income, which is trendless, our results are almost identical using either GNP or GDP.

As is standard in the business cycle literature, we also add, to GOS and  $Y$ , the capital income from consumer durable goods and government capital which are not incorporated in the current NIPA (Cooley and Prescott (1995)). As in Cooley and Prescott (1995), we impute and incorporate the flow of services from consumer durable goods and government capital to both GOS and  $Y$ , by applying the net rate of return of the private fixed capital and the respective depreciation rates to the consumer durable goods and government capital. This is consistent with the definitions of the LS in the business cycle literature (Gomme and Rupert (2004, 2007), Ríos-Rull and Santaaulàlia-Llopis (2010), McGrattan and Prescott (2014), Koh and Santaaulàlia-Llopis (2017)).

#### D.1. *An Economy-wide Labor Share and the Effects of IPP Capitalization*

Figure D-1 shows the time series of this alternative LS (i.e., the economy-wide BEA LS labeled “BEA LS”). Clearly, the LS exhibits a relentless secular decline starting in the late 1940s. The LS begins at 54.2% in 1947 and reaches a value of roughly 51.0% in 2017 with a historical low at 49.5% in 2010, that is, a decline of approximately 4.7 percentage points. Notice that the average level of our economy-wide LS is lower than the value of two-thirds usually attained for the business sector. This is due to the fact that we extend national income using measures of consumer durables and government capital.

The comparison between our benchmark LS (blue line, Figure D-1) and the pre-1999 revision counterfactual LS (orange line, Figure D-1) delivers the consistent message as in our paper: In sharp contrast to the decline of the benchmark LS, the pre-1999 revision counterfactual LS is absolutely trendless, with an average value of 54.2%. That is, the decline of the LS is entirely explained by the capitalization of IPP in national accounts. Had the BEA kept the pre-1999 treatment of IPP (as an expense), the LS would display no secular trend.

#### D.2. *Gross Versus Net Labor Share*

Thus far, we have focused on the gross LS. Part of the macro literature emphasizes that the decline in net LS is less pronounced than that of the gross LS, suggesting that the increased depreciation explains the decline of the LS (Bridgman (2017)).<sup>53</sup> We show that this phenomenon is also the result of IPP capitalization. In Figure D-2, we plot the gross LS and the net LS separately for the pre-1999 accounting (i.e., when only structures and equipment are part of BEA capital) and for the post-2013 accounting (i.e., when IPP is

<sup>53</sup>Kravis (1959) used national income, that is, net national product, to construct the LS.

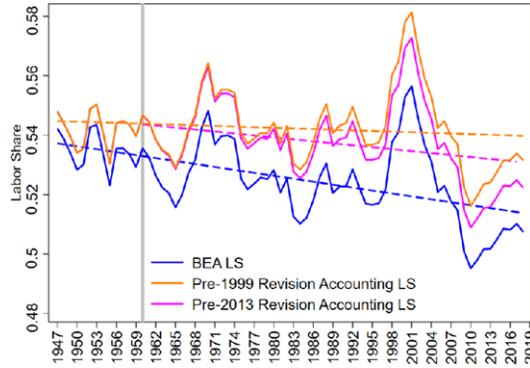


FIGURE D-1.—U.S. alternative definition of labor share and IPP effects, BEA 1947–2018.

capitalized). The result is clear. Gross and net LS are equally trendless in the pre-1999 accounting (panel (a), Figure D-2). That is, the depreciation in structures and equipment has no implications for the trend of the LS. Only when IPP is capitalized do we find differences in the trends between gross and net LS (panel (b), Figure D-2), because the IPP depreciation measured by the BEA increases over time (from 70.6% of gross investment in IPP in 1947 to 87.8% in 2017). That is, the decline of the gross LS relative to the net LS is entirely due to the capitalization of IPP.<sup>S4</sup>

#### APPENDIX E: FURTHER ANALYSIS BY INSTITUTIONAL SECTORS

In this appendix, we do two things. First, we show that the notion that most of the effects of IPP capitalization are driven by corporate businesses is reinforced by the fact that most of GVA is accounted for by the corporate sector. Panel (a) in Figure E-1 shows

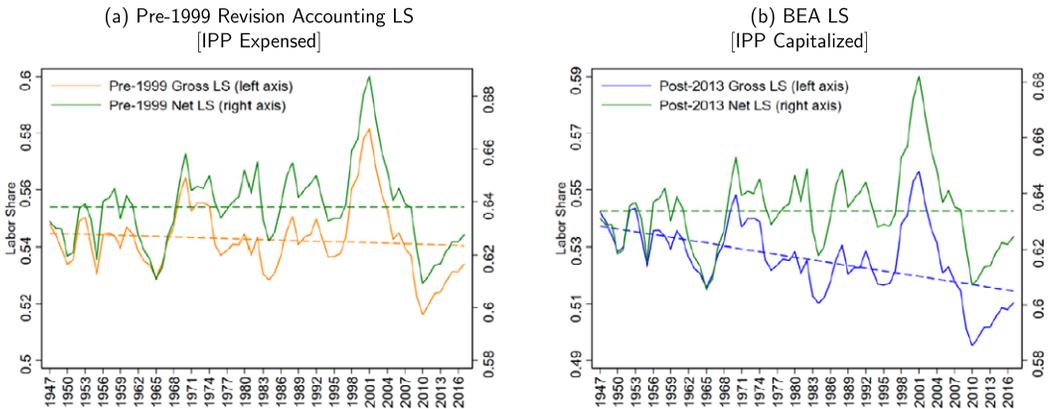


FIGURE D-2.—Gross versus Net LS.

<sup>S4</sup>Piketty and Zucman (2014) also studied the decline of the net LS. These authors reported a LS for the U.S. that starts at the level of 0.80 in 1974 and decreases to 0.71 in 2010. The larger LS decline found by these authors is most likely due to the difference in the data sources, in particular, as argued in Bonnet et al. (2014), to the use of market prices for housing capital. Instead, our LS construct is strictly based on BEA national income data.

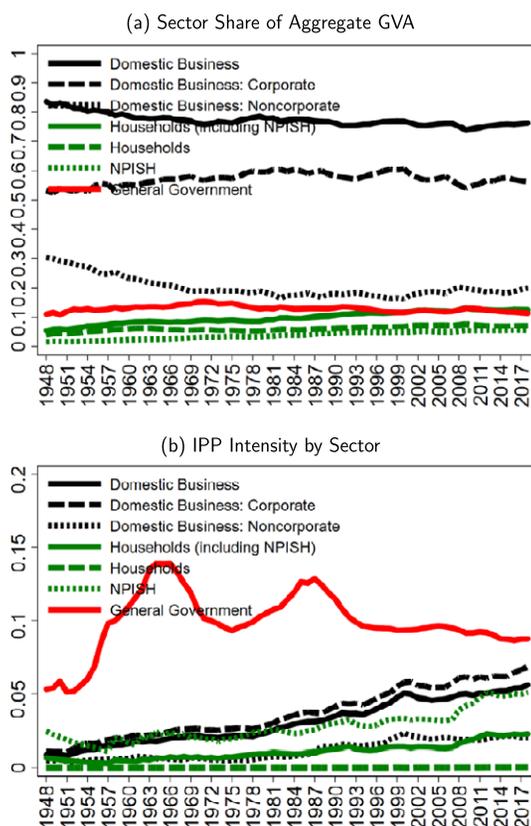


FIGURE E-1.—GVA share and IPP intensity by institutional sectors, 1948–2018.

a decomposition of the GVA by institutional sector as a share of aggregate GVA. The largest share of the GVA is that of domestic businesses (76.2% in 2018), which largely consists of the corporate sector that accounts for 56.2% of aggregate GVA. Within domestic businesses, the noncorporate sector accounts for 20.0% of aggregate GVA. Then, government accounts for 11.3%, the NPISHs for 5.5%, and the household sector for 6.9% in 2018. Further, panel (b) in Figure E-1 shows the intensity of IPP by sector defined by the share of IPP in sector-specific GVA. The corporate sector (6.9% in 2018), the government (8.7% in 2018), and the NPISHs (5.0% in 2018) lead in IPP intensity, followed by the noncorporate sector (2.0% in 2018) and the household sector (0.0% in 2018).

Second, we study the behavior of the LS in the NPISH sector and the household sector. Note that the LS behavior of domestic business and corporate sectors is shown in the paper. We find that the labor share in the NPISH sector behaves similarly in level and trend to that in the government sector. In both, under SNA08 and pre-SNA93, the labor share in NPISHs increases, and its average level under pre-SNA93 is 0.863; see panel (a) of Figure E-2. Finally, the effects of the IPP capitalization on the labor share of the household sector are negligible; see panel (b) of Figure E-2. Also notice that the level of the LS in the household sector is small, averaging 0.072 for the entire sample period under both SNA8 and pre-SNA93.

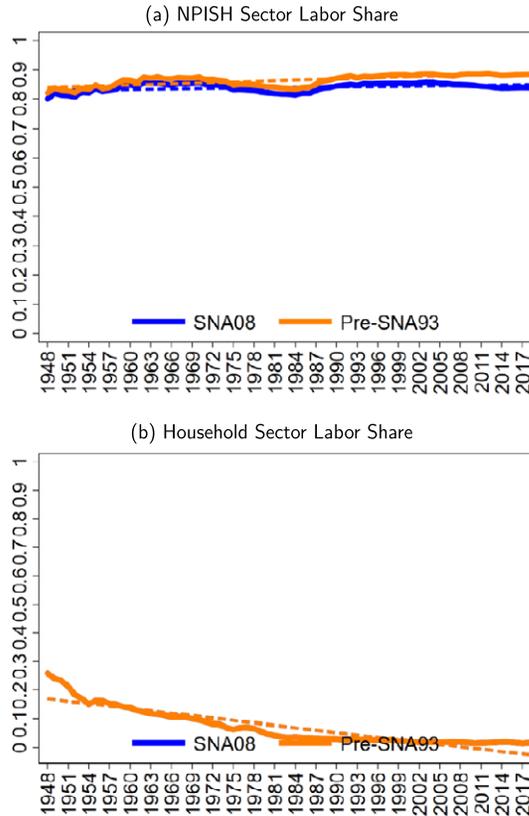


FIGURE E-2.—Effects of IPP capitalization on the household and NPISH sectors, 1948–2018.

#### APPENDIX F: FURTHER INTERNATIONAL EVIDENCE

In this section, we discuss the data series used in the construction of the labor share for other countries shown in Section 4 of the paper. It is important to emphasize that, because we are interested in the long-run behavior of the labor share, we require long time series data. Here, we focus on countries for which these data are directly available from the country-specific national accounts that follow the most recent System of National Accounts (SNA2008) that capitalizes IPP: Canada, Denmark, France, Japan, and Sweden.<sup>S5</sup> We retrieve the data directly from each country’s corresponding national statistics office. This original data source usually provides more detailed data and longer time series than the data available from the OECD, at the cost of losing some information we need for harmonization purposes across countries.

We use a definition of the labor share that requires data on compensation of employees (CE), gross operating surplus (GOS), gross value added (GVA), taxes less subsidies on production and imports (TS), and proprietor’s income (PI). Note that many national

<sup>S5</sup>The long time series is a critical requirement because, as we highlighted in the paper, data with shorter horizons might deliver a very different picture capturing medium- or short-run behavior of the labor share, for which the accounting treatment of IPP is potentially less relevant in a purely accounting sense. For example, Aum et al. (2019) showed that in the 21st century with a short horizon of 15 years, the number of OECD countries for which the corporate labor share increases is equal to the number of countries for which the labor share decreases, leaving us a trendless OECD average across countries.

TABLE F-I  
NATIONAL ACCOUNTS, STATISTICS CANADA, 1926–2018<sup>a</sup>

| Variables                    | Reference Tables        | Years         |
|------------------------------|-------------------------|---------------|
| National Accounts Aggregates |                         |               |
| GDP                          | CANSIM 380-0063         | 1961Q1–2019Q2 |
|                              | CANSIM 380-0555 (SNA68) | 1926–1986     |
| CE                           | CANSIM 380-0063         | 1961Q1–2019Q2 |
|                              | CANSIM 380-0555 (SNA68) | 1926–1986     |
| TaxSub                       | CANSIM 380-0063         | 1961Q1–2019Q2 |
|                              | CANSIM 380-0555 (SNA68) | 1926–1986     |
| GOS                          | CANSIM 380-0063         | 1961Q1–2019Q2 |
| NMI                          | CANSIM 380-0063         | 1961Q1–2019Q2 |
|                              | CANSIM 380-0555 (SNA68) | 1926–1986     |
| GFCF                         | CANSIM 380-0068         | 1961Q1–2019Q1 |
|                              | CANSIM 380-0539 (SNA68) | 1926–1986     |
| IPP-GFCF                     | CANSIM 380-0068         | 1961Q1–2019Q1 |

<sup>a</sup>All the time series data were retrieved on Sep. 23, 2019. GVA: gross value added at market prices; CE: compensation of employees; TaxSub: taxes less subsidies on production and imports; GOS: gross operating surplus; NMI: net mixed income; GFCF: gross fixed capital formation; IPP-GFCF: gross fixed capital formation on intellectual property products.

statistical offices outside the U.S. label PI as net mixed income (NMI). In addition, to construct our counterfactual accounting LS, we need data on IPP investment (IPP), that is, the gross fixed capital formation (GFCF) of IPP.

### F.1. Canada (1926–2018)

We retrieve data series from the Economic Accounts in Statistics Canada (<https://www.statcan.gc.ca/eng/start>).<sup>56</sup> We construct the necessary data to conduct our exercise from 1926 to 2018 for the economy-wide aggregates. We note that Statistics Canada does not currently publish a set of income accounts by institutional sector and, therefore, corporate sector data are not available. Sources of our data are detailed in Table F-I.

*Variable Construction.* Statistics Canada provides quarterly data on GDP, CE, TS, GOS, NMI, and IPP for the period 1961Q1 to 2019Q2. We take the quarterly average to transform the quarterly data into annual series. To construct a longer time series of the labor share, we retrieve the SNA68 archived historical contents from the Statistics Canada,<sup>57</sup> which provide national accounts data for each and every item required to compute the labor share from 1926 to 1986 except IPP.<sup>58</sup> This implies that the SNA68 historical series and the current national accounts data overlap in years from 1961 to 1986.

**IPP.** IPP investment series is not available in SNA68. Therefore, we have to impute the series extending back to 1926 from the SNA08 series. We take the ratio of IPP investment to GFCF under SNA08, which has a clear upward trend after 1961. We

<sup>56</sup>For downloading, see [https://www150.statcan.gc.ca/n1/en/subjects/economic\\_accounts](https://www150.statcan.gc.ca/n1/en/subjects/economic_accounts).

<sup>57</sup>The archived historical consolidated production account (SNA68) is available from <https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=3610019001>. The archived historical investment in fixed capital (SNA68) is available from <https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=3610017401>.

<sup>58</sup>We obtain GDP, TS, and NMI under SNA68. For NMI, we proxy it by summing up “Net income received by farm operators from farm production,” “Adjustment to farm income,” and “Net income of non-farm unincorporated business, including rent.”

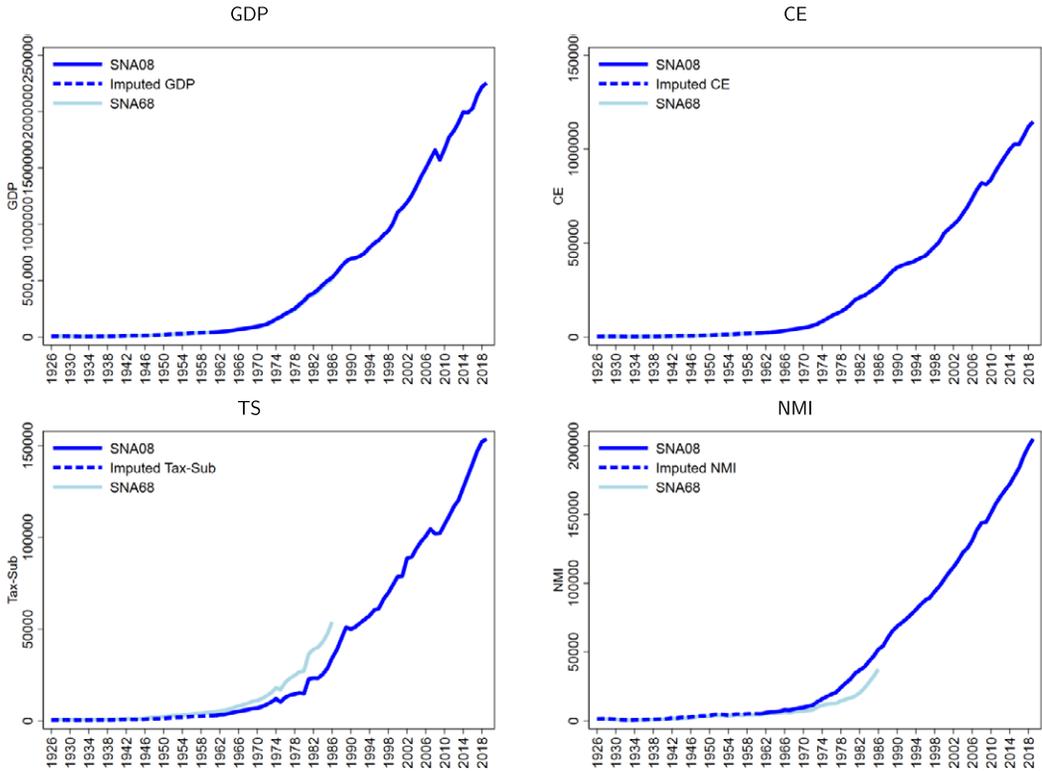


FIGURE F-1.—Adjusting NIPA components from 1926 to 2016, Canada.

assume that the ratio in 1926 takes two-thirds of the level in the U.S. in 1926, which is 1.6%, and then linearly interpolate the ratio between 1926 to 1961. Panel (b) of Figure F-3 shows the ratio and its imputed values from 1926 to 1961. We apply this ratio to GFCF series from 1926 to 1961 to impute the IPP investment series starting from 1926.

**Adjusting SNA68 to SNA08.** To adjust the data series under SNA68 to a level consistent with SNA08, we first take the ratio of each series under SNA08 to that under SNA68 in the subperiod 1961–1986 where both series overlap,  $\hat{x} = \frac{\hat{X}_{SNA08}}{\hat{X}_{SNA68}}$ . Then, we estimate a linear trend of the ratio  $\hat{x}$  for the overlapping period if it exists; and otherwise we take the mean of the ratio. We extend the ratio to 1926 and apply it to the SNA68 series to impute each national income component back in 1926 that is consistent with SNA08. In Figure F-1, we compare each series of the national income components under SNA08, under SNA68, and the imputed values.

*Analysis by Income Composition.* Before we analyze the dynamics of aggregate LS, we can examine the behavior of income components that construct the LS. Figure F-2 shows that CE as a share of GDP is mildly increasing until 1980 and becomes almost stable after 1980. On the other hand, NMI has some movements in the 1930s and 1940s, but then gradually declines after 1947. TS is relatively constant throughout the periods. This implies that the long-run downward trend of aggregate LS can be attributed to the decline of NMI as a share of GDP.

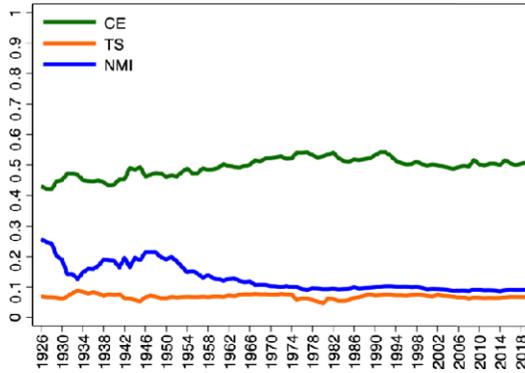


FIGURE F-2.—Income components as a share of GDP from 1926 to 2018, Canada.

*Aggregate Labor Share and the Effects of IPP Capitalization.* Using the imputed series with longer sample periods, we construct an economy-wide LS for the period 1926–2018. The aggregate LS is constructed as  $LS = \frac{CE}{GDP-TS-NMI}$  (see the blue line in Figure F-3). The series exhibits a mild downward trend of  $-0.023\%$  per year with some fluctuations around it. Interestingly, the two sharp peaks in 1948 and 1992 at around 0.66 are followed by a sharp decline. The timing of the two peaks is different from the peaks of the U.S. LS. Further, there is a recent mild increase of LS after 2005.

Once we remove IPP investment from the denominator of the aggregate LS, that is,  $LS = \frac{CE}{GDP-TS-NMI-IPP}$ , there is clearly an upward revision of the LS trend (the orange line in Figure F-3). The slope is not significantly different from zero after removing the IPP investment. The effect of IPP capitalization is significant in Canada since the growth of IPP investment share of aggregate investment is as rapid as that of the U.S. As shown in panel (b) of Figure F-3, IPP investment relative to aggregate investment grows from 1% in 1926 to 15.5% in 2001, while U.S. IPP share increases from 1.4% in 1926 to 16% in 2001.

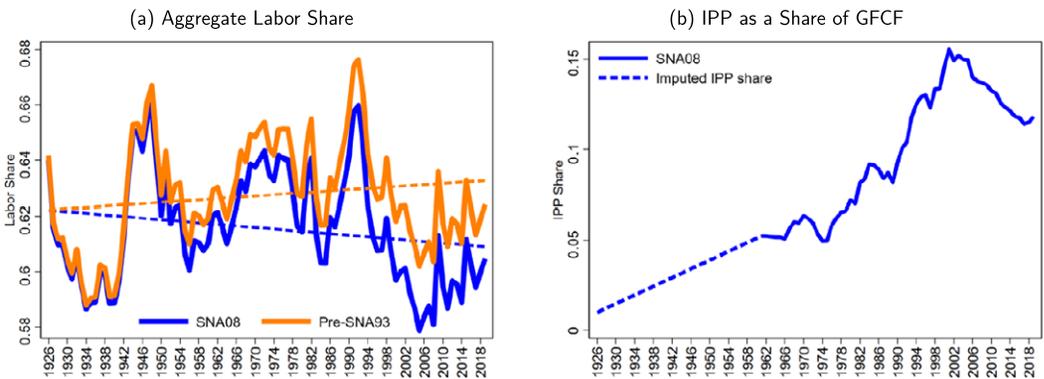


FIGURE F-3.—Aggregate labor share and IPP capitalization from 1926 to 2018, Canada.

TABLE F-II  
NATIONAL ACCOUNTS, STATISTICS DENMARK, 1966–2018<sup>a</sup>

| Variables                    | Reference Tables   | Years     |
|------------------------------|--|-----------|
| National Accounts Aggregates |  |           |
| GDP                          | 1-2.1.1 Production, GDP and generation of income                   | 1966–2018 |
| CE                           | 1-2.1.1 Production, GDP and generation of income                   | 1966–2018 |
| TaxSub                       | 1-2.1.1 Production, GDP and generation of income                   | 1966–2018 |
| GOS                          | 1-2.1.1 Production, GDP and generation of income                   | 1966–2018 |
| NMI                          | 2.1.1 Generation of income (full sequence) by transaction and time | 1995–2017 |
| IPP-GFCF                     | Gross capital formation by assets and price unit                   | 1966–2018 |

<sup>a</sup>All the time series data were retrieved on Sep. 23, 2019. GDP: gross domestic product at market prices; TaxSub: taxes less subsidies on production and imports; GOS: gross operating surplus plus mixed income<sup>S10</sup>; NMI: net mixed income; IPP-GFCF: gross fixed capital formation on intellectual property products.

### F.2. Denmark (1966–2018)

We retrieve data series from Statistics Denmark (<https://www.dst.dk/en>).<sup>S9</sup> Statistics Denmark provides data on GDP, TS, CE, and IPP from 1966 to 2018. Data on the sum of gross mixed income (GMI) and GOS are also provided from 1966 to 2018. However, separate data for the GMI series and the GOS series are only available from 1995 onward. The same occurs to the data series of NMI and net operating surplus (NOS), which are only available for the period 1995 to 2018. Sources of our data are detailed in Table F-II.

*Variable Construction.* Statistics Denmark provides time series of the sum of GOS and GMI for the entire 1966–2018 sample period, but the separate series of GOS and GMI are only available starting from 1995. The same occurs for NMI and NOS.

**GMI and GOS.** We construct separate series for GOS and GMI for the years before 1995 in two steps. First, we linearly regress the observed ratio  $\frac{\text{GOS}}{\text{GOS}+\text{GMI}}$  against time for the years in which these data are available (i.e., 1995–2018); see panel (a) of Figure F-4.<sup>S11</sup> Second, we extend the GOS series by multiplying the predicted value

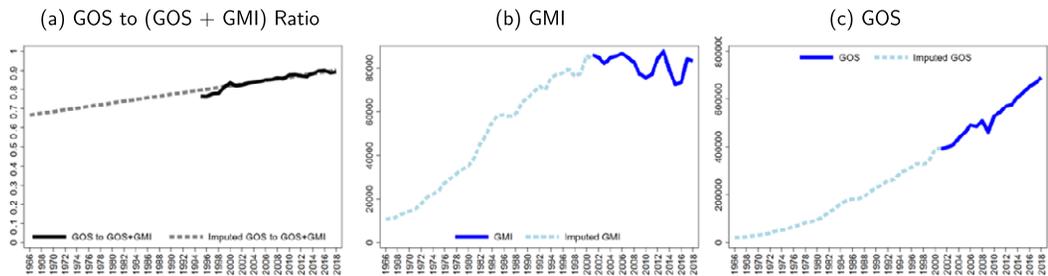


FIGURE F-4.—Extrapolation of GMI and GOS from 1966 to 1995, Denmark.

<sup>S9</sup>For downloading, go to StatBank: <https://www.statbank.dk/statbank5a/default.asp?w=1366>.

<sup>S10</sup>We label as GOS what Statistics Denmark explicitly writes as Gross (Operating Surplus + Mixed Income).

<sup>S11</sup>Our linear regression uses the sample period from 2000 to 2018. The reason why we focus on the post-2000 sample for this regression is that we observe a clear off-trend drop in 1995–1999. However, we have checked that keeping the entire sample 1995–2018 in the regression does not change our results in any significant way.

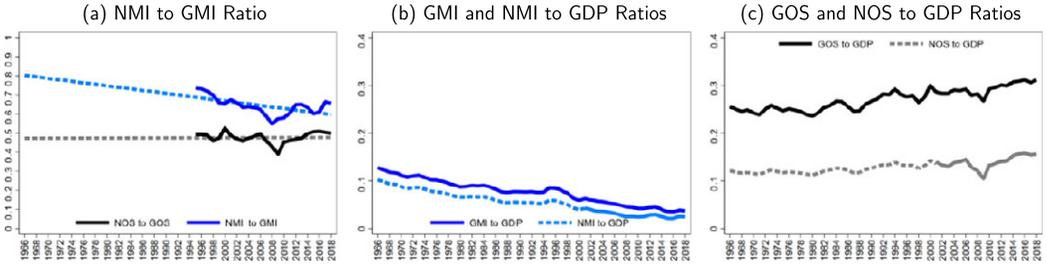


FIGURE F-5.—Extrapolation of NMI and NOS from 1966 to 1995, Denmark.

$\frac{\widehat{GOS}}{GOS+GMI}$  to the series  $GOS + GMI$ . Third, we construct a series of GMI by subtracting the extended GOS series from the series of  $GOS + GMI$ . Figure F-4 shows the results of these imputations for GMI and GOS in panels (b) and (c), respectively.

**NMI and NOS.** To extend the series of NMI for the years before 1995, we linearly regress the ratio NMI to GMI against time for the post-2000 sample period; see panel (a) in Figure F-5. Then we construct a series of NMI by computing the product of the predicted value  $\frac{NMI}{GMI}$  times the extended series of GMI. The results of this extrapolation for NMI as a fraction of GDP are in panel (b) of Figure F-5. Results for NOS are in panel (c) of the same figure.

*Analysis by Income Composition.* Figure F-6 shows the share of income components in GDP. The share of CE in GDP is approximately 52% on average. The share of GOS increases from approximately 25% in the mid-1960s to 30% in 2018. The share of NMI decreases from approximately 10% in the mid-1960s to 5% in 2018. The share of TS in GDP remains relatively constant around 13% throughout the entire sample period.

*Aggregate Labor Share and the Effects of IPP Capitalization.* Our benchmark labor share is shown as the blue line in panel (a) of Figure F-7. Note that the benchmark LS not only corrects for TS but also corrects for NMI:

$$LS = \frac{CE}{GDP - TS - NMI}.$$

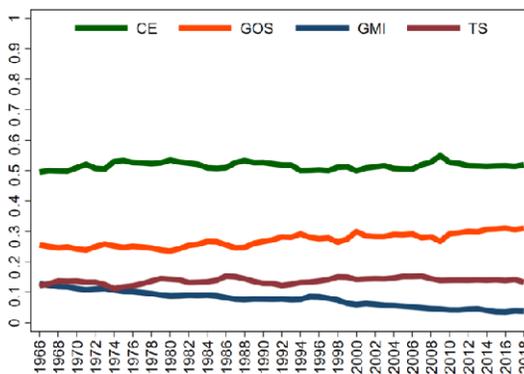


FIGURE F-6.—Income composition of GDP from 1966 to 2018, Denmark.

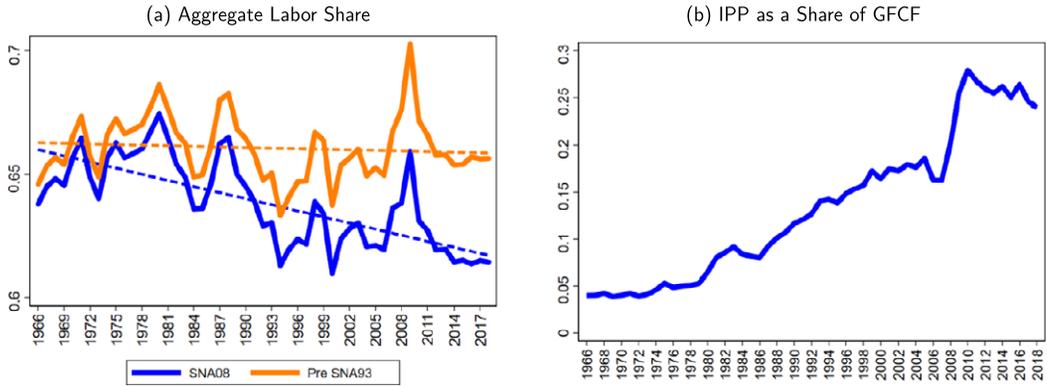


FIGURE F-7.—The effects of IPP capitalization on the labor share, Denmark 1966–2018.

We find that the LS declines throughout the entire sample period from approximately 65% in the late 1960s to 61% in the 2010s. In terms of long-run trends, the labor share significantly drops by  $-0.12\%$  per year.

In the case of Denmark, GFCF and IPP are provided for the entire sample period 1966–2018. Panel (b) of Figure F-7 shows the IPP as a share of the economy-wide GFCF. IPP investment is rising rapidly after 1970, from 4% of aggregate investment in 1970 to almost 28% in 2011 as in panel (b) of Figure F-7. Without IPP capitalization, the counterfactual accounting labor share under SNA93 is

$$LS = \frac{CE}{GDP - TS - NMI - IPP}.$$

The capitalization of IPP entirely explains the decline of the labor share in Denmark; see panel (a) of Figure F-7. Without IPP capital the labor share is trendless.

### F.3. France (1949–2018)

We retrieve the data from the Institut national de la statistique et des études économiques (INSEE: <https://www.insee.fr/en/accueil>).<sup>S12</sup> Sources of our data are detailed in Table F-III.

*Variable Construction.* INSEE provides time series of GOS and GMI for the entire 1949–2018 sample period, but the series for NOS and NMI are only available from 1978 onward. The same occurs to the gross fixed capital formation of IPP. That is, we need to extend measures of NOS, NMI, and IPP for years before 1978.

**NMI and NOS.** To extend the series of NMI to the period before 1978, we linearly regress the ratio of NMI to GMI on years; see panel (a) of Figure F-8. Then, we construct a series of NMI by computing the product of the predicted value  $\frac{NMI}{GMI}$  and the series of GMI. The results as a fraction of GDP are shown in panel (b) of Figure F-8. Analogous results for NOS are in panel (c) of the same figure.

**IPP.** Although GFCF is available for the entire sample period 1949–2018, the series for IPP investment is only available from 1978 onward. We find a clear upward trend

<sup>S12</sup>For downloading, see <https://www.insee.fr/en/statistiques?categorie=1>.

TABLE F-III  
NATIONAL ACCOUNTS, INSEE, 1949–2018<sup>a</sup>

| Variables                    | Reference Tables   | Years     |
|------------------------------|--|-----------|
| National Accounts Aggregates |  |           |
| GDP                          | 1.105 Gross domestic product: the three approaches             | 1949–2018 |
| TaxSub                       | 1.105 Gross domestic product: the three approaches             | 1949–2018 |
| GOS                          | 1.105 Gross domestic product: the three approaches             | 1949–2018 |
| GMI                          | 7.401 Households account                                       | 1949–2018 |
| NMI                          | 7.401 Households account                                       | 1978–2018 |
| GFCF                         | 1.101 Gross domestic product and its components                | 1949–2018 |
| IPP-GFCF                     | 8.221 Gross fixed capital formation (classification of assets) | 1978–2018 |

<sup>a</sup>All the time series data were retrieved on Sep. 23, 2019. GDP: gross domestic product at market prices; CE: compensation of employees; TaxSub: taxes less subsidies on production and imports; GOS: gross operating surplus; GMI: gross mixed income; NMI: net mixed income; GFCF: gross fixed capital formation; IPP-GFCF: gross fixed capital formation on intellectual property products. Note that in INSEE GOS is explicitly labeled as “Gross Operating Surplus + Mixed Income.”

for the ratio of IPP to the economy-wide GFCF. This ratio, starts as 11.1% in 1978 and reaches 24.7% in 2018. To extend the series of IPP for the period before 1978, we can either take a linear trend of the ratio for the period 1978–2002 or assume an initial value of the ratio as 1% in 1949 and linearly interpolate between 1949 and the first available value of IPP in 1978. The results of the latter approach are shown in panel (b) of Figure F-10.

*Analysis by Income Compositions.* Figure F-9 shows the share of income components in GDP. The share of CE in GDP increases from approximately 40% in the late 1940s to 50% in the 2010s. The share of GOS increases from approximately 20% in 1950s to 30% in 2019. The share of GMI decreases from approximately 30% in the late 1940s to 5% in 2019. The share of TS in GDP remains relatively constant around 13% throughout the entire sample period.

*The Labor Share and the Effects of IPP Capitalization.* Our benchmark labor share under SNA08 is computed as

$$LS = \frac{CE}{GDP - TS - NMI}.$$

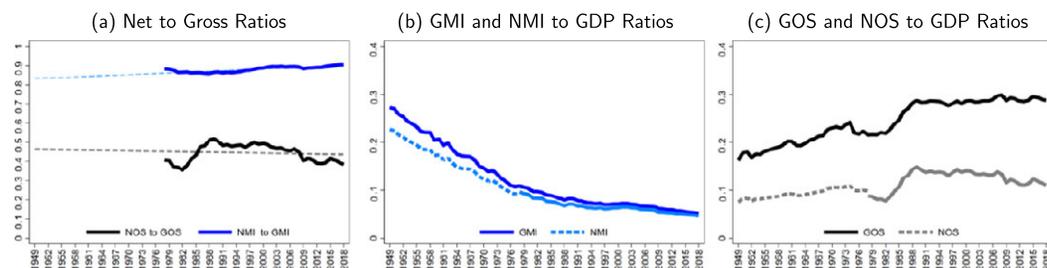


FIGURE F-8.—Extrapolation of NMI and NOS from 1949 to 1978, France.

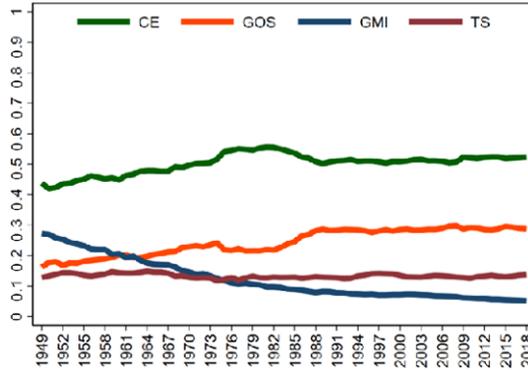


FIGURE F-9.—Income composition of GDP from 1949 to 2018, France.

The labor share declines throughout the entire period from approximately 67% in the 1950s to 62% in the 2010s as shown in panel (a) of Figure F-10. It implies a long-run trend of a significant decline of  $-0.11\%$  per year.

The counterfactual accounting labor share consistent with SNA93 undoes the capitalization of IPP, that is,

$$LS = \frac{CE}{GDP - TS - NMI - IPP}.$$

We find that the labor share without IPP capital shows no significant trend; see Figure F-10. The capitalization of IPP entirely explains the long-run decline of the labor share in France.

#### F.4. Japan (1955–2018)

We retrieve national accounts data from the system of national accounts of the Cabinet Office in Japan (<https://www.cao.go.jp/index-e.html>).<sup>S13</sup> Sources of our data are detailed in Table F-IV.

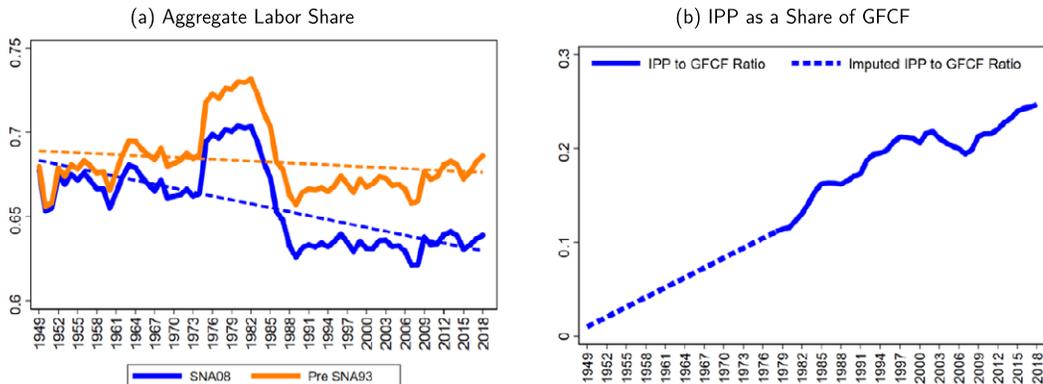


FIGURE F-10.—The effects of IPP capitalization on the labor share, France 1949–2018.

<sup>S13</sup>For downloading, see <https://www.esri.cao.go.jp/index-e.html>.

TABLE F-IV  
NATIONAL ACCOUNTS, CABINET OFFICE IN JAPAN, 1955–2018<sup>a</sup>

| Variables                     | Reference Tables   | Years     | Series ID                 |
|-------------------------------|--|-----------|---------------------------|
| National Accounts, Aggregates |  |           |                           |
| GDP                           | Table 1. Gross Domestic Product and Expenditure          | 1994–2018 | From Line 1.1 to 1.6      |
|                               | Table 1. Gross Domestic Product and Expenditure (SNA 93) | 1980–2009 | From Line 1.1 to 1.6      |
|                               | Table 1. Gross Domestic Product and Expenditure (SNA 68) | 1955–1998 | From Line 1.1 to 1.6      |
| TaxSub                        | Table 1. Gross Domestic Product and Expenditure          | 1994–2018 | Line 1.4-1.5              |
|                               | Table 1. Gross Domestic Product and Expenditure (SNA 93) | 1980–2009 | Line 1.4-1.5              |
|                               | Table 1. Gross Domestic Product and Expenditure (SNA 68) | 1955–1998 | Line 1.4-1.5              |
| CE                            | Table 1. Gross Domestic Product and Expenditure          | 1994–2018 | Line 1.1                  |
|                               | Table 1. Gross Domestic Product and Expenditure (SNA 93) | 1980–2009 | Line 1.1                  |
|                               | Table 1. Gross Domestic Product and Expenditure (SNA 68) | 1955–1998 | Line 1.1                  |
| GOS                           | Table 1. Generation of Income Account                    | 1994–2018 | Line 0.4 (1) (regrouped)  |
|                               | Table 1. Generation of Income Account (SNA 93)           | 1980–2009 | Line 0.4 (1) (regrouped)  |
| NMI                           | Table 1. Generation of Income Account                    | 1994–2018 | Line 0.4 (2)              |
|                               | Table 1. Generation of Income Account (SNA 93)           | 1980–2009 | Line 0.4 (2)              |
| NOSHH+NMI                     | Table 5. Households (SNA68)                              | 1955–1998 | Line 12                   |
| NOSHH                         | Table 5. Households (SNA68)                              | 1955–1998 | Line 12 (imputed rentals) |
| IPP-GFCF                      | Table 14. Gross Capital Formation by Type                | 1994–2018 | Line 1 (6)                |

<sup>a</sup>This table includes private unincorporated non-financial enterprises. NOSHH in this table entails the imputed service from owner-occupied dwellings. All the time series data were retrieved on Sep. 23, 2019. All variables are in current prices. GVA: gross value added at market prices; TaxSub: taxes less subsidies on production and imports; GOS: gross operating surplus; NMI: net mixed income; IPP-GFCF: gross fixed capital formation on intellectual property product.

*Variable Construction.* The Cabinet Office in Japan provides annual data for the series of GDP, TS, and CE under three different SNAs (SNA68, SNA93, and SNA08), which cover different, though overlapping, sample periods. Precisely, the Cabinet data under SNA08 cover the period from 1994 to 2018; the Cabinet data under the SNA93 cover the period from 1980 to 2009; and the Cabinet data under SNA68 cover the period from 1955 to 1998. We use all three SNAs to construct a time series that spans from 1955 to 2018 that is consistent with SNA08.

**GFCF.** To impute the IPP investment, we need to adjust GFCF under SNA68 (GFCF68) and SNA93 (GFCF93) to the level under SNA08 (GFCF08). We regress the ratio of GFCF08 to GFCF93 for the overlapping period 1994–2009, linearly extend the estimated ratio to 1980, and apply the series to GFCF93 to impute GFCF08 going back to 1980. We apply the same methodology to the ratio of GFCF93 to GFCF68 and apply the extended ratio to GFCF68 to impute GFCF93 and then apply the previous extended ratio to compute GFCF08 (see the last panel of Figure F-11).

**IPP.** To extrapolate the IPP investment under SNA08 back to 1955, we use the IPP investment under SNA08 and the imputed GFCF08 extending back to 1955. We assume that the ratio of IPP to GFCF in Japan in 1955 is 4%, which is two-thirds of the ratio in the U.S. in 1955 (6%). Then we interpolate this ratio between 1955 and 1994 and apply it to the extended GFCF08 to impute the IPP investment tracing back to

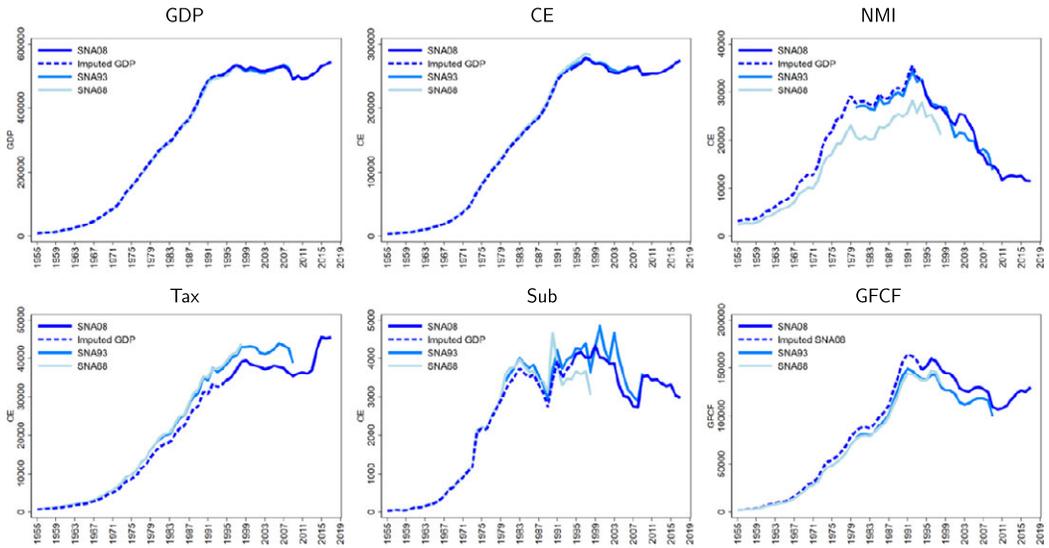


FIGURE F-11.—Imputation of national income components, Japan 1955–2017.

1955 (see panel (b) of Figure F-13).<sup>S14</sup> The linear interpolation of the IPP to GFCF ratio could overstate the IPP investment in the early years, so we also consider an exponential growth of the ratio from 1955, which does not affect our results on the decline of the labor share.

**NMI.** The series of NMI is available under the current accounts (SNA08) and the immediate precedent (SNA93), but not for the earlier SNA68. However, “Table 5. Households” under SNA68 provides a series of net operating surplus that incorporates both net mixed income and the imputed service from owner-occupied dwellings. Also, the SNA68 provides separately the imputed service from owner-occupied dwellings which is synonymous to the net operating surplus of households (NOSHH). Therefore, we can obtain NMI by subtracting from the net operating surplus the imputed service from owner-occupied dwellings.

**Adjusting SNA68 to SNA08.** For GDP, CE, TS, NMI, and GFCF, we have three different versions of SNA. We adjust older versions of GDP to be consistent with SNA08. More specifically, we add (imputed) IPP investment to GDP under SNA68 and add (imputed) IPP investment to GDP under SNA93 after removing the investment of software. However, SNA updates are not just about the treatment of IPP, and hence there still exists some gap between the different SNA’s after the IPP adjustment. Therefore, we adjust the level of GDP, CE, TS, and NMI under SNA68 and SNA93 to the level of SNA08, as shown in Figure F-11. Precisely, we regress the ratio of two different SNA’s for the overlapping periods and apply the extended ratio to the previous version of SNA to boost the series under SNA68 and SNA93.

*Analysis by Income Components.* As we disaggregate the LS into income components, the source of the U-shape pattern before 1976 and the gradual decline after 1976 become

<sup>S14</sup>Applying the U.S. level of IPP share in 1955 (6%) to Japan can be high for Japan after WWII, but we checked the sensitivity of the LS trend over the periods 1955–2018 and confirmed that the trendless result remained unchanged.

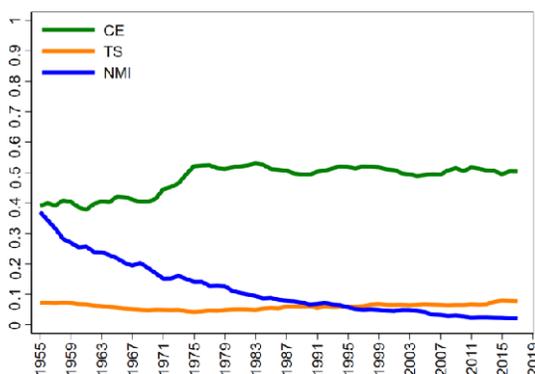


FIGURE F-12.—Income composition of GDP from 1955 to 2018, Japan.

clear. Figure F-12 shows CE, TS, and NMI as shares of GDP. First, CE as a share of GDP remains constantly trendless throughout the periods except for one time jump in 1970–1974. Similarly, TS is also almost constant. Therefore, the most of the dynamics of LS attributes to NMI, which declines from 37% of GDP in 1955 to almost 2% in 2017. This implies that the sharp drop during 1955–1970 and the gradual decline after 1976 are both driven by NMI, while the sharp increase in 1970–1976 is driven by an increase in CE.

*Aggregate Labor Share and the Effects of IPP Capitalization.* We compute the aggregate labor constructed by the imputed national income components. Using the adjusted series consistent with SNA08, we construct the benchmark labor share for Japan in the usual way:

$$LS = CE / (GDP - TS - NMI).$$

Figure F-13 shows that the aggregate labor share starts declining after 1976. In fact, there are two drastic declines, one during 1983–1990 and the other during 1998–2007. Throughout the period of 1976–2017, there is  $-0.18\%$  annual drop in labor share. But more interestingly, before 1976, there was a huge drop from 0.656 in 1955 to 0.521 in 1970, followed by a huge jump to 0.634 in 1976. With this longer series of LS, the overall trend is significantly downward sloping. Once we remove IPP investment from the denominator of the labor share, it corrects the overall decline and the slope becomes trendless.

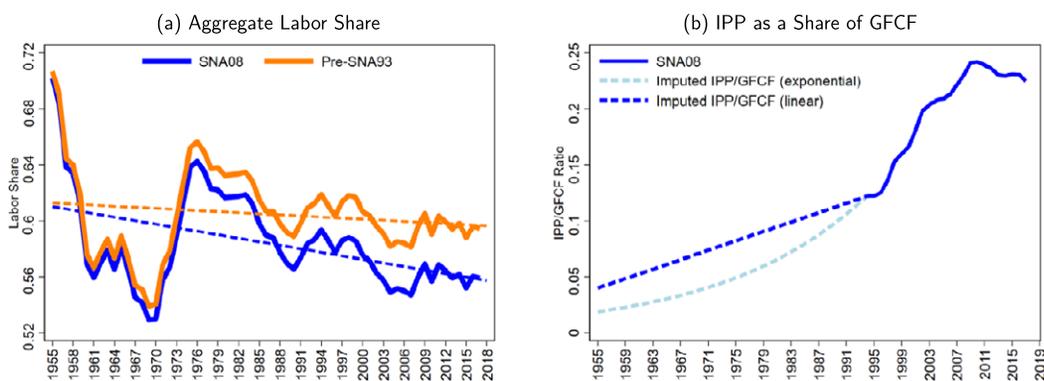


FIGURE F-13.—The effects of IPP capitalization on the labor share, Japan 1955–2018.

TABLE F-V  
NATIONAL ACCOUNTS DATA SOURCES: SWEDEN<sup>a</sup>

| Variables                    | Reference Tables   | Years     | Series ID |
|------------------------------|--|-----------|-----------|
| National Accounts Aggregates |  |           |           |
| GDP                          | Institutional non-financial sector accounts (ESA2010)  | 1950–2018 | B1gb      |
| CE                           | Institutional non-financial sector accounts (ESA2010)  | 1950–2018 | D1        |
| TaxSub                       | Institutional non-financial sector accounts (ESA2010)  | 1950–2018 | D2XD3     |
| GOS                          | Institutional non-financial sector accounts (ESA2010)  | 1950–2018 | B2g       |
| GMI                          | Institutional non-financial sector accounts (ESA2010)  | 1950–2018 | B3g       |
| NMI                          | Institutional non-financial sector accounts (ESA2010)  | 1950–2018 | B2g       |
| GFCF                         | GDP: expenditure approach by type of use, aggregated   | 1950–2018 |           |
| IPP-GFCF                     | Fixed capital formation (ESA2010) by industrial classification NACE Rev. 2, type of asset and year | 1980–2018 |           |

<sup>a</sup>All the time series data were retrieved on Jan. 20, 2020. GDP: gross domestic product at market prices; CE: compensation of employees; TaxSub: taxes less subsidies on production and imports; GOS: gross operating surplus; GMI: gross mixed income; NMI: net mixed income; GFCF: gross fixed capital formation; IPP-GFCF: gross fixed capital formation on intellectual property products.

### F.5. Sweden (1950–2018)

We retrieve data series from Statistics Sweden ([https://www.stat.fi/index\\_en.html](https://www.stat.fi/index_en.html)).<sup>S15</sup> Note that when we first retrieved the national accounts data from the Statistics Sweden on Aug. 28, 2019, the financial sector CE/GDP ratio has an inexplicable jump from 9% to 31% in 1978. The Statistics Sweden conducted a revision of the national accounts data in Sep. 2019 and the released data were cut off at the year 1994. Recently (Jan. 2020), they released the longer series again starting from 1950 and the current version of NA data no longer has this inexplicable jump of the financial sector. The sources of our data are detailed in Table F-V.

*Variable Construction.* The current NA data in Statistics Sweden have all the national income components in aggregate and by institutional sector going back to 1950. IPP investment, however, dates back only to 1980. Therefore, we extend the series back to 1950 by taking the IPP to GFCF ratio from 1980 to 2018 and assume that the ratio in 1950 was two-thirds of U.S. level, which is 4.4%. We then linearly interpolate this ratio between 1950 and 1980. Panel (b) of Figure F-15 shows the extended IPP/GFCF ratio. There is clearly an upward trend from 1.5% in 1980 to 3.1% in 2000, and the dashed imputed line is closer to the linear trend of IPP/GFCF ratio between 1980 and 2018. We apply this interpolated ratio series to GFCF to impute IPP series going back to 1950.

*Analysis by Income Components.* Figure F-14 shows the income components of GDP as a share of GDP from 1950 to 2018. The share of CE rises throughout the 1950s and 1960s, followed by a decline from the 1970s to mid 1990s, after which it becomes constant for the rest of the sample period. Throughout the sample period, the GOS share is shown as almost a reverse of CE share because NMI and TS shares sum up to a constant 23% of GDP share.

<sup>S15</sup>For downloading, see <https://www.scb.se/en/finding-statistics/statistics-by-subject-area/national-accounts/national-accounts/national-accounts-quarterly-and-annual-estimates/>.

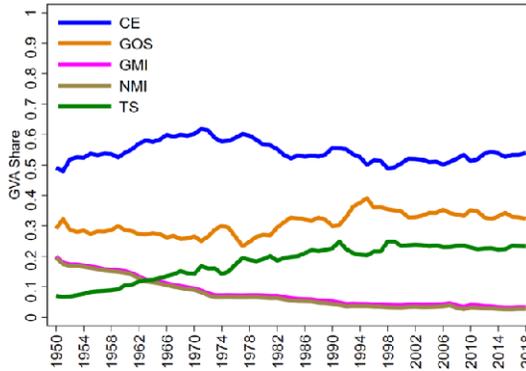


FIGURE F-14.—Income composition of GDP from 1950 to 2018, Sweden.

*Aggregate Labor Share and the Effect of IPP Capitalization.* We construct the aggregate labor share as

$$LS = \frac{CE}{GDP - TS - NMI},$$

and the counterfactual labor share as

$$LS = \frac{CE}{GDP - TS - NMI - IPP}.$$

Panel (a) of Figure F-15 shows the aggregate labor share and its counterfactual. The labor share in Sweden rises from 0.62 in 1950 to 0.71 in 1971. As is true to the United States and other European countries, labor share reaches a peak around 1970 and starts declining until the end of the 1990s. After 1996, the labor share in Sweden is mildly increasing until 2018. Overall, the labor share declines annually by  $-0.19\%$ . Once we remove the IPP investment from the LS construct, the trend of LS from 1950 to 2018 declines annually by  $-0.073\%$ , which is less than half of the current decline. From the analysis by income components, it is clear that the peak around 1970 is driven by the peak of the CE share around the same time period.

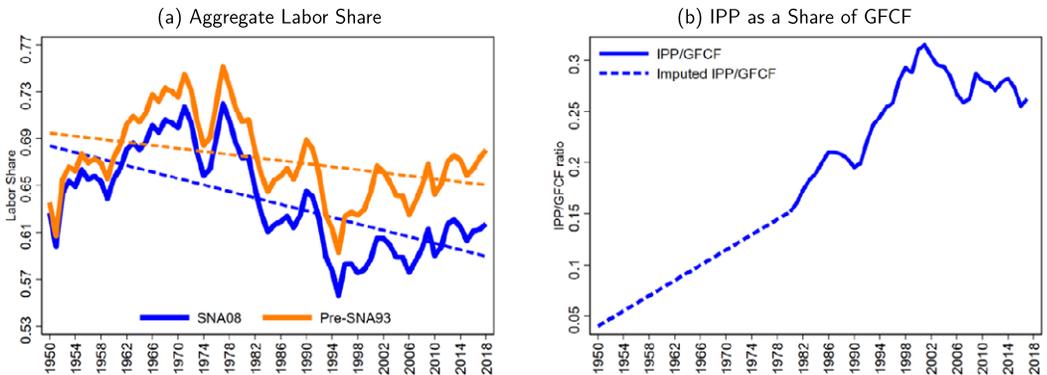


FIGURE F-15.—The effects of IPP capitalization on the labor share, Sweden 1950–2018.

## REFERENCES

- BONNET, O., P.-H. BONO, G. CHAPPELLE, AND E. WASMER (2014): “Does Housing Capital Contribute to Inequality? A Comment on Thomas Piketty’s Capital in the 21st Century,” Technical report. [8]
- BRIDGMAN, B. (2017): “Is Labor’s Loss Capital’s Gain? Gross versus Net Labor Shares,” *Macroeconomic Dynamics*. [7]
- BUREAU OF LABOR STATISTICS (2007): “Technical Information About the BLS Multifactor Productivity Measures,” Technical report, Bureau of Labor Statistics Multifactor Productivity. [5]
- COOLEY, T. F., AND E. C. PRESCOTT (1995): “Economic Growth and Business Cycles,” in *Frontiers of Business Cycle Research*, ed. by T. F. Cooley. Princeton, NJ: Princeton University Press, 1–38. [5-7]
- ELSBY, M., B. HOIJN, AND A. SAHIN (2013): “The Decline of the U.S. Labor Share,” *Brookings Papers on Economic Activity*, 47 (2), 1–63. [5]
- GOMME, P., AND P. RUPERT (2004): “Measuring Labor’s Share of Income,” Federal Reserve Bank of Cleveland Policy Discussion Papers. [5,7]
- (2007): “Theory, Measurement and Calibration of Macroeconomic Models,” *Journal of Monetary Economics*, 54 (2), 460–497. [5,7]
- KOH, D., AND R. SANTAELÀLIA-LLOPIS (2017): “Countercyclical Elasticity of Substitution,” Barcelona GSE, Working Paper 946. [5,7]
- KRAVIS, I. B. (1959): “Relative Income Shares in Fact and Theory,” *American Economic Review*, 49 (5), 917–949. [7]
- MCGRATTAN, E. R., AND E. C. PRESCOTT (2014): “A Reassessment of Real Business Cycle Theory,” *American Economic Review*, 104 (5), 177–182. [7]
- PIKETTY, T., AND G. ZUCMAN (2014): “Capital is Back: Wealth-Income Ratios in Rich Countries, 1700-2010,” *The Quarterly Journal of Economics*, 1255–1310. [8]
- RÍOS-RULL, J.-V., AND R. SANTAELÀLIA-LLOPIS (2010): “Redistributive Shocks and Productivity Shocks,” *Journal of Monetary Economics*, 57 (8), 931–948. [5,7]

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*Co-editor Giovanni L. Violante handled this manuscript.*

*Manuscript received 10 July, 2019; final version accepted 28 May, 2020; available online 10 June, 2020.*