

Measuring Marxian Categories in the U.S. Economy: Profitability, Distribution, and Capital Composition

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Abstract

Empirical work on the rate of profit depends on how theoretical categories are mapped into national accounts. Conventional accounts treat every marketed activity as production, whereas the Marxian framework distinguishes activities that produce new value from those that circulate or appropriate it. Building on the framework of Shaikh and Tonak (1994), we classify every industry in the U.S. input-output accounts into production, semi-production, business, financial, and non-production sectors, justify the classification of borderline industries, and construct the Marxian net product, surplus value, profit, the rate of surplus value, the organic composition of capital, and four alternative measures of the rate of profit for 2017–2022. Three findings stand out. First, the distinction between production and other activities is quantitatively large: only 56–57 percent of the reconstructed net product is recorded in production sectors, while about 40 percent is recorded in business sectors that realize output. Second, the level of the rate of profit depends heavily on the treatment of unproductive labor and capital, ranging from 9 to 53 percent across measures, although all measures move together over time. Third, an exact decomposition shows that year-to-year movements in the Marxian rate of profit are driven by the rate of surplus value, while the organic composition of capital is stable at about 2.6–2.7, and that about three-fifths of surplus value is absorbed by the wages of unproductive labor. The estimated rate of surplus value is lower than in studies that count only production workers' wages as variable capital, and it is sensitive in level, but not in its movements, to the classification of borderline industries.

Keywords: rate of profit, productive and unproductive labor, Marxian net product, rate of surplus value, input-output accounts

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1 Introduction

The rate of profit occupies a central place in classical and Marxian political economy. It links production, technical change, competition, and accumulation. In Marx’s account, the pursuit of surplus value drives capitalists to mechanize production, raising the organic composition of capital. Because only living labor creates surplus value, this tends to lower the general rate of profit, a tendency that “at a certain point comes into antagonistic conflict” with the development of the productive forces and “must be overcome constantly through crises” (Marx, 1998, p. 257). When profitability falls far enough, capitalists scale back investment and hiring, lower wage income depresses consumption, and falling demand discourages investment further, setting off a cumulative downturn (Sweezy, 1942; Foley, 1986; Heinrich, 2012; Basu, 2018). Whether the rate of profit actually shows such a tendency is therefore an empirical question with direct implications for the theory of crisis.

A large empirical literature has accordingly measured the U.S. rate of profit over the postwar period. Some studies find a sustained decline (Weisskopf, 1979; Wolff, 1986; Basu and Manolakas, 2013; Tsoulfidis and Paitaridis, 2019), while others find an initial rise followed by a decline (Moseley, 1990).

These disagreements are partly about measurement. Marxian categories such as surplus value, variable capital, and the organic composition of capital are defined in terms of productive activity, but official national accounts are built on a different production boundary. In the national accounts, any activity that is marketed, or that the government provides, contributes to output. In the Marxian framework, only activities that transform use values into new use values produce value; activities that transfer existing products from sellers to buyers, or that maintain and reproduce the social order, are financed out of the value produced elsewhere (Shaikh and Tonak, 1994; Wolff, 1987; Moseley, 1992). Measures of the rate of profit computed directly from official aggregates therefore mix categories that the theory keeps distinct, and conclusions drawn from them may depend as much on accounting conventions as on economic dynamics.

This paper takes the measurement problem as its starting point. Following Shaikh and Tonak (1994), we reconstruct Marxian categories from the U.S. national income and product accounts and the input-output (IO) accounts of the Bureau of Economic Analysis (BEA). Our contribution is to apply the framework at the level of individual IO industries and to make the classification of each industry explicit. Rather than adopting a broad sector-level classification, we assign every industry in the IO accounts to one of five groups: production, semi-production, business, financial, and non-production sectors. We discuss the industries whose classification is contested and show how sensitive the results are to alternative choices. We then compute the Marxian net product (MNP), surplus value, profit, the rate of surplus value, the organic composition of capital (OCC), and four alternative measures of the rate of profit for 2017–2022.

The exercise yields three findings. First, the distinction between production and other activities is quantitatively consequential. Only 56–57 percent of the reconstructed MNP is recorded in production sectors in the IO accounts, while roughly 40 percent is recorded in business sectors such

as wholesale and retail trade, which realize rather than produce value. Second, the level of the rate of profit depends heavily on the treatment of unproductive labor and capital. Our four measures range from about 9 to 53 percent, although they move together over time, with a common decline in 2020 and a recovery in 2021 and 2022. Third, an exact decomposition of the Marxian rate of profit into the rate of surplus value and the organic composition of capital shows that its movements over the period are driven by the rate of surplus value, while the organic composition of capital is stable. About three-fifths of surplus value is absorbed by the wages of unproductive labor. Our estimated rate of surplus value, about 1.3–1.4, is well below the estimates of Tsoulfidis and Paitaridis (2019), a difference we trace to the definition of variable capital.

The rest of the paper is organized as follows. Section 2 reviews how the Marxian and national-accounts production boundaries differ. Section 3 presents the classification of activities and industries, discusses borderline cases, and defines the measured categories. Section 4 describes the data. Section 5 presents the results, examines their sensitivity to the classification, and compares them with previous estimates. Section 6 concludes.

2 Production Boundaries in National and Marxian Accounts

National accounts measure gross domestic product in three equivalent ways: as the sum of value added across industries, as the sum of incomes generated in production, and as the sum of expenditures on final goods and services. Each method rests on the same production boundary, under which essentially all marketed activities, together with government services, count as production (Shaikh and Tonak, 1994). Wholesale and retail trade, finance, legal services, and general government therefore all contribute value added.

The Marxian framework draws the boundary differently. Production is the activity through which use values are transformed into new use values, and only labor employed in such activity creates value and surplus value. Activities that transfer commodities and money between owners, such as trade and finance, and activities that maintain the social order, such as general government, law, and the military, use up part of the social product rather than adding to it (Wolff, 1987; Moseley, 1992; Shaikh and Tonak, 1994). Their incomes are paid out of the value created in production.

Two examples illustrate how the boundaries diverge. First, the national accounts impute a rental value to owner-occupied housing and include it in output, even though no market transaction takes place. Second, the compensation of general government employees is counted as value added, although government revenue derives from taxation and borrowing, that is, from transfers of value produced elsewhere. From a Marxian perspective, both conventions overstate the value produced in the economy. More generally, because official aggregates count the value added of circulation and social-maintenance activities as output, they misstate both the net product and its division between wages and surplus value.

Shaikh and Tonak (1994) develop a systematic method for translating national accounts into Marxian categories, and subsequent work has applied it to the U.S. economy (Mohun, 2005;

Paitaridis and Tsoulfidis, 2012; Tsoulfidis and Paitaridis, 2019); see Basu (2015) for a review. Mohun (2005), for example, measures productive labor using the Standard Industrial Classification without separately assessing whether each industry’s activity is productive. The adoption of the North American Industry Classification System (NAICS) has since made it possible to separate many service activities that the older classification grouped together (Tsoulfidis and Paitaridis, 2019). Our approach classifies each industry in the IO accounts directly, which makes the mapping between theoretical categories and data transparent at the industry level.

3 Framework

3.1 Classification of activities

Following Shaikh and Tonak (1994), we distinguish four types of activity in social reproduction. *Production* uses up use values to create new use values. *Distribution* uses up use values to transfer other use values from their current holders to those who intend to use them. *Social maintenance and reproduction* uses up use values in the administration and reproduction of the social order, through government, the legal system, and the military. *Personal consumption* is the direct consumption of use values by individuals. All four types of activity may employ labor, but only production yields output in the Marxian sense. Labor employed in production is therefore productive labor, while labor employed in distribution and social maintenance is unproductive labor, compensated out of income generated in production.

3.2 Classification of industries

Shaikh and Tonak (1994) group industries into two broad sectors. Production and trade together form the *primary flows* sector, whose gross output constitutes the total value generated in the economy. Industries in the primary flows sector earn their revenue by producing and selling commodities. The revenues of all other industries, such as ground rent, interest and finance charges, fees, royalties, insurance charges, and taxes, are derived from the primary flows. They are either a recirculation of money flows generated in the primary flows, a circulation of socially validated claims on part of those flows, or both. These industries form the *secondary flows* sector, and their “output” does not add to the new value created in the economy (Shaikh and Tonak, 1994; Basu, 2015).

We refine this two-sector distinction by assigning every industry in the BEA IO accounts to one of five groups, based on the classification of activities above. *Production sectors* are those engaged in the generation of surplus value in the pursuit of profit, excluding industries engaged in distribution, circulation, and the maintenance of existing relations of production. *Semi-production sectors* also carry out production activity, but part of their output is purchased by the government or financed through government expenditure. Only the part of their output that is realized through the market is counted as production.

The remaining three groups do not produce value. *Business sectors* engage primarily in the realization of value, that is, in changing its form, as when commodities are converted into money.

Wholesale trade, retail trade, and rental and leasing belong to this group. *Financial sectors* appropriate part of the surplus value produced by productive capital through their control over money capital. Finally, *non-production sectors* derive their income from value created in production and subsequently redistributed. They include general government as well as private activities that maintain existing relations of production, such as legal services.

This finer classification separates activities that the primary/secondary distinction groups together: it distinguishes the realization of value in trade from its appropriation in finance, and it allows for production that is only partly carried out for the market. The full assignment of industries is reported in Table 8 in the Appendix.

3.3 Borderline industries

The classification of most industries follows directly from the definitions above. Agriculture, mining, utilities, construction, and manufacturing transform material inputs into new use values, while trade, finance, and general government transfer, appropriate, or administer value produced elsewhere. Several industries, however, are contested in the literature, and because our contribution rests on the classification of individual industries, we state the reasoning behind each of these choices.

Transportation and warehousing. Marx treats the transport industry as productive, since changing the location of a use value is part of completing it for consumption, and the costs of transport add value to the commodity (Marx, 1997). Storage that preserves use values is likewise a continuation of production rather than a pure cost of circulation. We therefore classify all transportation industries and warehousing and storage as production sectors.

Market services. Educational services, health care, social assistance, the arts, accommodation, and food services produce use values that are sold as commodities, even though these use values are consumed as they are produced. Following Shaikh and Tonak (1994) and Tsoulfidis and Paitaridis (2019), we classify them as production. The same reasoning applies to information industries, such as publishing, broadcasting, and data processing, and to computer systems design and other professional, scientific, and technical services, which sell services that enter into production or final consumption. An important feature of the IO accounts makes this treatment consistent with our definition of semi-production. Public schools and public hospitals are recorded under state and local general government rather than under educational services and hospitals. The latter industries therefore consist mainly of providers selling their output on the market, and the publicly provided part of education and health care is already included in general government, which we classify as non-production.

Other services. The industry “other services, except government” combines market services, such as repair and personal services, with the activities of religious, civic, and membership organizations, which are financed largely by contributions rather than sales. The IO accounts do not separate these activities, so we treat the industry as semi-production and assume that half of its activity is productive ($\theta = 0.5$ below). Section 5.4 shows that the results are insensitive to this choice.

Real estate and rental. Owner-occupied and rental housing is classified as non-production. The

national accounts impute a rent to owner-occupied housing that involves no market transaction, and the income from residential rental is a claim on value produced elsewhere. Other real estate, which consists mainly of brokerage and the leasing of commercial property, and rental and leasing services, which include the lessors of intangible assets, realize and circulate value through the transfer of use rights and are therefore classified as business sectors.

Management, administrative support, and legal services. The management of companies and enterprises, administrative and support services, and legal services perform supervisory, administrative, and protective functions. These functions are necessary for capitalist enterprise, but they do not transform use values. Their costs correspond to what business accounting calls overhead, which Tsoulfidis and Paitaridis (2019) argue is paid out of surplus value. We classify these industries as non-production.

Government enterprises and accounting adjustments. Federal and state and local government enterprises, such as the postal service and public utilities and transit, sell their output on the market and are classified as production. The items “scrap, used and secondhand goods” and “noncomparable imports and rest-of-the-world adjustment” are accounting adjustments rather than activities and do not contribute to the Marxian net product.

3.4 Mapping sectors into the Marxian net product

Because the IO accounts record transactions at producers’ prices, the value realized through trade appears as the output of the business sectors rather than as part of the value added of the producing industries. The value added of production sectors therefore understates the net product they generate, and part of that net product is recorded in other sectors. Our measurement strategy is to identify these transfers and add them back. Table 1 summarizes the mapping.

Table 1: Activities, sectors, and their contribution to the Marxian net product

Activity	Sector	Contribution to MNP
Production	Production	Net value added
	Semi-production	Productive share of net value added
Distribution	Business	Total industry output
Social maintenance	Financial	Payments from production sectors and productive share of payments from semi-production sectors
	Non-production	None
Personal consumption	–	None

Let NVA_i denote the net value added (value added minus depreciation) of industry i , X_i its total output, G_i government expenditure on its output, and z_{ji} the payments from industry i to financial industry j . Denote by $\mathcal{P}$, $\mathcal{S}$, $\mathcal{B}$, and $\mathcal{F}$ the sets of production, semi-production, business, and financial industries. The productive share of a semi-production industry is

$$\theta_i = \frac{X_i - G_i}{X_i}, \quad i \in \mathcal{S}. \quad (1)$$

The Marxian net product is then

$$MNP = \sum_{i \in \mathcal{P}} NVA_i + \sum_{i \in \mathcal{S}} \theta_i NVA_i + \sum_{i \in \mathcal{B}} X_i + \sum_{j \in \mathcal{F}} \left(\sum_{i \in \mathcal{P}} z_{ji} + \sum_{i \in \mathcal{S}} \theta_i z_{ji} \right). \quad (2)$$

The first two terms are the net product recorded in production and semi-production sectors. The third term is the value realized through the business sectors: since the IO accounts record their output at producers' prices, this output originates in the production and semi-production sectors. The fourth term adds the part of the net product paid to the financial sectors by producing industries. Payments from business sectors to financial sectors are excluded, because the full output of business sectors is already included and adding them would double count. Non-production sectors consume rather than produce value, so their recorded output is excluded.

In the IO accounts for our sample period, no government expenditure is recorded for the industries that would otherwise be classified as semi-production, so θ_i cannot be computed from the accounts. As discussed in Section 3.3, the semi-production group consists of a single industry, other services except government, for which we set $\theta = 0.5$.

3.5 Measured categories

Table 2 defines the categories we construct. Productive compensation is the compensation of employees in production sectors plus the productive share of compensation in semi-production sectors. It is the empirical counterpart of variable capital. Surplus value is the Marxian net product minus productive compensation. Profit is the Marxian net product minus total compensation of employees.

The difference between surplus value and profit is conceptually important. Profit treats all wages as a cost of production, as in conventional accounts. Surplus value treats only the wages of productive workers as variable capital, so that the wages of unproductive workers are counted as a use of surplus value rather than as a deduction from it, as in Shaikh and Tonak (1994). Surplus value therefore always exceeds profit, and the gap between them equals the compensation of unproductive labor.

We compute four measures of the rate of profit that combine the two numerators with the two capital stocks:

$$R_1 = \frac{\Pi}{K}, \quad R_2 = \frac{S}{K}, \quad R_3 = \frac{\Pi}{K^p}, \quad R_4 = \frac{S}{K^p}. \quad (3)$$

R_1 is closest to conventional measures of the profit rate. R_4 is closest to the Marxian concept, relating surplus value to the capital advanced in production.

The Marxian measure can be decomposed exactly into the two ratios on which the law of the tendency of the rate of profit to fall turns. Dividing the numerator and denominator of R_4 by productive compensation gives

$$R_4 = \frac{S/CE^p}{K^p/CE^p} = \frac{e}{OCC}, \quad (4)$$

so that the Marxian rate of profit rises with the rate of surplus value and falls with the organic

Table 2: Definitions and data sources

Symbol	Category	Definition	Source
MNP	Marxian net product	Equation (2)	BEA IO Use tables
CE	Compensation of employees	Total compensation of employees	BEA IO Use tables
CE^p	Productive compensation	Compensation in production sectors plus productive share in semi-production sectors	BEA IO Use tables
S	Surplus value	$MNP - CE^p$	Derived
Π	Profit	$MNP - CE$	Derived
e	Rate of surplus value	S/CE^p	Derived
K	Capital stock	Current-cost net stock of private nonresidential fixed assets	BEA Fixed Assets Table 1.1
K^p	Productive capital stock	K times the share of depreciation in production sectors	BEA Fixed Assets Tables 1.1, 3.4ESI; NIPA Table 7.3
OCC	Organic composition of capital	K^p/CE^p	Derived

composition of capital. The other measures are related to R_4 through $R_2 = R_4 K^p/K$ and $\Pi = S - (CE - CE^p)$: the gap between surplus value and profit is the compensation of unproductive labor.

4 Data

We use the BEA summary-level input-output Use tables for 2017–2022, which report value added, its components, and interindustry transactions for all industries on a consistent classification. We restrict the analysis to these years because they are published on the current industry classification; extending the series with historical IO tables is an important next step. The capital stock and depreciation by industry come from the BEA Fixed Assets accounts and the national income and product accounts, as listed in Table 2. All values are in millions of current dollars.

5 Results

5.1 The Marxian net product and its sectoral distribution

Table 3 reports the constructed categories. The Marxian net product rises from \$13.2 trillion in 2017 to \$17.9 trillion in 2022, with a decline in 2020 associated with the COVID-19 pandemic.

Table 4 shows where the Marxian net product is recorded in the IO accounts. Production sectors account for only 56–57 percent of it. Business sectors account for 38.4–40.5 percent, financial sectors for 1.8–2.7 percent, and the semi-production sector for about 1.4 percent. In other words, roughly two-fifths of the net product generated in production appears in the official accounts as the output of sectors that realize and circulate value. The share recorded in business sectors rises slightly over the period, while the share recorded in financial sectors declines.

Table 3: Marxian categories, 2017–2022 (millions of current dollars)

Year	MNP	CE	CE^p	S	Π	K	K^p	OCC
2017	13,190,715	10,434,980	5,571,512	7,619,203	2,755,735	24,066,900	14,850,086	2.67
2018	13,968,776	10,967,689	5,901,952	8,066,824	3,001,087	25,227,300	15,450,473	2.62
2019	14,488,965	11,459,776	6,205,681	8,283,284	3,029,189	26,441,700	16,183,399	2.61
2020	13,989,338	11,602,289	6,204,894	7,784,445	2,387,049	27,049,300	16,491,650	2.66
2021	16,154,894	12,556,629	6,767,522	9,387,372	3,598,265	30,074,100	18,016,163	2.66
2022	17,853,558	13,455,238	7,342,968	10,510,590	4,398,320	33,417,000	19,739,694	2.69

Table 4: Share of the Marxian net product recorded in each sector (percent)

Year	Production	Semi-production	Business	Financial	Total MNP (millions)
2017	57.33	1.45	38.52	2.70	13,190,715
2018	57.44	1.44	38.40	2.72	13,968,776
2019	57.54	1.45	38.61	2.40	14,488,965
2020	56.39	1.41	39.83	2.37	13,989,338
2021	56.02	1.31	40.54	2.13	16,154,894
2022	56.58	1.32	40.28	1.81	17,853,558

The division of compensation follows a similar pattern. Productive compensation accounts for 53–55 percent of total compensation of employees in every year, so that nearly half of all wages and salaries are paid to workers in distribution, finance, and social maintenance. About 60 percent of the private nonresidential capital stock is attributed to production sectors, and the remainder is employed in business, financial, and non-production activities.

5.2 Four measures of the rate of profit

Figure 1 and Table 5 report the four profit rates. Their levels differ substantially. The conventional-type measure R_1 lies between 9 and 13 percent, while R_4 , which relates surplus value to productive capital, lies between 47 and 53 percent. Against the total capital stock, using surplus value rather than profit in the numerator raises the rate by 18 to 20 percentage points, and using productive rather than total capital in the denominator raises it further. The level of the rate of profit is therefore highly sensitive to the treatment of unproductive labor and capital.

Table 5: Rates of profit, the rate of surplus value, and the organic composition of capital

Year	$R_1 = \Pi/K$	$R_2 = S/K$	$R_3 = \Pi/K^p$	$R_4 = S/K^p$	e	OCC
2017	11.5%	31.7%	18.6%	51.3%	1.37	2.67
2018	11.9%	32.0%	19.4%	52.2%	1.37	2.62
2019	11.5%	31.3%	18.7%	51.2%	1.33	2.61
2020	8.8%	28.8%	14.5%	47.2%	1.25	2.66
2021	12.0%	31.2%	20.0%	52.1%	1.39	2.66
2022	13.2%	31.5%	22.3%	53.2%	1.43	2.69

Despite their different levels, the four measures move together. They are broadly stable from

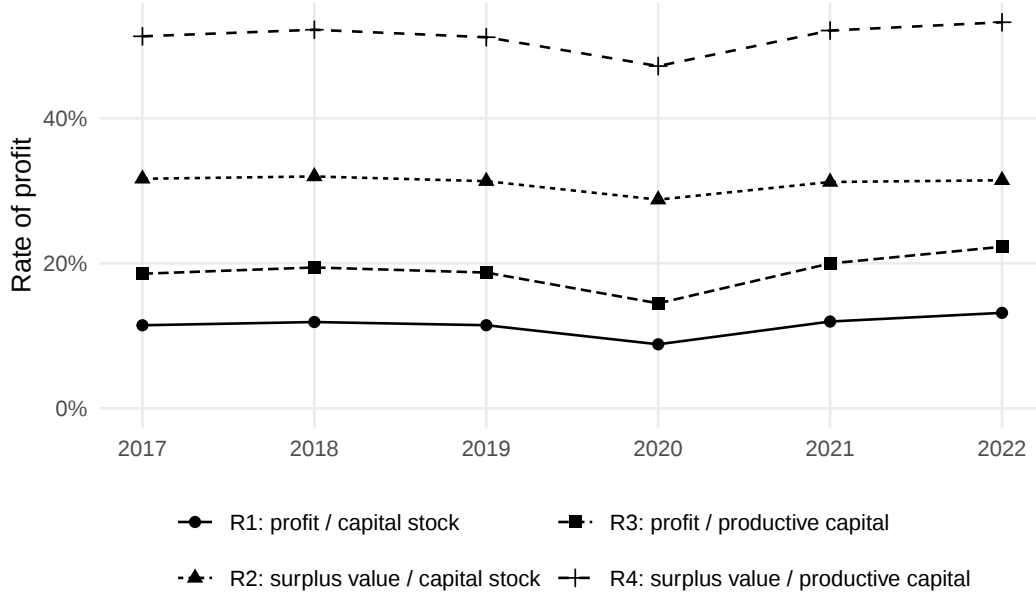


Figure 1: Four measures of the rate of profit, 2017–2022.

2017 to 2019, fall in 2020 during the pandemic, and recover in 2021 and 2022, when all four return to their pre-pandemic range. The decline in 2020 is proportionally larger for the measures based on profit, which fall by about a quarter, than for those based on surplus value, which fall by about 8 percent. Figure 2 shows why. Surplus value fell by 6 percent in 2020, whereas profit fell by 21 percent, because the compensation of unproductive labor, which is subtracted from surplus value to obtain profit, continued to rise.

5.3 Decomposing the rate of profit

Equation (4) allows us to attribute movements in the Marxian rate of profit to the rate of surplus value and the organic composition of capital. Figure 3 and the last two columns of Table 5 show that the organic composition of capital is remarkably stable, between 2.61 and 2.69 throughout the period, while the rate of surplus value varies more. The rate of surplus value falls from 1.33 in 2019 to 1.25 in 2020, a decline of 6 percent, while the organic composition of capital rises by 2 percent. The fall of R_4 from 51.2 to 47.2 percent in 2020 is therefore due mainly to the rate of surplus value. The recovery follows the same pattern: the rate of surplus value rises to 1.39 in 2021 and 1.43 in 2022, its highest value in the sample, while the organic composition of capital changes little.

The decomposition also shows how much of surplus value is absorbed outside production. The compensation of unproductive labor amounts to 62–64 percent of surplus value in 2017–2019 and 2021, rises to 69 percent in 2020, when surplus value fell while unproductive compensation did not, and falls to 58 percent in 2022. Only about two-fifths of surplus value therefore remains as profit in the conventional sense, available for accumulation, interest, rent, and taxes. This is the mechanism emphasized by Paitaridis and Tsoulfidis (2012) and Tsoulfidis and Paitaridis (2019): the larger

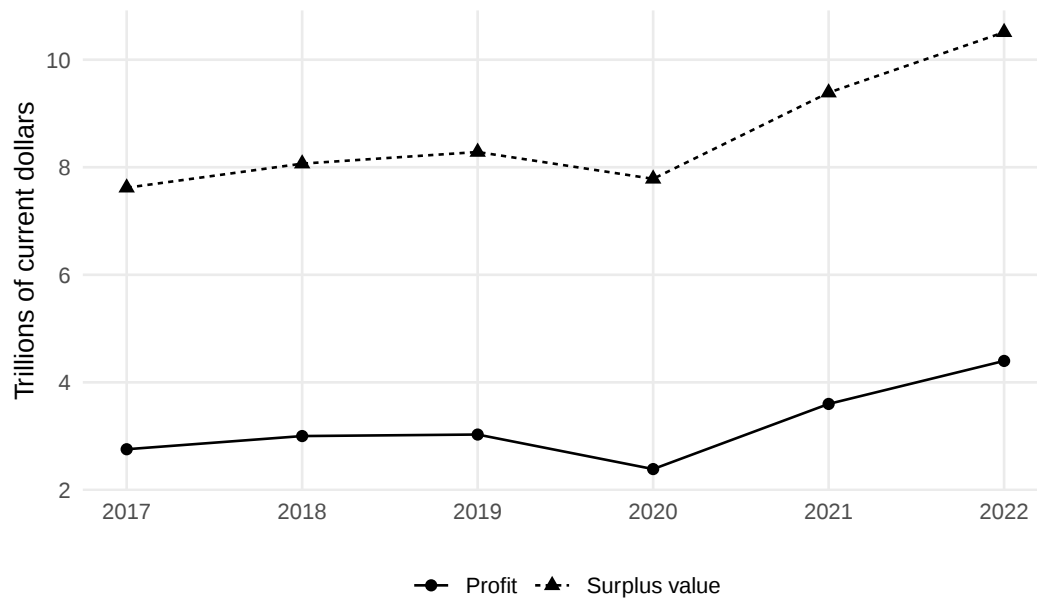


Figure 2: Profit and surplus value, 2017–2022.

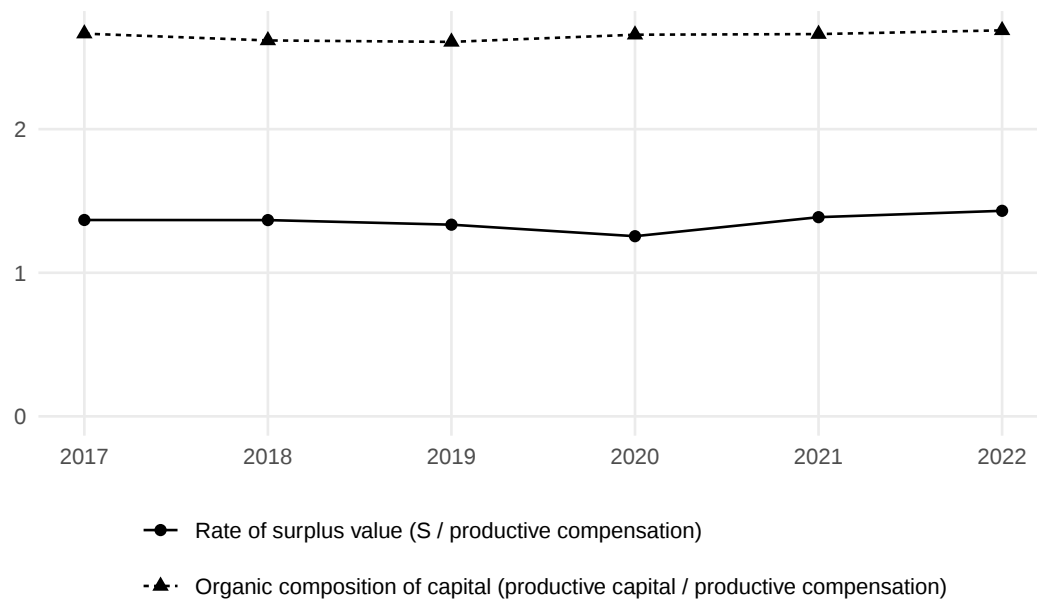


Figure 3: Rate of surplus value and organic composition of capital, 2017–2022.

the share of surplus value consumed by unproductive activities, the smaller the part available for accumulation.

Over a period of six years, these movements cannot be read as evidence for or against the law of the tendency of the rate of profit to fall, which concerns long-run tendencies. They show, however, that the decomposition in equation (4) can be applied consistently to industry-level data, and that the short-run movements of the Marxian rate of profit in this period reflect distribution rather than changes in the composition of capital.

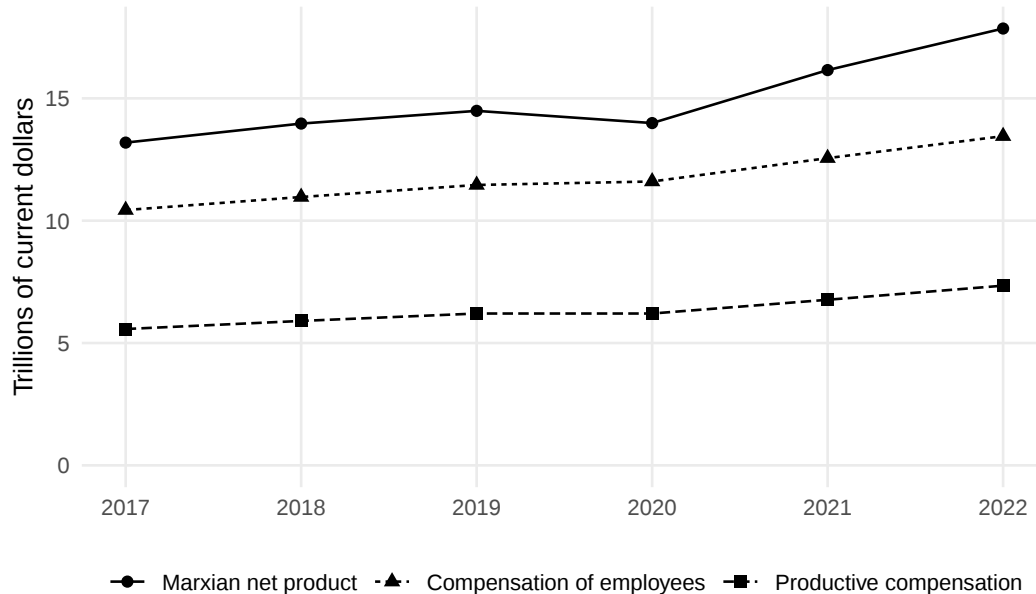


Figure 4: Marxian net product, total compensation, and productive compensation, 2017–2022.

5.4 Sensitivity to the classification

Two features of the classification involve judgment: the productive share θ of the semi-production sector, and the treatment of the borderline industries discussed in Section 3.3. Table 6 reports the rate of surplus value, the organic composition of capital, and R_4 for $\theta = 0, 0.5$, and 1, holding payments to financial sectors and the productive capital stock fixed. Moving θ across its full range changes the Marxian net product by about 1.4 percent, the rate of surplus value by about 0.03, and R_4 by at most 0.3 percentage points. The results are therefore insensitive to the assumed productive share of other services.

The classification of borderline industries matters more. Table 7 reports the rate of surplus value under two alternative classifications, in which the relevant industries are moved from production to non-production, holding payments to financial sectors fixed. In the first, computer systems design and other professional, scientific, and technical services are treated as non-production, as supporting services to business rather than production. These industries account for about 8 percent of the Marxian net product and 15–17 percent of productive compensation, and reclassifying them raises

Table 6: Sensitivity to the productive share θ of other services

Year	e			OCC			R_4 (percent)		
	$\theta = 0$	0.5	1	$\theta = 0$	0.5	1	$\theta = 0$	0.5	1
2017	1.40	1.37	1.34	2.74	2.67	2.59	51.1	51.3	51.6
2018	1.40	1.37	1.34	2.69	2.62	2.55	52.0	52.2	52.5
2019	1.37	1.33	1.31	2.68	2.61	2.54	50.9	51.2	51.4
2020	1.28	1.25	1.23	2.73	2.66	2.59	47.0	47.2	47.4
2021	1.42	1.39	1.36	2.73	2.66	2.59	51.9	52.1	52.3
2022	1.47	1.43	1.40	2.76	2.69	2.62	53.0	53.2	53.4

the rate of surplus value to 1.5–1.7. In the second, educational services, health care, and social assistance are treated as non-production, as activities of social reproduction rather than commodity production. These industries account for 11–12 percent of the Marxian net product and about a quarter of productive compensation, and reclassifying them raises the rate of surplus value to 1.7–1.9. Because these industries are labor intensive, excluding them from production raises the rate of surplus value. In both cases, however, the movements over time are unchanged: the rate of surplus value falls in 2020 and recovers in 2021 and 2022. The classification of service industries thus affects the level of the Marxian categories substantially, but not the conclusions about their movements.

Table 7: Rate of surplus value under alternative classifications

Year	Baseline	Professional and technical services as non-production	Education, health, and social assistance as non-production
2017	1.37	1.57	1.77
2018	1.37	1.57	1.77
2019	1.33	1.54	1.73
2020	1.25	1.47	1.65
2021	1.39	1.64	1.81
2022	1.43	1.69	1.86

5.5 Comparison with previous estimates

Our estimates can be compared with those of Tsoulfidis and Paitaridis (2019), who apply a closely related framework to the NAICS-based U.S. accounts for 1964–2016. Their classification of industries is similar to ours. They also treat trade, real estate, finance, legal services, the management of companies, administrative and support services, and general government as non-production, and education, health care, the arts, and accommodation and food services as production. Their estimated rate of surplus value, however, is much higher than ours, averaging 2.87 over 1964–2016, 3.65 over the last fifteen years of their sample, and 3.71 in 2016, compared with 1.25–1.43 in our sample.

The difference arises mainly from the definition of variable capital. Tsoulfidis and Paitaridis

(2019) count as variable capital only the wages of production workers within production industries, treating the wages of supervisory, managerial, and other overhead personnel in these industries as part of surplus value. We count the full compensation of employees in production industries as variable capital, in line with the industry-level approach of Shaikh and Tonak (1994), because the IO accounts do not divide compensation within industries by occupation. Our variable capital is therefore larger and our rate of surplus value correspondingly lower. The two approaches bracket the plausible range. Ours treats all labor in production industries as productive, while theirs treats only the direct labor of production workers as productive. Combining our industry classification with occupational data on production and nonsupervisory employment within industries would allow the two approaches to be reconciled.

6 Conclusion

This paper reconstructs Marxian categories from U.S. national and input-output accounts, following the framework of Shaikh and Tonak (1994) and applying it at the level of individual IO industries. We classify every industry into production, semi-production, business, financial, and non-production sectors, state the reasoning behind the classification of contested industries, identify the part of the net product that the official accounts record outside production, and construct the Marxian net product, surplus value, profit, the rate of surplus value, the organic composition of capital, and four measures of the rate of profit for 2017–2022.

The results show that the mapping from theoretical categories to data is quantitatively consequential. About 40 percent of the Marxian net product is recorded in business sectors rather than in production, and nearly half of all compensation is paid to unproductive labor. The level of the rate of profit ranges from about 9 to 53 percent depending on the treatment of unproductive labor and capital, although all measures move together over time. The exact decomposition of the Marxian rate of profit shows that its movements in this period are driven by the rate of surplus value, while the organic composition of capital is stable, and that about three-fifths of surplus value is absorbed by unproductive labor. The level of the rate of surplus value depends on the classification of service industries and on the definition of variable capital, but its movements do not.

These findings carry a methodological lesson for empirical work on the tendency of the rate of profit to fall. Conclusions about the level of profitability can depend on accounting choices as much as on economic dynamics, so the correspondence between empirical variables and theoretical concepts deserves as much attention as econometric identification. Making the classification of each industry explicit, as we do here, allows these choices to be examined and their consequences to be measured.

The main limitation of the present analysis is its short sample. We are extending the series backward with historical input-output tables, which will make it possible to study long-run trends in the rate of surplus value, the organic composition of capital, and the rate of profit, and to relate the measured categories to accumulation and crisis. A second extension is to combine our industry

classification with occupational data, in order to separate productive and unproductive labor within industries.

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A Classification of Industries

Table 8: Classification of BEA input-output industries

Production (52 industries)
Farms; Forestry, fishing, and related activities; Oil and gas extraction; Mining, except oil and gas; Support activities for mining; Utilities; Construction. Wood products; Nonmetallic mineral products; Primary metals; Fabricated metal products; Machinery; Computer and electronic products; Electrical equipment, appliances, and components; Motor vehicles, bodies and trailers, and parts; Other transportation equipment; Furniture and related products; Miscellaneous manufacturing. Food and beverage and tobacco products; Textile mills and textile product mills; Apparel and leather and allied products; Paper products; Printing and related support activities; Petroleum and coal products; Chemical products; Plastics and rubber products. Air transportation; Rail transportation; Water transportation; Truck transportation; Transit and ground passenger transportation; Pipeline transportation; Other transportation and support activities; Warehousing and storage. Publishing industries, except internet (includes software); Motion picture and sound recording industries; Broadcasting and telecommunications; Data processing, internet publishing, and other information services; Computer systems design and related services; Miscellaneous professional, scientific, and technical services. Waste management and remediation services; Educational services; Ambulatory health care services; Hospitals; Nursing and residential care facilities; Social assistance; Performing arts, spectator sports, museums, and related activities; Amusements, gambling, and recreation industries; Accommodation; Food services and drinking places; Federal government enterprises; State and local government enterprises.
Semi-production (1 industry)
Other services, except government.
Business (7 industries)
Wholesale trade; Motor vehicle and parts dealers; Food and beverage stores; General merchandise stores; Other retail; Other real estate; Rental and leasing services and lessors of intangible assets.
Financial (4 industries)
Federal Reserve banks, credit intermediation, and related activities; Securities, commodity contracts, and investments; Insurance carriers and related activities; Funds, trusts, and other financial vehicles.
Non-production (9 industries)
Housing; Legal services; Management of companies and enterprises; Administrative and support services; Federal general government (defense); Federal general government (nondefense); State and local general government; Scrap, used and secondhand goods; Noncomparable imports and rest-of-the-world adjustment.