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1. Introduction

In this paper I conceptualize and measure the accumulation of unproductive capital in the postwar United States economy. I focus on the shifting balance between productive and unproductive activity and the distribution of capital between these two categories. I develop a new methodology to compute Marxist categories and provide several empirical estimates of productive and unproductive forms of accumulation from 1947 to 2011. My methodology and results provide new evidence of how exploitation, inequality, and unproductive accumulation interact in an advanced capitalist economy.

I employ the term *unproductive accumulation* to indicate the growth in the flow of income or in the stock of capital of unproductive activities, and the term *productive accumulation* to indicate the growth in the flow of income or in the stock of capital of productive activities. The distinction between productive and unproductive relies directly on the concept of surplus value and, as such, is predicated on the idea that value needs to come from somewhere. In no way does unproductive mean unnecessary, or less important, and it is not a derogatory term. There is also no connection between productive and tangible, since services and intangible commodities can be the output of productive activities.

A *productive activity* is any economic activity that produces surplus value. To produce surplus value an activity must have workers creating useful commodities with value for capital. Other activities comprising all efforts to create new use-values or recirculate existing use-values, but not commodities with surplus value are considered to be *unproductive*. Unproductive activities create new use-values or recirculate existing use-values without adding any new surplus value to the economy. This implies that the incomes of unproductive activities represent flows drawn out of the value generated in productive activities. While productive activities create and also consume surplus value, unproductive activities only consume it.

Despite directly consuming the surplus from productive endeavors, unproductive accumulation can well enhance labor productivity or even boost aggregate demand in productive activities, and therefore indirectly improve the creation of surplus value. Hence, there is a double effect under consideration: Unproductive activity might *indirectly* increase labor productivity and it might also increase demand for productive activity, while it draws on the value that it does not *directly* produce. Even though unproductive activities *indirectly* impact productive accumulation, they do not *directly* add any new surplus value to the economy.

Official income and product accounts and input-output matrices have to be translated to be used in a Marxist analysis since Marx developed his own system of concepts grounded on his unique understanding of the labor theory of value. Official data series, on the contrary, are constructed using concepts drawn from orthodox economics that conceptualize value in a different manner. In particular, official accounts do not distinguish between productive and unproductive activities.

To separate industries between productive and unproductive activities I introduce the *Marxist Industry Classification System*, whose main feature is the treatment of knowledge production and knowledge ownership as unproductive activities. Besides trade, finance, insurance, real estate, non-profit organizations, and government administration, I also classify as unproductive the production of software, data, pharmaceuticals, movies, recorded video and music, and published materials such as books and journals. The *re*-production of knowledge and information requires no labor time and therefore produces neither value nor surplus value, implying that these activities must be classified as unproductive. My estimates reveal that knowledge creation and finance have been the fastest growing unproductive activities both in terms of net income and capital stock.

The pattern of accumulation in the United States economy has changed substantially throughout the postwar period. Prior to 1980 the US experienced rapid productive accumulation, slower growth in unproductive fixed assets, non-increasing rates of exploitation of productive workers, and low levels of

inequality. Throughout the postwar period workers gradually took on unproductive jobs and by the early 1970s the majority of employees were already unproductive. After 1980 the situation changed dramatically and the economy shifted to faster unproductive accumulation, faster growth in the stock of unproductive assets, exhibited an ever-increasing rate of exploitation of productive workers, and widening income inequality. The total income of unproductive activities quadrupled relative to the total value generated in productive activities during the 1947-2011 period.

The post-1980 Neoliberal phase of United States capitalism has been characterized by the rising exploitation of productive workers, the shift of investments toward unproductive activities, and increasing income inequality across classes. Capitalists have been extracting more surplus value from a diminishing portion of the working class at the same time the stock of fixed assets in unproductive activities has tripled relative to the productive capital stock. The result is that for the Neoliberal period the general profit rate has fallen substantially behind the rate of exploitation. I attribute the rapid pace of unproductive accumulation as the possible reason for the post-1980 disconnection between exploitation and profitability.

The paper is structured as follows: I first present my analytical approach and offer a comparison with previous studies. I then introduce a range of empirical estimates and discuss the potential causes and likely outcomes of unproductive accumulation in the United States. The main conclusion is that the observed trends, beyond their implications in terms of capital accumulation rates and class inequality, point to a deeper capitalist dynamic that Marx himself named the 'autonomization of value': the tendency of capital to create forms of wealth that are increasingly autonomized from the production of value and from the exploitation of productive labor.

2. Comparison with Other Approaches

The crucial difference between the approach introduced in this paper compared to other exiting approaches is the treatment of knowledge and information production as unproductive activity. Predicated

on Teixeira and Rotta (2012), my methodology is the only one that provides estimates of Marxist categories considering *knowledge and information as valueless commodities*. I do so by first differentiating production from *re*-production and then following Marx when positing that value is determined by the labor time necessary to *re*-produce a commodity. Commodified knowledge and information are valueless because they require labor to be originally produced but no labor to be further reproduced. The valueless character of knowledge and information as commodities is therefore a direct implication of Marx's value theory.

Because of competition with new technologies and new production conditions, produced values are continuously re-valued in the market. Values are not fixed magnitudes but changing quantities even if their production has already taken place in the past. The fact that Marx did not stress this point early on in *Capital I* is because at that level of analytical abstraction he had not yet introduced reproduction into his analysis, focusing only on the production of commodities. Once he introduced the reproduction of capital halfway through *Capital I*, Marx then shifted from production to reproduction conditions. He then explicitly claimed that in determining the value of any commodity, including *already existing* commodities, it is the *re*-production time that matters, not the original production time. Revaluations based on reproduction time effect the values of all commodities. In the three volumes of *Capital* Marx repeatedly made the same point.

In *Capital I*:

> [H]owever young and full of life the machine may be, its value is no longer determined by the necessary labour-time actually objectified in it, but by the labour-time necessary to reproduce either it or the better machine. It has therefore been devalued to a greater or lesser extent. (Marx, 1990, p.528)

In *Capital II*:

> Just as with any other commodity, so in the case of labour-power, too, its value is determined by the amount of labour needed to reproduce it. […] wages are the value of the commodity labour-

> power, and the latter can be determined (like the value of any other commodity) by the labour needed for its reproduction. (Marx, 1992, p.458-459)

In *Capital III* Marx commented on the "the great difference in costs between the first construction of a new machine and its reproduction" (1994, p.199), and then made it very clear that:

> Once machines, factory buildings or any other kind of fixed capital have reached a certain degree of maturity, so that they remain unchanged for a long while at least in their basic construction, a further devaluation takes place as a result of improvements in the methods of reproduction of this fixed capital. The value of machines, etc. now falls not because they are quickly supplanted or partially devalued by newer, more productive machines, etc., but because they can now be reproduced more cheaply. (Marx, 1994, p.209)

> The value of any commodity - and thus also of the commodities which capital consists of - is determined not by the necessary labour-time that it itself contains, but by the socially necessary labour-time required for its reproduction. This reproduction may differ from the conditions of its original production by taking place under easier or more difficult circumstances. (Marx, 1994, p.237-238)

> [A] large part of the existing capital is always being more or less devalued in the course of the reproduction process, since the value of commodities is determined not by the labor-time originally taken by their production, but rather by the labor-time that their reproduction takes, and this steadily decreases as the social productivity of labor develops. (Marx, 1994, p.522)

Commodified knowledge and information have no value and thus no surplus value; therefore their production constitutes a type of unproductive activity. Even more, the owners of knowledge and information become *knowledge-lords* analogously to how we commonly refer to the owners of land as landlords. Workers laboring for knowledge-lords produce no value and hence no surplus value. If no surplus value creation takes place in the production of knowledge and if certain capitalists become knowledge-lords due to the monopoly rights they possess over produced information, then all the profits knowledge-lords make are pure *knowledge-rents* (Teixeira and Rotta, 2012).

Even though the production of new knowledge does not generate surplus value it does give rise to rents that allow knowledge-lords to appropriate a share of the surplus value produced in productive activities. Intellectual property rights and copyrights in general are meant to guarantee that the owners of information get a fraction of the surplus value produced elsewhere in the economy. Intellectual property rights have a similar economic role compared to land ownership rights, namely that they assure a flow of surplus value to unproductive capitalists in the form of rents. In the case of commodified knowledge, market prices are gross overestimations of its null value.

Albeit under a different value theory, the Political Economy notion that knowledge has *zero reproduction cost* appears in a similar way in mainstream economics as the *zero marginal cost* of knowledge (Arrow, 1962; Stiglitz, 1999; Duffy, 2004; Shavell and van Ypersel, 2001). Kenneth Arrow (1962) in his famous 'learning by doing' growth model paper noted that knowledge is inherently a public good with zero marginal cost, and therefore would not be supplied under perfect competition. Knowledge can only be produced for profit if supplied under imperfect competition and with state-sponsored intellectual property rights. Shavell and van Ypersel (2001, p.545) noted subsequently that the zero marginal cost property applies to industries producing pharmaceuticals, software, movies, recorded music, books, and visual products.

Despite potential indirect contributions to productive accumulation, knowledge creation and ownership produce no new value and should be classified as unproductive. With this key insight on the labor theory of value I can then provide new measures and a new analysis of productive and unproductive forms of accumulation in the United States economy.

The new methodology that I introduce thus provides estimates of unproductive accumulation in a broader way compared to current attempts to measure financialization (as in Lapavitsas, 2013; Lazonick, 2013; Davis, 2016; Arestis, and Singh 2010; Orhangazi, 2008; Krippner, 2005; Epstein, 2005). While the notion of financialization remains circumscribed to financial circuits of capital, the Political Economy

notion of unproductive accumulation includes the idea of financialization and additionally considers that many other unproductive activities also draw on the value that productive workers generate.

The mainstream of the economics profession has nonetheless begun to embrace the idea that some forms of economic activity, named '*rent-seeking activities*', directly usurp productive wealth. The concept of 'rent seeking' identifies cases in which there is appropriation of uncompensated value from others with no contribution to productivity. The 'rent-seeking' and 'directly unproductive profit-seeking (DUP) activities' literature has been expanding (Krueger, 1974; Stiglitz, 2012; Colander, 1984; Bhagwati, 1982) and it clearly refers to the concept of rent in classical Political Economy, particularly in Adam Smith and David Ricardo.

In the heterodox economics tradition the role of rentier activities has a long track record that also dates back to the original insights from classical Political Economy. More recent approaches (Bezemer and Hudson, 2016; Bezemer, Grydaki, and Zhang, 2014; Hudson and Bezemer, 2012; Hudson, 2014, 2015; Epstein, 2005) have broadened the perpspective by including empirical estimates of the adverse impacts of rentier incomes on productive activities. The role of economic rents as a cause of income inequality and stagnation has also gained substantial traction in sociology (Lin and Tomaskovic-Devey, 2013; Tomaskovic-Devey and Lin, 2011).

The methodology that I develop builds on and extends the groundbreaking works of Shaikh and Tonak (1994) and Edward Wolff (1987), and includes more recent insights from the works of Mohun (2016; 2014; 2006; 2005), Paitaridis and Tsoulfidis (2012), and Moseley (1997; 1992; 1985). In this paper I develop a broad range of empirical indicators of productive and unproductive forms of accumulation in terms of gross and net incomes, employment, labor compensation, and fixed assets. Unlike previous studies my estimates feature the production and ownership of knowledge and information as forms of unproductive activity. I also present a breakdown of the inner components of unproductive accumulation and a comparison between estimates that include and exclude government incomes and

assets. In the Appendix I provide a detailed description of data sources as well as a step-by-step explanation of how I computed Marxist categories from available data for the United States between 1947 and 2011.

3. Estimating Marxist Categories

Marxist Political Economy has a unique class theory of the production, appropriation, and distribution of surplus value, and therefore estimates of these categories provide a diagnosis of capitalism that differs substantially from more mainstream economic analyses. From the Marxist point of view, the official measures of gross and net outputs (such as GDP) contain systematic double counting of values and so constitute artificially inflated indicators of outputs and incomes.

Virtually every enterprise operates with a mix of productive and unproductive activities, with few firms actually being classified as purely productive or purely unproductive. For this reason I do not employ the term unproductive *sector* but rather unproductive *activity*. The purpose is to make clear that productive and unproductive endeavors are not separated into sectors but in fact into activities.

The value of any commodity (λ_i) can be decomposed into the indirect and direct labor necessary to reproduce it. Indirect or past labor appears through the use of means of production while direct or current labor appears through the employment of labor power. Indirect labor contributes to the value of a new commodity because the means of production used up are themselves commodities and therefore products of past human labor. The direct labor applied adds more value and, eventually, a surplus value (S_i) over and above that required to reproduce labor power as a commodity. The value of every commodity (λ_i) can thus be decomposed into the value transferred from the means of production used up, called constant capital (C_i), and the new value added by direct labor (VA_i). The constant capital C_i comprises the value transferred from circulating constant capital (the inputs consumed all at once) and the value transferred from fixed constant capital (the inputs that gradually transfer their value over multiple

production turnovers). Constant capital is therefore the sum of the raw materials and inputs immediately consumed plus the depreciation of productive fixed capital.

The direct labor applied (VA_i) can then be further decomposed into the value necessary to reproduce the laborers, called variable capital (V_i), and the extra value that workers produce but do not receive, named surplus value (S_i). The ratio of the realized surplus value to the variable capital spent to produce the surplus is the realized rate of surplus value ($s_i = S_i/V_i$), or the rate of exploitation of productive workers, an index of how much productive workers '*pay to work*'. Hence:

$$\lambda_i = C_i + VA_i = C_i + V_i + S_i = C_i + V_i(1 + s_i) \quad (1)$$

To arrive at the total value (TV) realized in an economy we sum the realized values of all n commodities. The total value is thus the sum of all constant capital used up ($C = \sum_{i=1}^{n} C_i$), all the variable capital used up ($V = \sum_{i=1}^{n} V_i$), and all the surplus value ($S = \sum_{i=1}^{n} S_i$) realized. The constant capital C reflects all the productive inputs used up when producing the value of all commodities, or simply all the past indirect productive labor transferred to current productive output. The sum of variable capital and surplus is the total Marxist value added ($VA = \sum_{i=1}^{n} VA_i$) in the economy and it reflects all the direct productive labor employed. Letting $s = S/V$ denote the economy-wide average rate of surplus value, we now have:

$$TV = \sum_{i=1}^{n} \lambda_i = C + VA = C + V + S = C + V(1 + s) \quad (2)$$

The total value TV measures the realized values of all n commodities in an economy. It is a gross measure of productive output since it includes the value transferred from the inputs. When we net out the value of constant capital C we arrive at the Marxist value added (VA) measure. The direct productive

inputs consumed and the depreciation of productive fixed capital are both included in the measure of C, implying that the Marxist value added is both net of productive inputs used up and net of depreciation. The surplus value S is the residual that we obtain after subtracting from VA the value of the labor power of productive workers (V).

The constant capital C includes only inputs used up in productive activities that were themselves produced by productive labor. Inputs produced in unproductive activities that are then used up in productive activities are not included in the measurement of C, even if they were purchased at a positive price. For example, payments for land (land-rents) are not included in C. The same reasoning applies to the value of labor power, since the measure of variable capital V includes only the compensation of productive workers in productive activities. Unproductive workers in productive activities (such as supervisory employees) and all the workers in unproductive activities do not enter into the computation of V. Surplus value S is the new value that is then consumed to maintain all those activities that were excluded from the estimate of value added.

The economy-wide general profit rate (r) is simply the total surplus value realized relative to the total capital stock (K) employed in the economy: $r = \frac{S}{K}$. The organic composition of capital (OCC) can be computed as the stock of productive capital relative to variable capital. The stock of productive capital is the stock of fixed assets in productive activities (K_{PA}), hence: $OCC = \frac{K_{PA}}{V}$. The total stock of fixed assets in the economy comprises the fixed capital stock in productive (PA) and unproductive activities (UA) hence: $K = K_{PA} + K_{UA}$. Using $s = S/V$ as the economy-wide average rate of surplus value and $OCC = \frac{K_{PA}}{V}$ as the organic composition of capital it then becomes possible to rewrite the equation for the general profit rate as:

$$r = \frac{S}{K} = \frac{S}{K_{PA} + K_{UA}} = \frac{\frac{S}{V}}{\frac{K_{PA}}{V} + \frac{K_{UA}}{V}} = \frac{s}{OCC + UCC} \quad (3)$$

The new category that I introduce is the *unproductive composition of capital*: $UCC = \frac{K_{UA}}{V}$. The UCC captures the relationship between the accumulation of unproductive capital stock and the variable capital representing the workers generating surplus value in productive activities. It thus becomes evident that the general profit rate can rise if the rate of surplus value is rising, and it can fall if either the OCC or the UCC is rising, all else held constant. The profit rate falls if the rise in the rate of exploitation is not rapid enough to compensate for the effect of a rising unproductive composition of capital.

I also compute an alternative net profit rate (r') of productive activities by deducting the share of the surplus that covers the total compensation of unproductive employees (W_{UA}). W_{UA} includes the compensation of all supervisory and non-supervisory employees in unproductive activities plus the supervisory employees in productive activities. By subtracting W_{UA} from the surplus value, and computing it relative to the productive capital stock only, we arrive at a net measure of average profitability in productive activities:

$$r' = \frac{\Pi}{K_{PA}} = \frac{S - W_{UA}}{K_{PA}} = \frac{\frac{S}{V} - \frac{W_{UA}}{V}}{\frac{K_{PA}}{V}} = \frac{s - \frac{W_{UA}}{V}}{OCC} \quad (4)$$

Analogous to the total value TV and value added VA of productive activities it is possible to compute corresponding measures for unproductive activities. The corresponding measure to TV is the *gross income of unproductive activities* (GI_{UA}), and the corresponding measure to VA is the *net income of unproductive activities* (NI_{UA}). The difference between GI_{UA} and NI_{UA} is that the net measure excludes

the intermediate inputs and the depreciation of unproductive fixed capital that are included in the gross measure of unproductive income.

Two other categories that I introduce capture the relative magnitude of unproductive to productive flows of income. The first is the *net unproductive burden* (NUB), estimated as the ratio of the net income of unproductive activities to the surplus value generated in productive activities: $NUB = \frac{NI_{UA}}{S}$. The second is the *gross unproductive burden* (GUB), estimated as the ratio of the gross income of unproductive activities to the total value generated in productive activities: $GUB = \frac{GI_{UA}}{TV}$. The UCC, NUB, GUB, and the $\frac{W_{UA}}{V}$ ratio are thus four different ways of measuring the size and pace of unproductive accumulation relative to that of its productive counterpart.

The United States economy is a concrete heterogeneous *social formation* comprising different *modes of production* that co-exist side by side. Prior to measuring wages, incomes, and stocks of fixed assets it is necessary to identify what belongs to the productive side of the capitalist mode of production, what belongs to its unproductive side, and what belongs to other non-capitalist modes of production. On the unproductive side, besides including the production of knowledge and information I have also included government incomes and government fixed assets. Even though not necessarily producing commodities for profit, the state does integrate a productive capitalist system that continuously depends upon it for generating effective demand and even for entrepreneurial endeavors (Mazzucato, 2013). For comparison I present estimates of key variables in two versions: with and without government wages, incomes, and fixed assets. Despite its great importance in Marxist measures of unproductive accumulation, state participation changes the levels of the estimates but not their log-run trends.

In my treatment of the government as a capitalist unproductive entity I therefore follow Shaikh and Tonak (1994, p.71-72, p.137, p.212-213, p.223, p.344). Mohun (2014; 2006; 2005) and Paitaridis and Tsoulfidis (2012) on the contrary do not include state incomes, wages, or assets in their computations. As is standard in the literature, I classify household labor not hired for capital as a non-capitalist activity, I

include the self-employed as part of the working class, and I focus on GDP instead of GNP. Further theoretical discussions on modes of production and how they impact the estimates are included in the Appendix.

The first step to transform official national accounts data into Marxist categories is to classify and separate the different industries into new groups that actually reflect Marxist theory. The industry classification scheme associated with Marxist theory is what I would like to call the *Marxist Industry Classification System* (MICS). In contrast to the official North-American Industry Classification System (NAICS) and the Standard Industry Classification (SIC), the MICS posits that the value created in productive activities cannot be recounted in unproductive activities. The MICS has only three industry groupings, meant to adjust the official SIC and NAICS so as to allow for the proper estimation of Marxist categories:

(i) *Productive activities* (PA): Includes all commodity-producing activities generating surplus value. Agriculture, mining, manufacturing, transportation, construction, maintenance, and productive government enterprises are counted here. Only productive services are counted.

(ii) *Trade, rental, and leasing* (TRL): Includes retail trade, wholesale trade, rental of equipment, and leasing of commodities. Retail and wholesale industries contain trade margins only, and the rental of equipment and leasing of commodities imply that values are being realized via piecemeal sales. However, the rentals of use-values that contain no value (such as land and information) are not counted here.

(iii) *Unproductive activities* (UA): Accounts for all activities that either create new or re-circulate existing use-values without generating any new surplus value. Included here are real estate (land-rents), finance, insurance, legal services, non-profit entities, government administration, and the knowledge-rents in advertising, pharmaceuticals, software production, data management, research and development, publishing, music recording, and movie production.

It is necessary to separate trade from unproductive activities because the input-output system that the BEA has developed is cast in producer's prices, with trade margins recorded in the retail and wholesale industries. If the official accounts were cast in final selling prices (purchaser's price) then trade would be directly incorporated into the unproductive activities groups, but since trade margins are recoded in their own rows and columns it becomes necessary to first distinguish them from both productive and unproductive activities. To estimate the measure of total value TV we then have to combine the incomes recorded under the productive activities (PA) grouping with the trade and rental margins recorded under the trade, rental, and leasing (TRL) grouping.

4. Historical Trends in the US Economy

In this section I present a range of empirical indicators for productive and unproductive forms of accumulation in the postwar United States economy. The estimates capture the different dimensions of unproductive accumulation in terms of incomes, fixed assets, and employment. These measures also show how unproductive activity relates to exploitation, inequality, profitability, and productive stagnation. In the conclusion I then discuss the causes and implications of the observed trends.

4.1 Exploitation, Inequality, and Unproductive Activity

I begin my evaluation of the United State economy by plotting in Figure 1 key Marxist measures together with their official counterparts from the Bureau of Economic Analysis (BEA). All series are nominal in millions of dollars. I compare the BEA measure of gross output with Marxist total value, indicating that the gap between the two series is due to the double counting of values in unproductive activities. I additionally compare the BEA measure of GDP with my estimate of the Marxist value added, also indicating that the gap between the two series is due to the double counting of value added in unproductive activities. I additionally plot my estimate of surplus value. The comparisons make clear how from a Marxist perspective the BEA artificially inflates its official annual measures of income and output

by counting produced values more than once. Netting out unproductive activities from the measures of value creation makes a significant difference.

[Figure 1 about here]

In Figure 2 I plot my estimate for the rate of surplus value in the United States from 1947 to 2011 together with the profit-wage ratio. The rate of surplus value, which is the rate of exploitation of productive workers in productive activities, was roughly stable during the 'Golden Age' from 1947 to 1966, implying that productive workers were exploited roughly at the same rate every year. Possibly due to labor militancy and low levels of unemployment, capitalists could not extract surplus value from workers at an increasing rate. From 1966 to 1980, the 'crisis of Keynesianism' period, the rate of surplus value dropped sharply. Possibly due to international competition with European and Japanese capitalists in global markets and to labor militancy at home, the surplus of the capitalist class was indeed squeezed. The Neoliberal period beginning in the early 1980s then produced a sharp recovery of the rate of exploitation. By the end of the 1980s it had significantly surpassed its previous peak in 1966. Possibly due to the erosion of workers' bargaining power and increased competition in labor markets, the rate of surplus value continued to rise to unprecedented levels in the entire postwar period. Raising from a low point of 125% in 1974 it reached 200% in 2011. This implies that in 2011 productive workers labored 1/3 of the time for themselves and 2/3 of the time for the capitalists.

The rate of surplus value functions as an index of class struggle and indicates who has the margin of victory across different historical phases. The trends in the rate of exploitation of productive workers correspond to three different phases of postwar US capitalism. First, the Golden Age aligns with the years featuring a constant rate of exploitation (1947-1966). Second, the crisis of Keynesianism occurs when a falling rate of exploitation puts a squeeze on capitalists (1967-1979), suggesting that it was initially a crisis for capitalists which was transformed afterwards into a crisis for workers. The Neoliberal era then matches with a sustained increase in exploitation to record levels (1980-2011), suggesting that

Neoliberalism is a class project of squeezing the compensation of productive workers to the benefit of the capitalist class (as in Harvey, 2005; and Kotz, 2015).

The comparison with the profit-wage ratio available from the official BEA income accounts show that it is not a good proxy for the rate of exploitation. The profit-wage ratio misrepresents both the level and trend of the rate of surplus value because it ignores the productive-unproductive distinction present in Marxist theory.

[Figure 2 about here]

In Figure 3 I plot my estimate of the rate of exploitation together with that from Shaikh and Tonak (1994). Not only is the level of the rate of surplus value different but also its trend. In contrast to my approach, Shaikh and Tonak classify all activities related to knowledge and information production as productive of surplus value, and they deduct supervisory workers from self-employed persons in productive activities. Other technical differences in estimation methods are explained in detail in the Appendix.

[Figure 3 about here]

For Marx, a crucial cause of inequality is exploitation, or simply 'how much workers *pay* to work'. To show how this relationship manifests in the postwar Unites States, I plot in Figure 4 my estimate of the rate of exploitation together with the top 0.1% income share (excluding capital gains) from Piketty (2014) and Alvaredo, Atkinson, Piketty, and Saez (2014). The similarity of trends is remarkable. The correspondence is all the more striking given that I estimate Marxist categories from input-output matrices while Piketty (2014) computes personal income inequality from IRS tax-unit data. The very high correlation between exploitation and inequality also holds if I use instead either the top 1% income share or the inverted Pareto-Lorenz inequality measure.

[Figure 4 about here]

In Table 1 I provide further evidence of how my methodology can improve our understanding of the relationship among exploitation, inequality, and unproductive activity. I compute the correlation coefficients between my estimates of the rate of exploitation, Shaikh and Tonak's (1994) exploitation estimates, the official profit-wage ratio from the BEA, and Piketty's (2014) measures of income inequality for the US economy. The correlation coefficient between my estimate of exploitation and Piketty's top 1% income share is 0.95; 0.96 for the top 0.1% income share; and 0.94 for the inverted Pareto-Lorenz inequality coefficient. Correlation surely does not imply causality, but all measures are very close to unity. If we use instead Shaikh and Tonak's (1994) estimates we arrive at only 0.05, 0.26, and 0.45, respectively. If I truncate my estimates to stop in 1989, when Shaikh and Tonak's dataset ends, I still arrive at correlation coefficients between exploitation and inequality that are substantially higher. If we use the profit-wage ratio computed from the official BEA data, the correlations with Piketty's measures of inequality are also significantly lower than my estimates.

[Table 1 about here]

Since inequality is a different measure from exploitation in various ways, one would not expect the movements of the rate of exploitation to entirely explain movements of inequality. The rate of exploitation is computed from the functional distribution of income between productive workers and the surplus income that productive capitalists appropriate. Inequality is instead computed from the personal distribution of income across tax-units, whether or not they are attached to productive activities. Despite the differences between the two measures, it is striking that the rate of exploitation is so closely correlated with the income share of the super-rich. This high correlation suggests that the rate of exploitation may be a major determinant of the degree of inequality.

4.2 The Magnitude of Unproductive Accumulation

Marxist theory posits that unproductive activity survive by consuming the value that productive activities generate. To better understand the magnitude of unproductive accumulation I plot in Figure 5

three different measures of unproductive accumulation, as annual flows net of depreciation, relative to their productive analogues. The net income of unproductive activities relative to the surplus value generated in productive activities (the net unproductive burden, NUB) rises from a low point at 24.4% in 1948 to a peak at 78% in 2009, a rise of 220% in the period. The gross income of unproductive activities relative to the total value generated in productive activities (gross unproductive burden, GUB) rises from a low point at 13.4% in 1948 to a peak at 53.6% in 2009, hence quadrupling over the same period. The net income of unproductive activities relative to the value added in productive activities rises from 14.1% in 1948 to 50.8% in 2009, a total rise of 260%. In terms of aggregate flows of income these estimates offer strong evidence of the rapid pace of unproductive accumulation in the postwar US economy.

[Figure 5 about here]

In Figure 6 I further decompose the net income of unproductive activities (NI_{UA}) into the shares of five unproductive sub-categories: (i) government administration with the exception of productive government enterprises, consisting mostly of the government wage bill at all levels; (ii) finance and insurance; (iii) non-profit organizations and unproductive services, such as legal services and corporate management; (iv) real estate, comprising land-rents accruing to agents, managers, operators, and lessors (imputed owner-occupied rents are excluded); (v) knowledge and information rents, comprising all net incomes from activities involving advertising, pharmaceuticals, software production, data management, research and development, publishing industries, sound recording, and movie production.

[Figure 6 about here]

There is substantial growth in the shares of finance and insurance from 14% to 23.2%, and also in knowledge and information rents from 7.9% to 17.4%. Finance and knowledge-rents combined have risen from 21.9% to 40.5% of the net income of all unproductive activity, hence nearly doubling in the postwar period. The share of government administration has shrunk from 37.7% to 29.9%, while the real estate sector has also shrunk from 23.8% in 1963 (when we began to have better real estate input-output data) to

16.8% in 2011. The share of non-profit, legal and corporate management services remained somewhat stable at around 11% since 1963 (when we also began to have better input-output data for these services).

Unproductive accumulation has its effect not only on value distribution but also on employment. Since the early 1970s the employment of unproductive employees has surpassed its productive counterpart. In Figure 7 I plot the number of productive and unproductive employees as shares of total employment. Productive workers are nonsupervisory workers in productive activities, and unproductive employees comprise supervisory employees in productive activities plus all employees in unproductive activities. The share of unproductive employment rises from 43% in 1947 to 56% in 2011, while the complementary share of productive workers drops from 57% in 1947 to 44% in 2011.

[Figure 7 about here]

In Figure 8 I plot the ratio of unproductive to productive employees together with the ratio of unproductive to productive compensation ($\frac{W_{UA}}{V}$). Up to 1986 the two series evolve closely with similar trends but move apart thereafter as unproductive labor compensation begins to increase faster than the increase in unproductive employment. Albeit using a different methodology, Mohun (2014; 2006) offers a decomposition of these two trends to reveal that the main culprit for the widening gap between compensation and employment after 1986 is the fast rise in wage inequality between supervisory and non-supervisory employees in both productive and unproductive activities.

[Figure 8 about here]

To investigate inequality in labor compensation further, I plot in Figure 9 five types of labor income as shares of the Marxist value added (VA). First, the value of labor power (the labor income of non-supervisory workers in productive activities), which begins a steady decline after 1980 from 44% to 33% of value added. Second, compensation of government employees at all levels (local, state, and federal), doubling from 8% in 1947 to 16% in 1975 and then leveling off at around 15% of value added.

Mohun (2016) estimates the *labor incomes* of three classes (workers, non-capitalist managers, and capitalists) from IRS tax-unit data. Using his dataset I compute the ratios of the *labor* income of non-capitalist managers and the *labor* income of capitalists to the Marxist value added. The labor incomes of managers double from 15% of value added to 30% in 1986 and hover around 27% until 2011. The labor incomes of capitalists fluctuate at around 4% up to 1986 and then nearly triple to 11% in 2007. The *labor incomes* of managers and capitalists jointly represented 20% of value added in 1947 but twice that in 2001.

[Figure 9 about here]

The estimates in Figures 8 and 9 suggest that besides a shift in employment from productive to unproductive labor, there has been an even greater shift of labor income from non-supervisory to supervisory employees (the latter including top managers and CEOs). As Mohun (2016) indicates, the top income earners have seen an increasing proportion of their total income derived from labor income as opposed to non-labor income.

The US economy has thus had three concurrent dynamics since 1980: (a) structural change from productive toward unproductive activities; (b) shift of value added from productive workers' labor income to surplus value; and (c) shift of labor income from non-supervisory to supervisory employees in productive and unproductive activities. In the last section of this paper I offer an alternative explanation of why these three processes cannot be simply reduced to changes in class incomes as Mohun (2014, p.370 – emphasis added) suggests when claiming that "a class approach, focusing on the working class and class struggle, is *sufficient* to understand the historical evolution of the U.S. economy".

The evidence so far presented indicates that while productive workers produce ever more surplus value, unproductive activities and well-paid unproductive employees consume increasingly more of the surplus. After 1980 the capitalist and top-managerial classes in the United States benefitted from increasing levels of labor exploitation and income inequality at the same time that the American economy

was changing its structure toward unproductive activity. The effects of rising exploitation of productive labor combined with faster unproductive accumulation on profitability are analyzed in the next section.

4.3 Profitability and Unproductive Accumulation

In Figure 10 I plot my estimates of the general profit rate à la Marx (from equation 3) and the net profit rate of productive activities (from equation 4). The general profit rate is an index of how the surplus value generated in productive activities compensates the investment in fixed assets in all productive and unproductive activities combined. It displays four distinct phases during the postwar period. First, during the Golden Age between 1947 and 1966 it is roughly stable at around 26.3%. Second, during the crisis of Keynesianism from 1966 to 1980 it plummets from 27.8% to 19.7%. Third, during the Neoliberal period it recovers from its depressed level at 19.7% in 1980 to a historical high at 28.6% in 1997, indicating that Neoliberal policies did restore profitability. Fourth, from its peak at 28.6% in 1997 the profit rate falls significantly to 23% in 2009. The general profit rate was thus falling consistently during the ten years before the major crisis that began in late 2007.

The net profit rate shows how the share of the surplus that remains in productive activities remunerates the productive capital stock. It drops significantly from 22% in 1948 to 5.4% in 1974, hitting a low point at 5% in 1982, then recovering to 10.3% by the end of the 1980s and hitting a peak at 11.1% in 1997. After the 1990s the net profit rate for productive activities hits its lowest point at 4.8% in 2001 and keeps hovering around 7% until 2011, at about a third of its value compared to 1948.

Mohun (2016; 2014; 2006) argues that from a class perspective the labor incomes of capitalists should be shifted from W_{UA} to Π in the computation of the net rate of profit. For comparison, in Figure 10 I include a *class* net rate of profit à la Mohun (2016) by counting the labor incomes of capitalists as part of net profits. Further details on this class perspective of the profit rate are included in Section A.5 of the Appendix. In the Appendix I also present different versions of the general and net profit rates by deducting government wages from W_{UA} and government assets from K_{UA}. Netting out the government

does substantially impact the levels of the profit rates, because of the significant size of state wages and assets. However, their long-run trends remain similar. Government wages and assets are therefore not the culprits for the observed trends in profitability.

[Figure 10 about here]

To portray the changing correlation between exploitation and profitability, in Figure 11 I plot the rate of surplus value together with the general profit rate. To facilitate the comparison I adjust the left and right axes so as to make the two series overlap. The joint plot reveals a remarkable pattern. The rate of surplus value and the general profit rate tracked each other very closely until 1980. From 1947 to 1980 the trend of the general profit rate displayed the same behavior as the rate of exploitation of productive workers in productive activities. Beginning in the early 1980s, however, the rate of surplus value starts to rise significantly while the profit rate falls behind. The gap between the two series widens considerably every year between 1980 and 2011, indicating how profitability recovers but much less than the rising rate of exploitation of productive workers. In the analysis that follows I show that this disconnection between profitability and exploitation after 1980 can be attributed to the rapid rise in unproductive labor compensation and to the rapid rise in the unproductive capital stock.

[Figure 11 about here]

In Figure 12 I plot the organic composition of capital $\left(OCC = \frac{K_{PA}}{V}\right)$ together with the unproductive composition of capital $\left(UCC = \frac{K_{UA}}{V}\right)$. Both series rise over time even though with distinct behaviors. The OCC rises substantially from 1947 to a peak in 1982, but falls continuously until 2000. It then sharply recovers to record-high levels after 2000. The UCC rises continuously from 1953 to 1975 but stagnates from 1975 until the mid-1990s. Only by 1997 does the UCC reach its previous 1975 peak level. From 2000 onwards the UCC rises systematically to an unprecedented extent. The joint plot in Figure 12

reveals that despite the historical rise in the OCC, the UCC has actually been rising faster and closing the gap between the two series since the 1980s.

[Figure 12 about here]

The unproductive capital stock has begun to climb faster than the productive capital stock exactly after 1980. I plot in Figure 13 the ratio of the UCC to the OCC, which is in turn equal to the ratio of the stock of fixed capital in all nonresidential unproductive activities relative to productive activities: $\frac{UCC}{OCC} = \frac{K_{UA}}{K_{PA}}$. During the 1950s the $\frac{K_{UA}}{K_{PA}}$ ratio fluctuates around 70%, and then around 77% from 1963 to 1974. It then drops consistently until its lowest historical level in 1981. Beginning in 1981 the $\frac{K_{UA}}{K_{PA}}$ ratio climbs faster and higher than in any other period. From 1981 to 2009 the ratio of unproductive to productive capital stock rises 37.5%, a record increase for the postwar era.

Because of the substantial share of government fixed assets in K_{UA}, for comparison I plot the same $\frac{K_{UA}}{K_{PA}}$ ratio in Figure 13 but exclude state fixed assets at all levels (local, state, and federal, keeping productive government enterprises in K_{PA}). In this case the $\frac{K_{UA}}{K_{PA}}$ ratio more than triples its value from a low point at 11% in 1954 to a peak at 35% in 2006. Even after netting out government assets the unproductive capital stock doubles its size relative to the productive capital stock from 1980 to 2006.

[Figure 13 about here]

In order to check for the evolution of the determinants of profitability, in Figure 14 I plot jointly the rate of exploitation of productive workers, the OCC, the UCC, and the $\frac{W_{UA}}{V}$ ratio as index numbers (1980=100). The UCC and the $\frac{W_{UA}}{V}$ ratio appear both in two versions: with and without government wages and assets. The same series from Figure 14 also appear in Table 2 but in terms of cumulative growth rates for three distinct time periods.

From 1947 to 1980 the compression in the general profit rate came from a non-increasing rate of exploitation combined with increasing levels of the UCC, OCC, and unproductive wages. Despite the steep rise in the rate of exploitation beginning in 1980, the UCC then increases substantially above the OCC, jointly with a rapid increase in unproductive labor compensation. When government wages and assets are netted out, the relative rises in the UCC and in the $\frac{W_{UA}}{V}$ ratio are even greater. From 1980 onwards the OCC is the series featuring the least relative increase.

[Figure 14 about here]

[Table 2 about here]

It is also possible to decompose the current-cost net stock of fixed assets of unproductive activities (inclusive of trade, rental, and leasing but excluding real estate) into five unproductive sub-categories: (i) trade, rental, and leasing; (ii) knowledge and information; (iii) finance and insurance; (iv) unproductive services; and (v) general government, excluding public enterprises. In Figure 15 I present the evolution of the shares of these five sub-categories from 1947 to 2011 in percentage terms. The major share still belongs to the general government even though it has shrunk from 86.2% in 1947 to 64% in 2011. The unproductive activities with the fastest growth rates in shares have been, in descending order: knowledge and information (from 0.8% to 5.0%); finance and insurance (from 1.7% to 10.3%); trade, rental, and leasing (from 8.3% to 15.3%), and finally unproductive services (from 2.9% to 5.4%). Finance- and knowledge-related activities have grown their combined capital stocks six fold (or 502%) from 1947 to 2011 as a share of the total unproductive capital stock.

[Figure 15 about here]

[Table 3 about here]

Finally, in Table 3 I summarize the real growth rates of key measures of productive and unproductive forms of accumulation. The estimates are broken down into annual averages for the whole

1948-2011 postwar period, the Regulated period from 1948 to 1979, and the Neoliberal period from 1980 to 2011. The real growth rates of unproductive forms of accumulation tended to be higher than their productive counterparts for the whole postwar period, and the measures of productive accumulation faced substantial declines in the Neoliberal era compared to the earlier Regulated phase.

5. Implications and Final Remarks

In this paper I developed an innovative Marxist analysis of capital accumulation and presented a broad range of empirical evidence that indicates a close association between faster unproductive accumulation, greater exploitation of productive workers, rising overall inequality, and slower productive accumulation in the United States from 1947 to 2011. I argued unproductive accumulation is an explanation for the decoupling between exploitation and profitability since 1980.

The rapid increase in unproductive activity in terms of incomes, fixed assets, and employment constitutes a structural change within the United States economy, more pronouncedly so in the Neoliberal period. Whether or not over the long run faster unproductive accumulation has detrimental effects on productive accumulation remains an open empirical question. It is possible that the net effect is actually positive rather than negative. And it is yet not clear in which direction causality works between productive and unproductive forms of accumulation. It could be the case that unproductive activity is slowing down productive accumulation or, on the contrary, that it is productive stagnation creating faster unproductive accumulation. In this empirical matter more conclusive evidence is required (Rotta, 2015; Olsen, 2015).

Because new surplus value must be produced to sustain higher levels of unproductive activity, one might conclude from the evidence presented in this paper that the United States will reach an inner limit to the systematic rise of unproductive accumulation. Marx himself used this form of reasoning when he claimed that an *economic crisis* would be required to realign unproductive and productive forms of capital accumulation:

> Despite the *autonomy* it has acquired, the movement of commercial capital is never anything more than the movement of industrial capital within the circulation sphere. But by virtue of this autonomy, its movement is within certain limits independent of the reproduction process and its barriers, and hence it also drives this process beyond its own barriers. This *inner dependence* in combination with *external autonomy* drives commercial capital to a point where the *inner connection is forcibly re-established* by way of a *crisis*. (Marx, 1994, p.419 – emphasis added)

An advanced open economy has the possibility of financing productive accumulation at home by 'importing surplus value' generated from abroad, even if burdened with domestic unproductive accumulation. In the recent episode of US deindustrialization, American companies have relocated to other countries and have been exporting back their own products from overseas. Even though production is offshored, the surplus value can be repatriated (Tregenna, 2014). As long as it keeps access to surplus value from commodities produced elsewhere on the planet, the US can manage to sustain productive accumulation despite its higher levels of domestic unproductive activity.

The empirical evidence in this paper suggests that among its unproductive endeavors the United States is likely to experience a continued increase in the share of knowledge-rents and finance. The growing importance of intellectual property rights in a knowledge economy is likely to boost the economic significance of knowledge-rents. The continued commodification of knowledge and information will then strengthen the rentier aspect of capitalism. The literature on financialization (Krippner, 2005; Epstein, 2005; Lapavitsas, 2013; Davis, 2016; Orhangazi, 2008; Lin and Tomaskovic-Devey, 2013; Tomaskovic-Devey and Lin, 2011) additionally suggests that the influence of finance on production is most likely to remain on the rise.

On the causes of unproductive accumulation I would stress two explanations. The first explanation for these trends is cast at a more concrete level of analysis (as in Harvey, 2005; Kotz, 2015; Duménil and Lévy, 2011; Stiglitz, 2012; Lazonick, 2013; Mohun, 2016, 2014). These authors identify historical processes such as changes in the tax code, the election of Reagan in 1980, the attack on unions and on the welfare system, the successive repeals of financial regulations from the Bretton Woods system,

the rise of shareholder value and corporate governance, deindustrialization and offshoring of manufacturing jobs, and the transition to a service economy. The literature is vast on these issues and all of these elements have played a concrete role in the structural change of the US economy since 1980.

An alternative explanation, however, could offer a complementary argument for the causes of unproductive accumulation. As Rotta and Teixeira (2016) and Paulani (2014) have indicated, Marx had a deeper understanding of the long-run dynamics of capitalism, an understanding that was already built into his own theory of value. For Marx, capitalism is a system that produces abstract forms of wealth: the more that capitalism develops concretely, the more abstract forms of wealth it creates. In this regard Marx structured the three volumes of *Capital* in a very particular way. Even though *Capital* moves analytically from a higher level of abstraction to a higher level of concreteness, the forms of wealth that its analysis covers perform the opposite movement. The *forms of wealth* move from more concrete toward more abstract forms that are increasingly *autonomized* from the production of value and the exploitation of productive labor. As Rotta and Teixeira (2016) and Paulani (2014) have argued, Marx himself had named this movement from concrete to abstract forms of wealth as the 'autonomization of value'. If Marx's long-run theory of capital is correct then what capitalism produced in the postwar 'Golden Age' was indeed a historical exception. In case the autonomization of value unfolds as Marx theorized, capital should create even more unproductive accumulation (potentially on a global scale) and consequentially even more autonomized forms of wealth.

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Tables and Figures for the Main Text

Table 1: Exploitation and Inequality in the United States – Correlations (1947-2011)

	Correlation
Rate of Surplus Value and Top 1% income share - 1947 to 2011	0.95
Rate of Surplus Value and Top 0.1% income share - 1947 to 2011	0.96
Rate of Surplus Value and Inverted Pareto-Lorenz coefficient - 1947 to 2011	0.94
Rate of Surplus Value (Shaik and Tonak 1994) and Top 1% income share - 1948 to 1989	0.05
Rate of Surplus Value (Shaik and Tonak 1994) and Top 0.1% income share - 1948 to 1989	0.26
Rate of Surplus Value (Shaik and Tonak 1994) and Inverted Pareto-Lorenz coef. - 1948 to 1989	0.45
Rate of Surplus Value and Top 1% income share - 1948 to 1989	0.63
Rate of Surplus Value and Top 0.1% income share - 1948 to 1989	0.71
Rate of Surplus Value and Inverted Pareto-Lorenz coefficient - 1948 to 1989	0.70
Profit-Wage Ratio (from BEA) and Top 1% income share - 1947 to 2011	0.41
Profit-Wage Ratio (from BEA) and Top 0.1% income share - 1947 to 2011	0.34
Profit-Wage Ratio (from BEA) and Inverted Pareto-Lorenz coefficient - 1947 to 2011	0.29

Sources: Author's calculations; Shaikh and Tonak (1994); Piketty (2014); Alvaredo, Atkinson, Piketty, and Saez (2014); and BEA.

Table 2: Determinants of Profitability – Cumulative Growth Rates (1947-2011)

	Whole period (1947-2011)	**Regulated period** (1947-1980)	**Neoliberal period** (1980-2011)
Rate of Exploitation	53.6%	-1.7%	56.2%
OCC	61.0%	42.5%	12.9%
UCC	58.9%	5.3%	51.0%
UCC (without Gov assets)	316.0%	96.4%	111.8%
Wua / V	113.1%	38.3%	54.1%
Wua / V (without Gov wages)	106.7%	27.1%	62.5%

Sources: Author's calculations. Growth rates are cumulative for the time periods indicated.

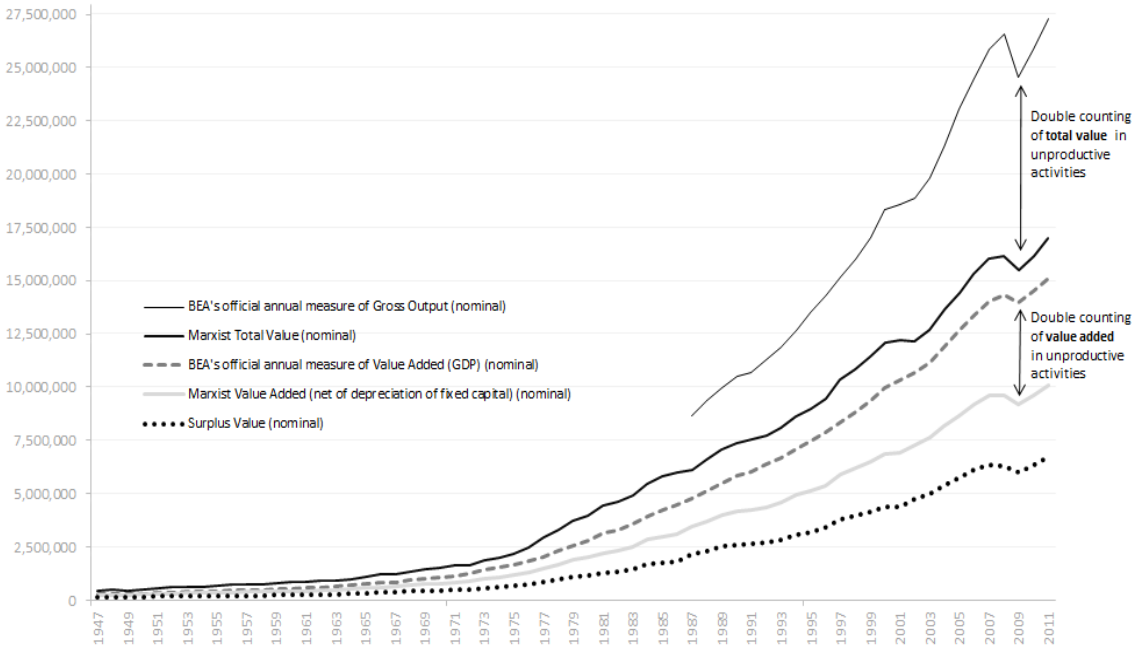
Table 3: Average Annual Real Growth Rates (1948-2011)

	Whole period (1948-2011)	**Regulated period** (1948-1979)	**Neoliberal period** (1980-2011)
Productive Activity (PA)			
Total Value of PA	2.66%	3.46%	1.86%
Marxist Value Added of PA	2.89%	3.42%	2.37%
Surplus Value of PA	3.19%	3.50%	2.89%
Capital Stock of PA	3.30%	4.44%	2.16%
Unproductive Activity (UA)			
Gross Income of UA	4.73%	4.61%	4.84%
Net Income of UA	4.90%	5.62%	4.19%
Capital Stock of UA (nonresidential, with Gov)	3.29%	3.47%	3.12%
Capital Stock of UA (nonresidential, without Gov)	4.87%	5.45%	4.29%

Sources: Author's calculations. Real growth rates are all in 2005 dollars.

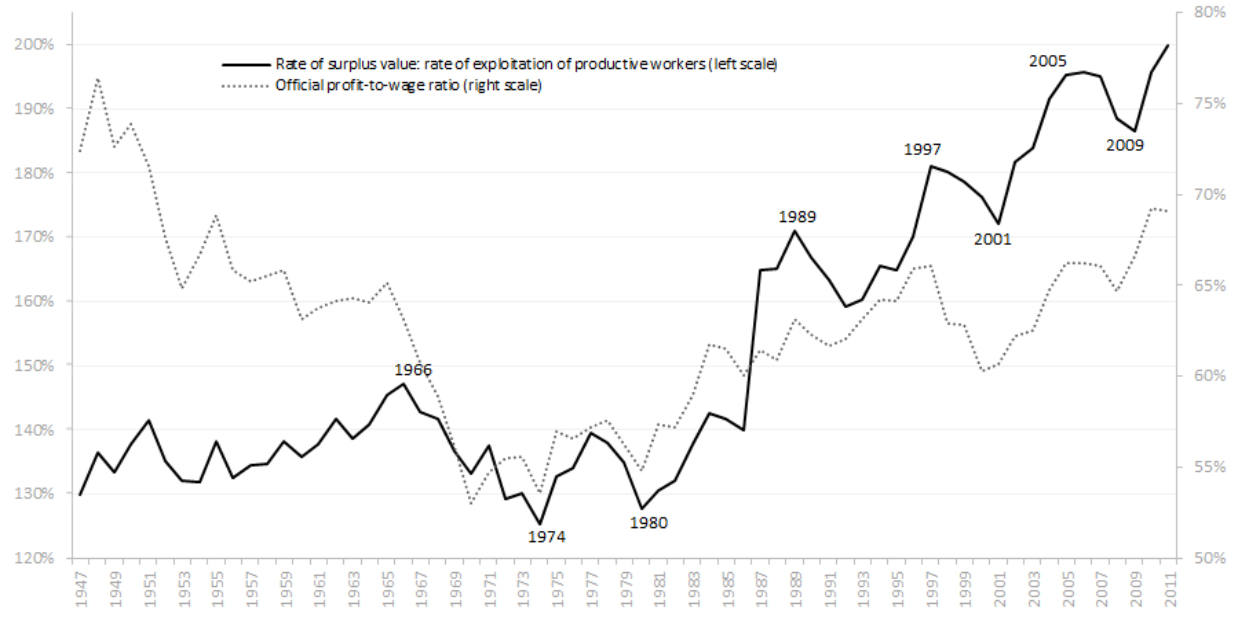
Notes: Real growth rates were obtained by deflating nominal flow measures by the implicit GDP deflator, and nominal stock measures by the producer price index (PPI). Marxist VA, surplus value, gross and net incomes of unproductive activities are all net of depreciation of fixed assets.

Figure 1: Marxist Categories and Official Measures of Output (1947-2011) – Millions of Dollars



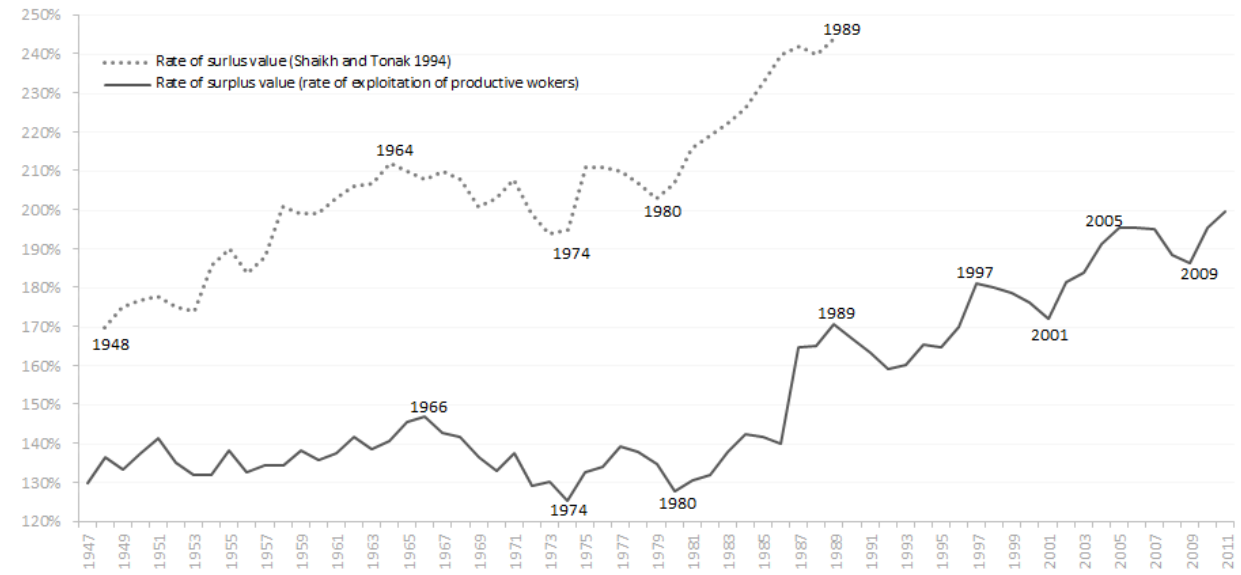
Sources: Author's calculations and BEA. All figures are nominal in millions of US dollars.

Figure 2: Rate of Surplus Value and Profit-Wage Ratio (1947-2011)



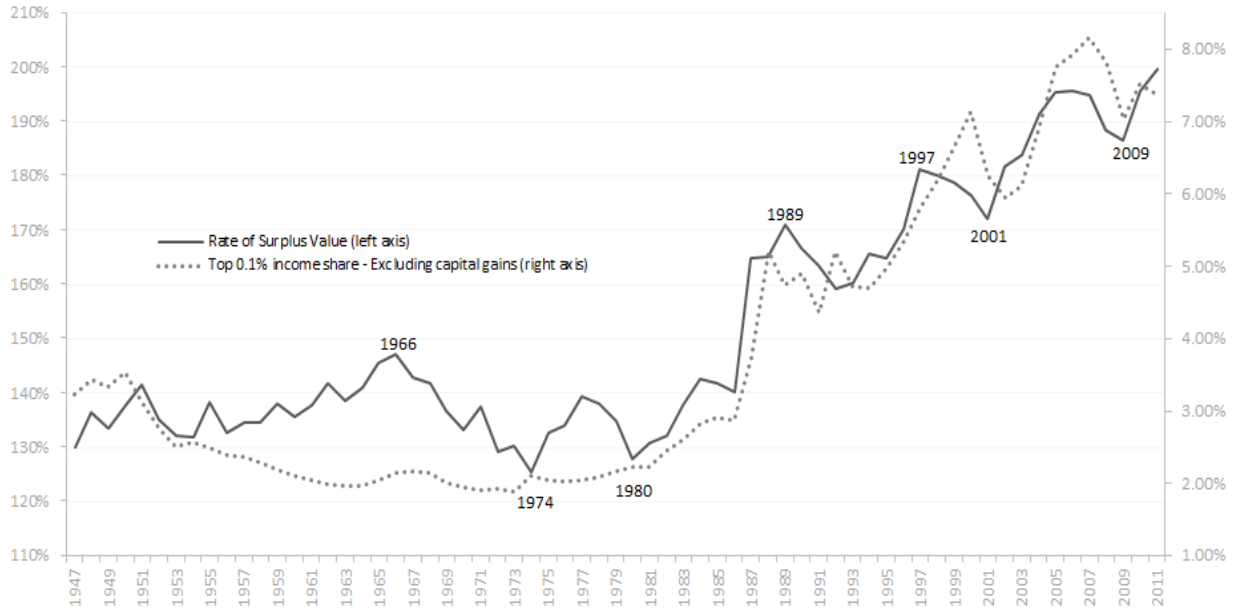
Sources: Author's calculations and BEA.

Figure 3: Comparison between Rates of Surplus Value (1947-2011)



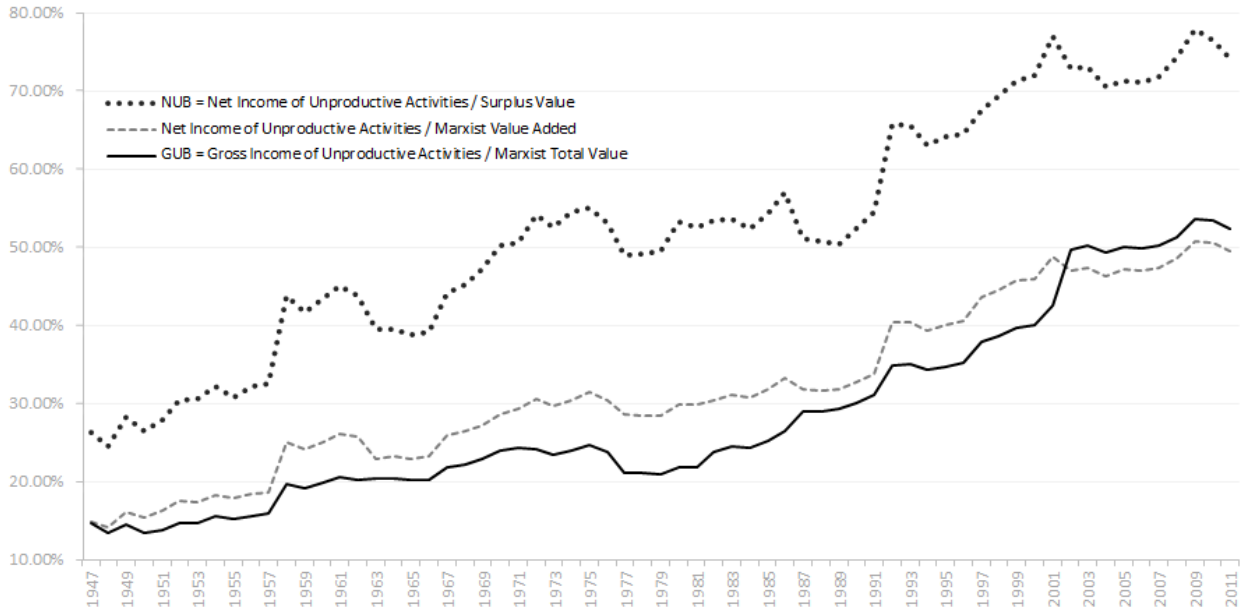
Sources: Author's calculations, and Shaikh and Tonak (1994).

Figure 4: Rate of Exploitation and Top 0.1% Income Share (1947-2011)



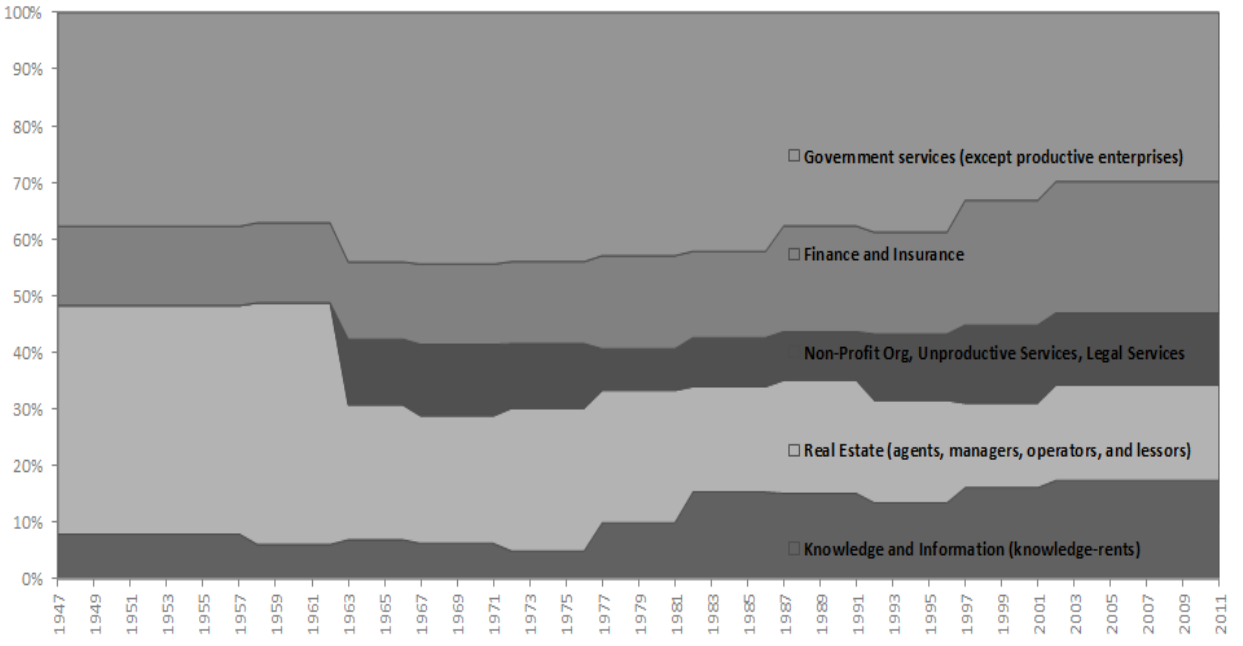
Sources: Author's calculations; Piketty (2014); Alvaredo, Atkinson, Piketty, and Saez (2014).

Figure 5: Relative Measures of Unproductive Accumulation (1947-2011)



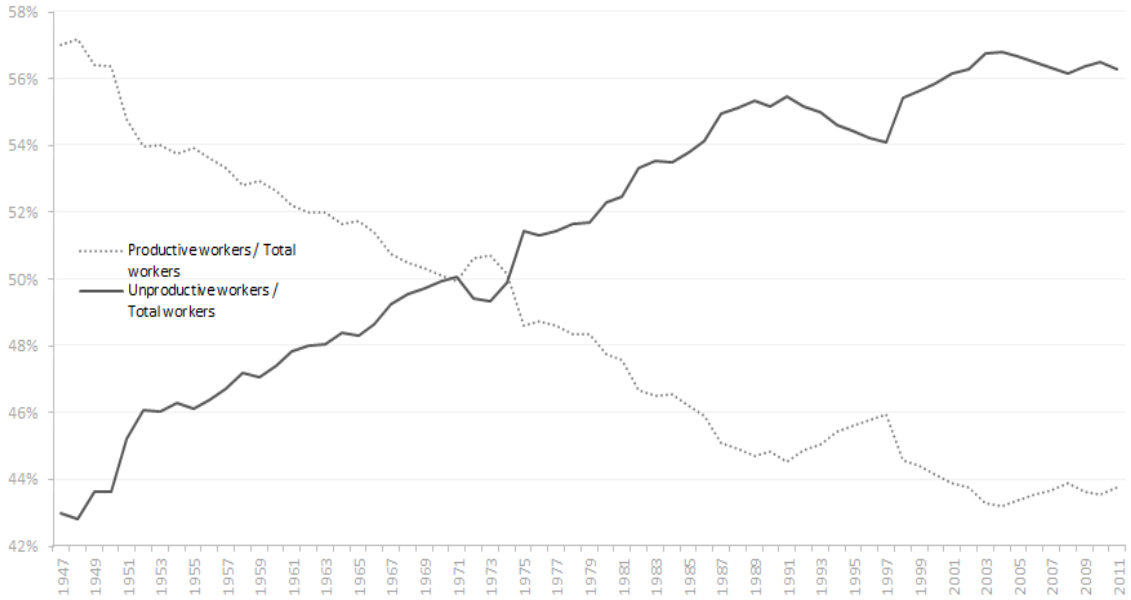
Sources: Author's calculations.

Figure 6: Decomposition of the Net Income of Unproductive Activities (1947-2011)



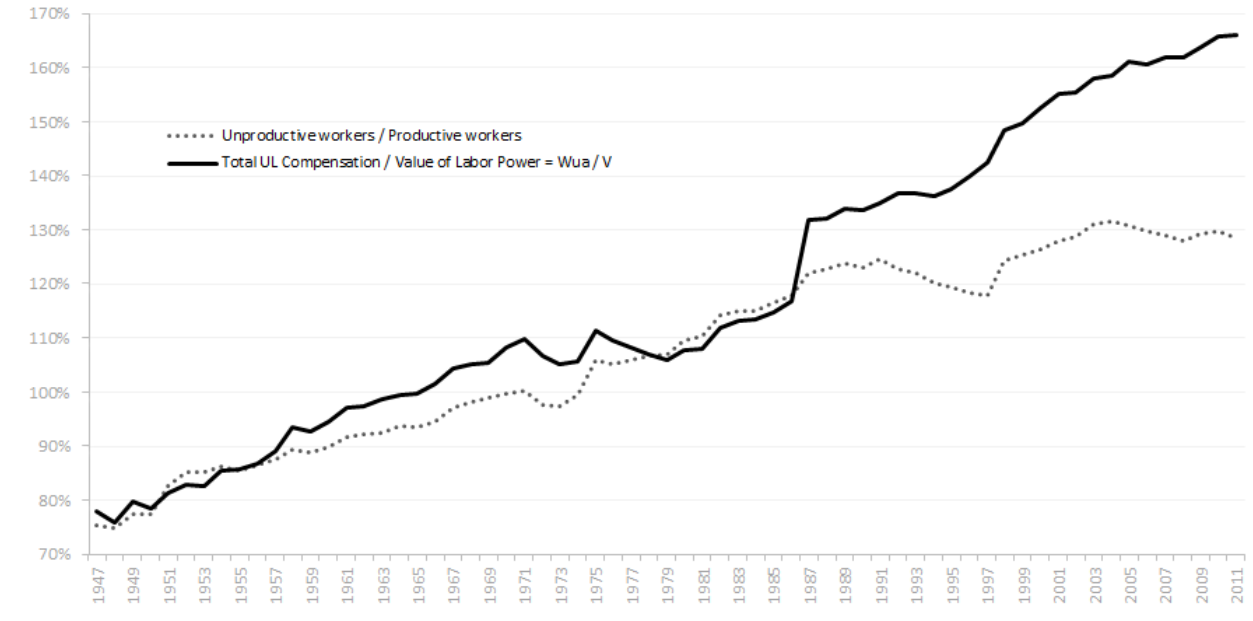
Sources: Author's calculations.

Figure 7: Productive and Unproductive Shares of Total Employment (1947-2011)



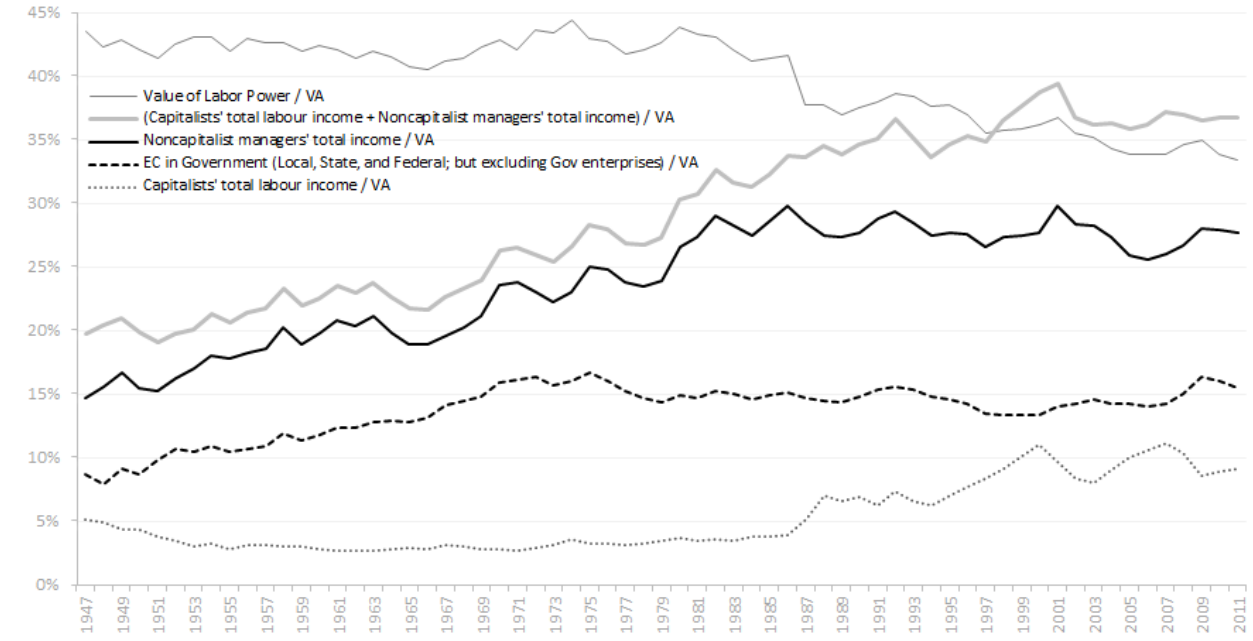
Sources: Author's calculations.

Figure 8: Employment and Compensation of Unproductive Employees Relative to Productive Workers (1947-2011)



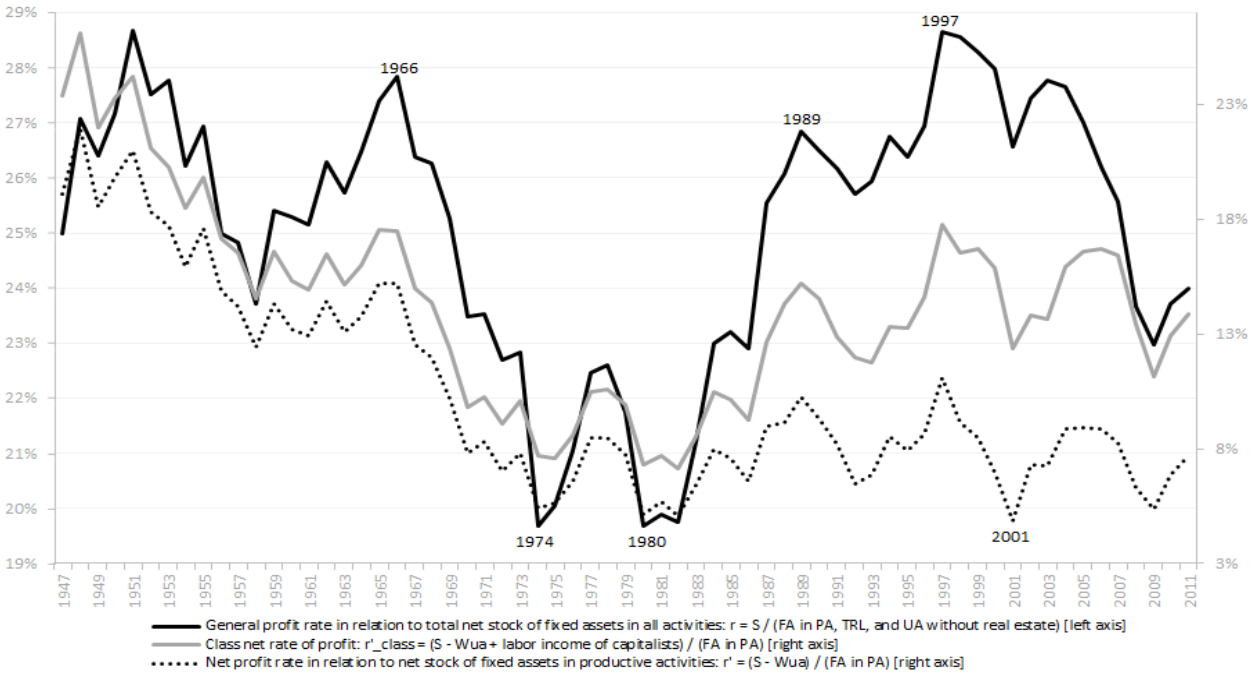
Sources: Author's calculations.

Figure 9: Labor Income Shares of Marxist Value Added (1947-2011)



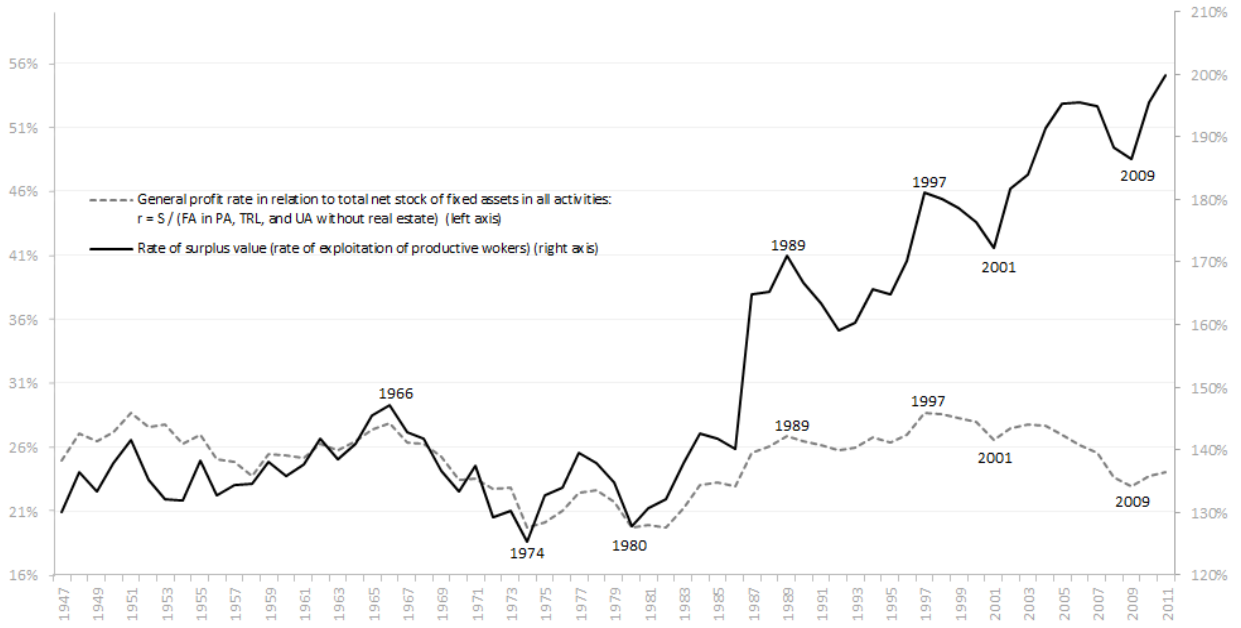
Sources: Author's calculations; and Mohun (2016). Only labor income is included for managers and capitalists. Because of the overlap between functional and personal distributions of income, percentages do not have to add up to 100%.

Figure 10: General and Net Profit Rates (1947-2011)



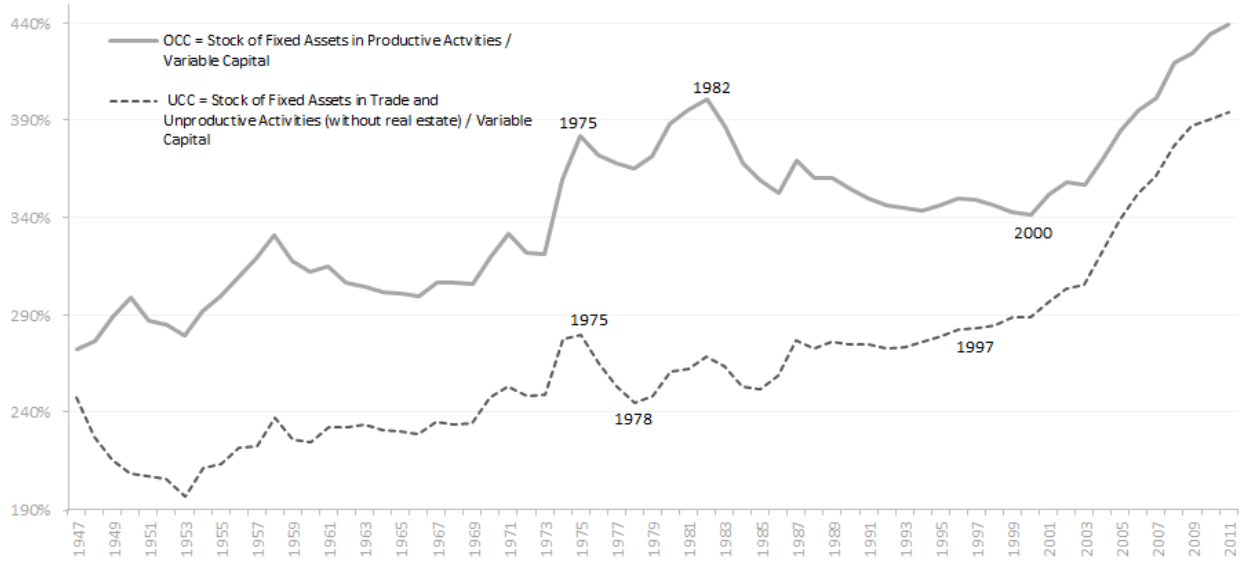
Sources: Author's calculations. Labor incomes of capitalists are from Mohun (2016).
Note: S = surplus value; Wua = total compensation of unproductive labor; PA = productive activities; TRL = trade, rental, and leasing; UA = unproductive activities; FA = fixed assets.

Figure 11: General Profit Rate and Rate of Surplus Value (1947-2011)



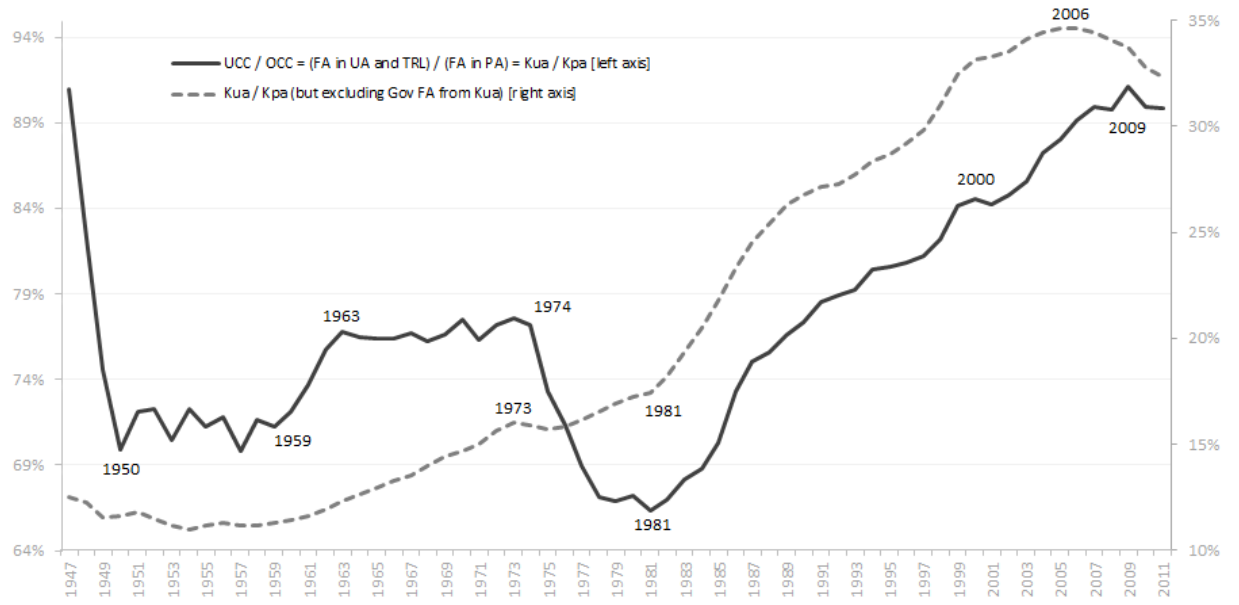
Sources: Author's calculations.
Note: S = surplus value; PA = productive activities; TRL = trade, rental, and leasing; UA = unproductive activities; FA = fixed assets; r = general profit rate.

Figure 12: Organic and Unproductive Compositions of Capital (1947-2011)



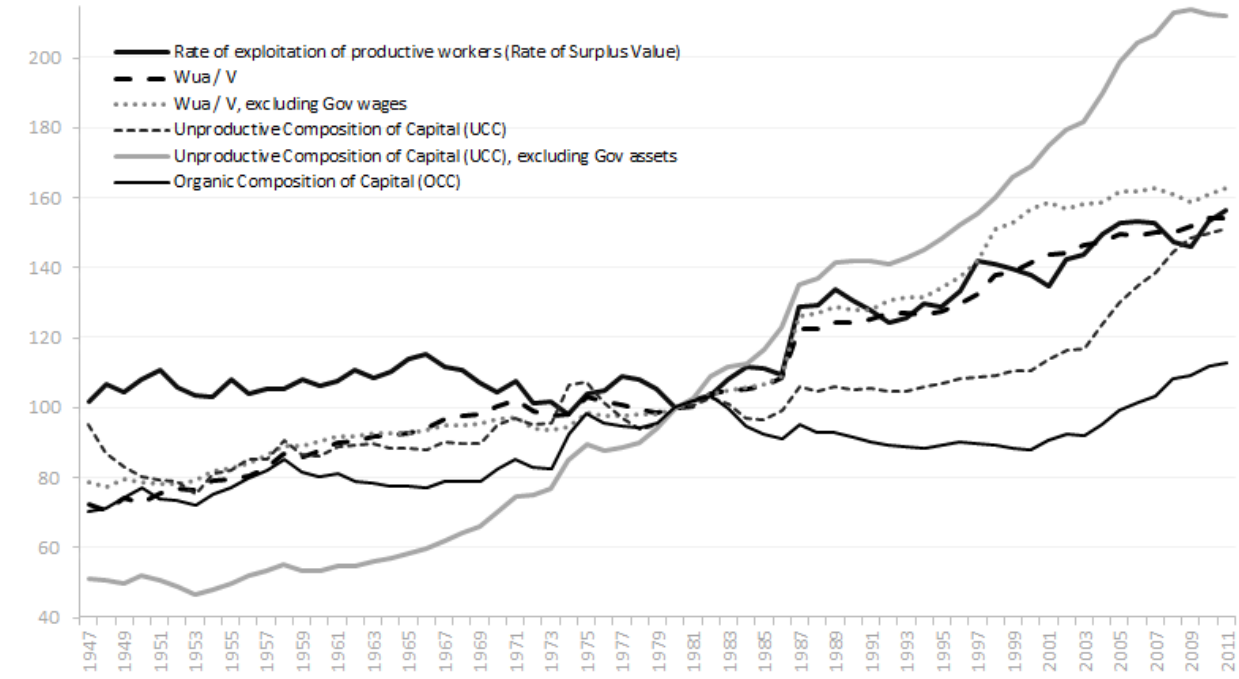
Sources: Author's calculations.
Note: OCC = organic composition of capital; UCC = unproductive composition of capital.

Figure 13: Ratio of Unproductive to Productive Capital Stock, with and without Government Fixed Assets (1947-2011)



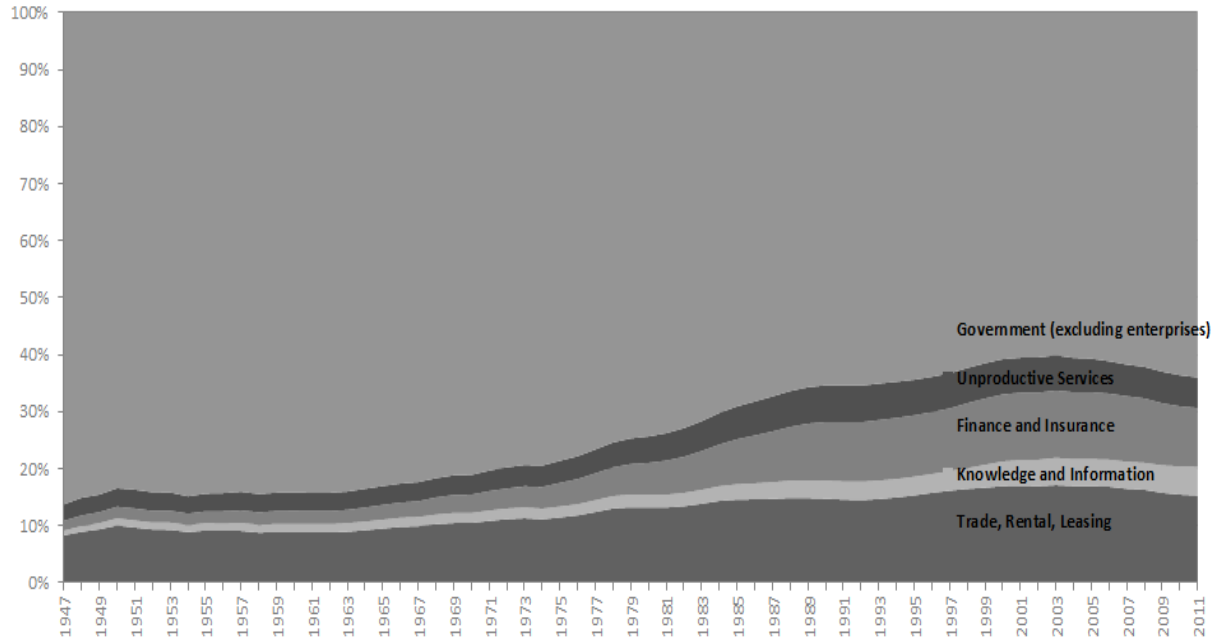
Sources: Author's calculations.
Notes: OCC = organic composition of capital; UCC = unproductive composition of capital; FA = fixed assets; PA = productive activities; TRL = trade, rental, leasing; UA = unproductive activities.

Figure 14: Determinants of Profitability (1947-2011)



Sources: Author's calculations. All measures are cast in index numbers, 1980=100.

Figure 15: Decomposition of the Unproductive Capital Stock (1947-2011)



Sources: Author's calculations.

APPENDIX

ESTIMATING MARXIST CATEGORIES FOR THE UNITED STATES ECONOMY

A.1 Introduction

In this appendix I explain how I estimated Marxist categories for the postwar United States economy using publicly available information from 1947 to 2011. I explain in detail: (i) how to obtain the necessary data from input-output matrices, national income accounts, and employment statistics; (ii) how to apply the Marxist Industrial Classification System (MICS); and (iii) how to convert official income and asset measures into estimates of Marxist categories. I offer further theoretical explanations for the procedures adopted jointly with the technical details.

The Marxist measures in this study stem from input-output matrices and national income accounts that are based on domestic (not national) incomes. The estimates therefore do not directly measure how much American companies can produce abroad and export back to the United States. This study takes into account all companies that reside in the US territory, be it American companies or not. It is very likely, however, that US transnational corporations have access to surplus value that is actually created in other countries. Given the data limitations, the focus on GDP instead of GNP is standard in the literature.

A.2 Data Sources

In order to estimate the Marxist total value produced in the United States it is necessary to have detailed industry-level information on the national gross output, which includes both the value added as well as the inputs used up. The only way to obtain historical information on value added and intermediate inputs with the required level of detail is through the benchmark input-output matrices. For any single year, an input-output table consolidates the three approaches to value added: the sum of final uses or

expenditures, the sum of all incomes, and the sum of all contributions from all industries net of their respective inputs. However, since benchmark input-output matrices are calculated roughly every five years it is also necessary to interpolate with estimates from annual GDP by industry data.

Aggregate and industry-level information are available through the Bureau of Economic Analysis (BEA) and the Bureau of Labor Statistics (BLS). From the BEA I use: (a) the benchmark input-output tables, compiled roughly every five years; (b) annual GDP by industry data using both the most recent North American Industry Classification System (NAICS) and the former Standard Industrial Classification (SIC); (c) data on stocks of fixed assets from the BEA Fixed Assets Accounts (FAA); (d) annual data on total employees and nonsupervisory workers per industry from the BLS; (e) price indices such as the producer price index (PPI) from BLS.

The first obstacle in estimating historical series is that BEA's methodologies and industry classification systems are neither stable nor consistent across input-output tables and GDP by industry accounts for the same year. The second obstacle is that BEA's methodologies and the industry classification systems are not entirely consistent through time. Even more, employment data from the BLS is based on a different industry classification system and hence must be adjusted when combined with the BEA series.

Benchmark input-output (I-O) matrices are available for 1947, 1958, 1963, 1967, 1972, 1977, 1982, 1987, 1992, 1997, and 2002. The closer to the present date the more details they contain. The I-O tables for 1947 and 1958 are available at the two-digit SIC level for 85 industries. For 1963 it is available at the four-digit SIC level for 387 industries. For 1967, 1972, 1977, 1982, 1987, and 1992 they are available at the six-digit SIC level for 484, 496, 537, 498, 570, 498 industries, respectively. The 1997 and 2002 benchmark I-O tables shift to the NAICS system and display, respectively, 494 and 428 industries. Prior to 1982 it is necessary to manually mount each I-O matrix and manually assign industry labels to every single row and column.

Input-output matrices display at the same time the income (revenues) side as well as the expenditure (uses) side of gross output and gross product. Incomes for each industry are organized vertically in columns while expenditures for the same industries are organized horizontally in rows. Inter-industry exchanges are shown as intermediate inputs on the income side and as intermediate demands on the expenditure side. Beginning in 1977 the value added component of each industry in the detailed I-O tables is decomposed into employee compensation, indirect business taxes, and gross operating surplus. For the summary I-O tables, which display 85 industries only, the decomposition of value added by industry begins in 1967. This implies that information on employee compensation and profit-type incomes is not available at all before 1967 and available between 1967 and 1977 solely at the summary level with industries grouped at the two-digit SIC system.

In 1987 the BEA also began to publish redefined benchmark I-O matrices by reassigning some secondary products and their associated inputs to the industry in which they are the primary products. The standard I-O tables assign both primary and secondary products to each industry as originally reported by businesses. From the original standard tables the BEA then computes the redefined tables to include the redefinitions made when the input structure of the industry's secondary product differs significantly from the input structure of its primary product. For example, the restaurant services in hotels are redefined from the accommodations industry to the food services industry. These redefined tables are referred to as 'after redefinition'. Redefinitions impact numerous industries in the I-O accounts, mainly wholesale trade, retail trade, construction, publishing industries, and accommodations and food services. As a result of redefinitions, the total value of secondary products is decreased, and the total value of primary products is increased by the same amount. However, commodity outputs are not impacted, only industry outputs (BEA, 2009; 2011).

For the years not covered in the benchmark I-O tables it is necessary to interpolate with the BEA GDP by industry data available annually from 1947 to 2011. Through the GDP by industry sheets it is possible to obtain information on value added, employee compensation (EC), profit-type income (gross

operating surplus), full-time and part-time workers (FTPT), full-time equivalent workers (FEE), and persons engaged in production (PEP). Annual data on gross output and input costs are available only from 1987 onwards. The GDP by industry series are available at the industry level but unfortunately with a different industry classification system than the I-O tables since the aggregation methods that the BEA employs are different between I-O tables and GDP by industry series.

Besides the differences concerning the aggregation method employed in I-O matrices for any single year, the GDP by industry aggregation method also changes through time. From 1947 to 1997 the BEA uses the SIC system while from 1977 to 2011 it employs the NAICS. Unfortunately, in the 20 years from 1977 to 1997 when the two methods overlap the SIC and NAICS systems do produce different results. The methodology that I propose to transform the official series into Marxist categories corrects for the *cross-sectional* and *temporal* differences and therefore generates more consistent annual estimates.

Information on stocks of fixed assets and depreciation by industry is available through the BEA's Fixed Assets Accounts (FAA). For the Marxist estimates I use series on current-cost net stocks of fixed assets by industry, which comprises stocks of buildings, equipment, and software at replacement costs. For stocks of assets and their respective depreciations I combine the datasets from nonresidential private entities with the federal, state, and local government entities.

The official measure of fixed asset depreciation includes the physical deterioration of buildings and equipment as well as the obsolescence due to new technological advances, implying that depreciation also measures early retirements and discards as assets are withdrawn from service while still being productive. For the annual depreciation estimates the BEA no longer applies the straight-line depreciation model with assumed patterns of retirements. It now uses a new model with a geometric pattern approximating the empirical evidence on the prices of used equipment and structures in resale markets (Fraumeni, 1997). A geometric pattern is a specific type of accelerated pattern which assumes higher dollar depreciation in the early years of an asset's service life than in the later years. The geometric

pattern of depreciation is also the default option when information on specific assets is unavailable. For some assets such as autos, computers, missiles, and nuclear fuel, the BEA uses a nongeometric pattern of depreciation.

To separate supervisory from nonsupervisory employees I use industry-level data from the BLS on the total number of employees and the number of production and nonsupervisory workers. Also from BLS I use the producer price index (PPI).

Finally, from Mohun (2016) I obtain estimates of *labor* and *non-labor* incomes for three classes: workers, managers, and capitalists. Mohun (2016) uses tax-unit data from the Internal Revenue Service (IRS) to compute the personal income distribution in terms of classes in the United States from 1918 to 2012. In this case a word of caution is needed. My estimates are computed in terms of functional income distribution taking into account the distinction between productive and unproductive activities. Mohun's class measures are estimated in terms of personal income distribution, ignoring the productive-unproductive distinction. It is likely, for example, that well-paid unproductive government employees are classified by Mohun as non-capitalist managers. Because of this overlap between functional and personal distributions of income, the percentages in Figure 9 in the main text do not have to add up to 100%.

A.3 Applying the Marxist Industry Classification System

The Marxist Industry Classification System (MICS) provides a way to regroup industries into three categories that reflect Marxist theory and the fact that knowledge-commodities are valueless and whose production belong to unproductive activity. The initial task consists of applying the MICS to the available data from the BEA and BLS. In the tables and figures that follow I explain the steps of this procedure.

I classify several activities as unproductive on the grounds that they produce knowledge that requires no labor to reproduce: software, data, pharmaceuticals, movies, recorded video and music, and

published materials. As an approximation, I classify the entire value of output of those industries as unproductive, despite the fact that a part of the value that these industries produce is attributed to new labor that is required each year. For example, the pharmaceutical industry must produce pills that require new labor as well as existing knowledge. Ideally it would be desirable to count part of the above industries' output as productive, but data limitations prevent me from doing so in this study.

I use the MICS to also make compatible the North-American Industry Classification System (NAICS) and the Standard Industry Classification (SIC) methodologies. Earlier works (as in Shaikh and Tonak, 1994, and Wolff, 1987) did not have to consider the compatibility issue since the SIC system was the only one available. However, starting in 1997 the official industry classification changed to the more recent NAICS. A key difference between the two systems is the treatment of the real estate sector, given that in the NAICS the fictitious 'owner-occupied housing' industry is implicitly included in the measure of value added. The transition between industry classification methodologies poses two problems. First, the NAICS and SIC produce different estimates for the years when the two series overlap. Second, the change in methodology creates discrete jumps over time in some of the series. The MICS provides a common ground necessary to deal with datasets that differ in methodology across series and over time, and therefore allows for the construction of more consistent estimates covering the entire 1947-2011 period.

In Table A.1 I apply the MICS to the 2002 benchmark I-O matrix, the last one that the BEA has made available. Earlier I-O matrices were regrouped in a similar way. In Table A.1 I also display the input-output industry codes to facilitate identification.

[Table A.1 about here]

In Table A.2 I apply the MICS to the BEA GDP by industry accounts that originally employed the SIC system for the 1947-1997 period.

[Table A.2 about here]

In Table A.3 I apply the MICS to the BEA GDP by industry accounts that originally employed the NAICS for the 1977-2011 period. In Table A.2 and Table A.3 the indentation indicates the level of industry aggregation: the more to the left the greater is the level of aggregation, and the more to the right the lower the level of industry aggregation. In Table A.1, on the contrary, there is no indentation and all industries are at the lowest level of aggregation.

[Table A.3 about here]

In Table A.4 I apply the MICS to the BEA net stock of fixed assets and depreciation accounts (FAA) under the NAICS for the 1947-2011 time period, combining private and public nonresidential fixed assets. Unlike the GDP by industry accounts that use both the NAICS and the SIC system, the BEA has a complete series for the whole postwar period for fixed assets and depreciation using only the NAICS.

[Table A.4 about here]

In Table A.5 I apply the MICS to the 1947-2011 BLS series on total employees per industry under the NAICS. The series are from the national annual Current Employment Statistics (CES) survey, not seasonally adjusted. In Table A.5 I also display the BLS industry codes to facilitate identification.

[Table A.5 about here]

[Table A.6 about here]

In Table A.6 I apply the MICS to the 1947-2011 BLS series on production and nonsupervisory workers per industry that originally used the NAICS and the SIC system. The series are from the national annual CES survey, not seasonally adjusted. The series using the SIC were discontinued in 2002 so it is necessary to combine it with the series under the NAICS. In Table A.6 I also display the BLS industry and series codes to facilitate identification.

A.4 Transforming Official Data into Marxist Categories

The task of this section is to provide a step-by-step explanation of how to transform the official BEA and BLS series into the desired Marxist categories.

Step 1: Apply the MICS to the Benchmark Input-Output Matrices

All benchmark I-O tables from 1947 to 2002 are available through the BEA. The first task is to properly mount the '*use'* matrices and assign industry labels corresponding to each SIC and NAICS codes for every row and column. Matrix sizes vary across years but each detailed I-O table is usually a matrix with roughly 500 rows by 520 columns. Rows indicate the industries producing outputs that are then used as inputs by the industries indicated in columns.

When read vertically, columns in I-O tables show industry gross outputs (GO) in current dollars. Inputs are displayed first and the decomposition of value added appears at the bottom. Value added usually appears divided into four rows: inventory valuation adjustment (IVA), employee compensation (EC), indirect business taxes (IBT), and gross operating surplus (GOS). When read horizontally, rows in I-O tables show industry gross products (GP) in current dollars. Intermediate demands are displayed first and the decomposition of final demand appears at the right-end of the table. Final expenditures usually appear divided into standard categories: personal consumption, investment in fixed assets and inventory adjustments, government purchases (local and federal, military and nonmilitary), imports and exports.

Input-output tables published prior to 1997 have industries assorted according to the SIC system. The NAICS has been applied solely to the 1997 and 2002 matrices. As long as each industry for every benchmark year is properly labeled with the corresponding codes and names, it is then possible to re-assort rows and columns according to the MICS. After the MICS has been applied, the interior input matrix of the Marxist I-O table should be symmetrical in term of industries in rows and columns. At the bottom we still have the decomposition of value added, and the far right we still have the decomposition of final demand.

In Figure A.1 I show a stylized Marxist I-O table that represents how actual benchmark I-O tables are to be organized after applying the MICS, independently of their sizes. The procedure is similar to that of Shaikh and Tonak (1994, p.74) but with the key difference that activities associated with the production of knowledge and information are classified as unproductive. The procedure deals solely with incomes and revenues by industry and not with expenditures or uses, hence I do not show the expenditures side of the I-O matrix. In a Marxist I-O table we should have productive activities (PA) grouped together row- and column-wise at the top-left, then trade margins and rentals (TRL) in the middle-center, and finally unproductive activities (UA) grouped together row- and column-wise at the bottom-right. The dummy industries (government, household, rest of the world, scrap, and noncomparable imports) should be placed right after unproductive activities.

[Figure A.1 about here]

The total shaded grey area in Figure A.1 represents the total value (TV) produced. The dark grey area represents a first approximation to surplus value (S). The top-left light grey area represents the circulating (non-fixed) part of constant capital (C), while the lower light grey area represents a first approximation to variable capital (V). Since official I-O tables are cast in producers' prices, the rows corresponding to trade margins must also be included in the light grey area representing the productive inputs to productive activities. For the same reason the first approximation to surplus value (S) must include all columns associated with trade and rentals. The gross income of unproductive activities (GI_{UA}) is the row-sum of all columns grouped under unproductive activities. I additionally indicate the areas representing the productive inputs to productive activities (which corresponds to a first approximation to the measure constant capital), unproductive costs to productive activities (which is part of surplus value), productive inputs to unproductive activities, and finally unproductive costs to unproductive activities.

Step 2: Deal With Specific Industries

From the Marxist I-O tables reflecting the MICS we can then proceed to fine-tune some specific industries. The necessary changes are as follows.

The official real estate sector comprises three different activities: (i) real estate brokerage, officially named 'real estate', which must be shifted to the unproductive group since it represents land rents; (ii) fictitious rents imputed to owner-occupied dwellings, which must be excluded altogether since the BEA treats homeowners as businesses renting their homes to themselves; (iii) rental and leasing of equipment, which must be shifted to the trade, rental, and leasing (TRL) group since it consists of piecemeal sales of commodities.

The entries in the household dummy industry row and column contain payments and incomes of household servants when they are not hired by an enterprise. Since household servants do not create any surplus value but merely use-values directly consumed by the household, they are part of a non-capitalist mode of production. Household do produce a surplus product but they are paid out of incomes, not capital. When servants are hired by an enterprise, such as home cleaning business, it then appears as a productive service. As it stands, the household dummy row and column should be excluded altogether.

The dummy row and column associated with 'rest of the world adjustment' can also be excluded. This entry reflects the incomes of US businesses abroad and therefore consists of an adjustment industry that offers the bridge between the domestic and national products. I exclude these entries since my focus is the domestic and not the national production of surplus value.

Federal, state, and local government enterprises should be put together with productive activities. Federal, state, and local government administration, on the other hand, should be grouped with unproductive activities. The revenues that support government offices and civil servants are deductions from surplus value and in order to avoid double counting of values they must be grouped together with unproductive activities. Additionally, the BEA records the wages and salaries of government employees

in a dummy column and row (often labeled ‘general government’) whose entries represent the wage bill of civil servants. Since these wages are incomes drawn from surplus value, the respective row and column must be shifted to the unproductive activity grouping.

My procedure regarding the roles of capitalist and non-capitalist modes of production is therefore the same as in Shaikh and Tonak (1994, p.71-72, p.137, p.212-213, p.223, p.344). Household labor, if not hired for profit by capital, is not a capitalist activity. The government is part of the capitalist mode of production, hence state enterprises are either productive or unproductive depending on the activity that they carry out, but government administration is always classified as an unproductive capitalist activity. Unlike Mohun (2014; 2006) and Paitaridis and Tsoulfidis (2012), I count government assets and government wages at all levels. At the end of this Appendix I offer a comparison of different versions of the general and net profit rates including and excluding government wages and assets.

The retail and wholesale trade rows and columns can be directly grouped as trade activities. The rental of equipment and the lease of commodities should also be added to the trade activities group. The rental of information and knowledge-commodities such as the rental of movies, DVDs, CDs, and software, however, should be considered unproductive activity since those commodities carry no value or surplus value.

Every industry should be properly classified and separated both column- and row-wise into one of the three grouping specified in the MICS. We can then proceed to simplify each Marxist I-O table so as to make them resemble the one depicted in Figure A.2, in which I show the simplified Marxist I-O matrix derived from the official 2002 benchmark I-O table. It is a simplified matrix because it shows only the row and column sums within each MICS grouping.

[Figure A.2 about here]

As long as all benchmark I-O matrices are transformed into Marxist I-O tables using the MICS, and as long as we deal with specific industries as outlined above, we can then construct a simplified Marxist I-O table similar to the one in Figure A.2 for each of the BEA benchmark I-O matrices.

Step 3: Interpolate with Annual Data Converted to MICS

Benchmark I-O matrices are much more complete and detailed than any other industry series. Only benchmark I-O tables have detailed information on the inter-industry flows of inputs and outputs, but unfortunately these matrices cover only some specific years. To bridge this gap it is possible to interpolate the years not covered by the benchmark tables using the BEA annual data on GDP by industry. The GDP by industry series, contrary to I-O matrices, do not have information on the production and uses of intermediate goods. The solution is to calculate the ratios of the benchmark I-O entries to corresponding entries in the annual GDP by industry series and then extrapolate them to the non-benchmark years.

First, as explained in Step 1, I apply the MICS to all official benchmark I-O matrices using Table A.1 in order to get Marxist I-O matrices just like the one depicted in Figure A.1. Second, as explained in Step 2, I fine-tune specific industries and then calculate the row and column sums within each of the three MICS groupings. It is then possible to calculate simplified Marxist I-O matrices similar to the one depicted in Figure A.2 for each benchmark year. Third, I apply the MICS to the BEA GDP by industry series on value added. From 1947 to 1997 I use the SIC series on value added and apply the MICS as specified in Table A.2. From 1977 to 2011 I use the NAICS series on value added and apply the MICS as specified in Table A.3. I do not use the NAICS series on value added prior to 1977 because data is missing for many industries. Unfortunately the methodologies used under the NAICS and SIC are different and a quick check on the overlapping years from 1977 to 1997 reveal that they do produce different estimates.

The purpose of Step 3 is to estimate a series of value added for productive activities, trade, and unproductive activities from 1947 to 2011 from the GDP by industry annual data that can then be used for interpolation. In this procedure, special care must be taken with the real estate row. In the SIC series the real estate industry can be broken down into 'housing' (consisting of the fictitious imputation for owner-occupied housing) and 'other real estate' (consisting of land rents). As can be seen in Table A.2 I simply delete the 'housing' row and then move the 'other real estate' row to the unproductive activities group. The problem emerges, surprisingly, with the newer NAICS series in which it is not possible to exclude the fictitious imputation for owner-occupied housing given that only one row is displayed for the entire real estate sector. In this case I exclude the owner-occupied imputation from the NAICS series by comparing the SIC and NAICS series during the 20 years from 1977 to 1997 when the two datasets overlap. I calculate that between 1947 and 1997 the SIC real estate sector was on average composed of 25% of land rent and 75% of fictitious owner-occupied housing. I then exclude 75% of the real estate row entries in the NAICS series, which brings it very close to the real estate sector estimate without owner-occupied housing in the SIC series for the overlapping years between 1977 and 1997. Since this method produces a very close estimate for land rents between the two series I then apply it to the whole 1977-2011 period in the NAICS data.

With this procedure I can obtain value added for every year for the three industry groupings in the MICS. The removal of the owner-occupied housing brings the 1977-2011 NAICS series in line with the 1947-1976 SIC series on value added per Marxist industrial grouping. The end result is three 1947-2011time series of value added for productive activities, trade, and unproductive activities that properly combine the original SIC and NAICS series.

The next task consists of calculating the ratios of the entries in the simplified Marxist I-O matrices to the respective value added estimates from the annual GDP by industry dataset for all of the benchmark years. Starting from the scheme depicted in Figure A.2 I divide all the main entries in the 'productive activities' column in the simplified Marxist I-O by the value added of productive activities

obtained from the GDP by industry annual series. I then divide all the main entries in the 'trade, rental, leasing' column in the simplified Marxist I-O by the value added of trade obtained from the GDP by industry annual series. Finally I divide all the main entries in the 'unproductive activities' column in the simplified Marxist I-O by the value added of unproductive activities obtained from the GDP by industry annual series. I repeat this procedure for all entries in the simplified Marxist I-O tables except for the decomposition of value added (labor compensation, indirect business taxes, and gross operating surplus), and I do it for all the years covered by the benchmark I-O tables. The coefficients that I obtain are then extrapolated for the years immediately following the benchmark publications until a new benchmark I-O table appears. The coefficients are hence updated every year in which a new benchmark I-O table is published, and then remain fixed for the subsequent years. These same coefficients are then all multiplied by the corresponding 1947-2011 series of value added of productive activities, trade, and unproductive activities.

Let $i = (PA, Trade, UA)$ be the industry grouping in the MICS, t any year from 1947 to 2011, and b any year for which there is a benchmark I-O table. Now let $\mathrm{X}^{\mathrm{IO}}_{\mathrm{i,t=b}}$ indicate the I-O entry for the Marxist industry grouping i for any year $t = b$ when a benchmark matrix is published, then let $\mathrm{VA}^{\mathrm{GDP}}_{\mathrm{i,t=b}}$ indicate the value added calculated from the GDP by industry annual series for the same Marxist industry grouping i for the same year $(t = b)$ when a benchmark I-O matrix is published. Therefore the benchmark interpolation coefficients are $x_{i,t=b} = \frac{\mathrm{X}^{\mathrm{IO}}_{\mathrm{i,t=b}}}{\mathrm{VA}^{\mathrm{GDP}}_{\mathrm{i,t=b}}}$, which I then extrapolate for the non-benchmark years $(t \neq b)$ when multiplying them by the value added for the same industry grouping i, namely $\mathrm{VA}^{\mathrm{GDP}}_{\mathrm{i,t\neq b}}$. Letting $\mathrm{X}_{\mathrm{i,t\neq b}}$ indicate the extrapolated Marxist I-O entry for a non-benchmark year $(t \neq b)$, we have:

$$X_{i,t\neq b} = x_{i,t=b} \,.\, VA^{GDP}_{i,t\neq b} = \left(\frac{X^{IO}_{i,t=b}}{VA^{GDP}_{i,t=b}}\right).VA^{GDP}_{i,t\neq b} \qquad \text{(A.1)}$$

The end result are annual series for the entire 1947-2011 period containing estimates for the main entries in the simplified Marxist I-O tables as if we had simplified Marxist I-O tables for every year. The basic idea is to extrapolate the proportions of the I-O matrices to the annual GDP by industry series after applying the MICS. The application of the MICS against the BEA GDP by industry series also has the nice consequence of making the SIC and NAICS series compatible with each other through time.

Step 4: Calculate the Number of Workers

Input-output matrices have information on labor compensation but no information on the number of workers employed in each industry. From the BEA GDP by industry dataset it is possible to obtain the number of full-time equivalent employees (FEE) and the number of persons engaged in production (PEP). The FEE and PEP annual series are available under the SIC system from 1948 to 1997 and under the NAICS from 1998 to 2011. The evident obstacles are that the industry classification and aggregation systems are very different across I-O tables and GDP by industry series, including the change in methodology from 1998 onwards with the introduction of the NAICS.

The first task is to make compatible the I-O, SIC, and NAICS methodologies. I hence regroup industries according to the MICS in the exact same way I did for value added in Step 3. For the SIC series on FEE and PEP I apply the MICS using Table A.2 while for the NAICS series on FEE and PEP I apply the MICS using Table A.3. The MICS therefore offers the common ground across the I-O, SIC, and NAICS datasets. I then construct the full 1948-2011 series combining the 1948-1997 SIC series and the 1998-2011 NAICS series for the three Marxist industry groupings: productive activities, trade, and unproductive activities. Since no data are available for 1947 I simply suppose that 1947 had the same employment level as 1948. This procedure produces annual information on FEE and PEP for the whole 1947-2011 period.

The second task is to calculate the number of self-employed workers (SEP) recalling that PEP is the sum of FEE and SEP. Let $i = (PA, Trade, UA)$ be the industry grouping in the MICS, and t any year from 1947 to 2011, we have:

$$SEP_{i,t} = PEP_{i,t} - FEE_{i,t} \quad \text{(A.2)}$$

By subtracting the FEE from PEP for each year I estimate the corresponding number of self-employed workers within each Marxist industry grouping.

In the measurement of the value of labor power I consider wageworkers as well as self-employed people in productive activities. Most of the Marxist literature views producers who do both the labor and own the means of production as 'simple (or independent) commodity producers'. They also view the mode of production based on 'simple (or independent) commodity producers' as a non-class mode of production called 'simple (or independent) commodity production' in which case there is no surplus appropriation (Marx, 1973, pp.471-479). In most of the Marxist literature it is assumed that some modes of production are not class-based, including primitive communism, simple commodity production, and communism. Contrary to this tradition, Resnick and Wolff (2006) interpret self-employed workers as belonging to the "ancient mode of production" in which the producers individually appropriate the surplus they produce. According to Resnick and Wolff, every mode of production has its own concept of surplus and therefore its own class structure. The concept of productive labor derives from the concept of surplus, which in turn derives from the concept of mode of production. Each mode of production, Resnick and Wolff (2006) claim, has its own concept of surplus and therefore its own criterion that distinguishes productive from unproductive labor. In any case, wageworkers and self-employed workers can produce commodities with value.

Self-employment could be understood as a mode of production in itself, with its own particular class structure that resembles the "ancients". If this is the case then capitalists benefit from the existence

of this non-capitalist mode of production that co-exists with capitalism. This is one possible interpretation of self-employment. The interpretation that I follow is that self-employment is just disguised capitalist exploitation, so I can impute a wage and a surplus value for self-employed workers. This procedure is standard in the literature. In my analysis of productive labor I therefore *combine the capitalist and the simple commodity production (or ancient) modes of production*. Most current self-employed workers actually produce commodities with value and in many cases self-employment is just disguised capitalist exploitation. Many workers are not hired as workers but as unincorporated businesses because the true capitalists want to avoid payroll taxes and social security.

Additionally, my measures of productive and unproductive labor also disregard the production of goods and services by household servants and non-wage laborers that work inside the household but not for capital. These types of household work, if not exchanged against capital, are not included within my estimates. This procedure is also standard in the literature.

Step 5: Calculate Employee Compensation

A similar procedure as the one used in Step 4 for the number of workers can be applied to employee compensation (EC). The data are available through the BEA GDP by industry accounts. The EC annual series are available under the SIC format from 1947 to 1997 and under the NAICS format from 1987 to 2011. I then regroup industries according to the MICS in the exact same way I did for value added in Step 3. For the SIC series on EC I apply the MICS using Table A.2 while for the NAICS series on EC I apply the MICS using Table A.3. I can thus obtain annual estimates of EC from 1947 to 2011 for the three industry groupings in the MICS by combining the SIC series from 1947 to 1986 with the NAICS series from 1987 to 2011.

The employee compensation series from the GDP by industry accounts cover only the compensation of full-time equivalent employees ($EC_{i,t}^{FEE}$). Since I use persons engaged in production ($PEP_{i,t}$) as the measure of employment I then need to impute a compensation for self-employed

workers ($EC_{i,t}^{SEP}$). Self-employed workers constitute the 'unincorporated business sector' and the BEA does not break down the value added that they produce each year into labor compensation and gross operating surplus. In this procedure I therefore suppose that self-employed workers receive on average the same compensation as their full-time counterparts in incorporated businesses. I follow Shaikh and Tonak (1994) by imputing a wage equivalent to self-employed workers in the unincorporated business sector. Let $i = (PA, Trade, UA)$ be the industry grouping in MICS, and t any year from 1947 to 2011, we have:

$$EC_{i,t}^{PEP} = \ EC_{i,t}^{FEE} + EC_{i,t}^{SEP} = EC_{i,t}^{FEE} + \left(\frac{EC_{i,t}^{FEE}}{FEE_{i,t}}\right).SEP_{i,t} \qquad \text{(A.3)}$$

I estimate $EC_{i,t}^{SEP}$ by imputing the average compensation of full-time equivalent employees $\left(\frac{EC_{i,t}^{FEE}}{FEE_{i,t}}\right)$ to self-employed workers ($SEP_{i,t}$); and $SEP_{i,t}$ is in turn obtained from Step 4 through equation A.2. I then finally estimate the compensation of PEP as the sum of the compensation of full-time equivalent employees ($EC_{i,t}^{FEE}$) and the imputed compensation of self-employed workers ($EC_{i,t}^{SEP} = \frac{EC_{i,t}^{FEE}}{FEE_{i,t}}.SEP_{i,t}$).

Step 6: Net Out Supervisory Workers from Productive Activities

Productive workers are workers performing productive activities within industries classified as productive in the MICS. Unproductive workers in productive activities and workers in trade and unproductive activities are considered to be unproductive laborers. To net out unproductive labor from productive activities I use the BLS series on total and nonsupervisory employees by industry.

The procedure consists of applying the MICS against the BLS series on total employees and nonsupervisory workers. Both series are organized by industry so the MICS can be applied directly as shown in Tables A.5 and A.6. The BLS series on total employees per industry is complete for all years and is organized solely under NAICS from 1947 to 2011, hence I apply the MICS using Table A.5.

For nonsupervisory workers the BLS has two series: one using the SIC from 1947 to 2002 and another using the NAICS from 1947 to 2011. The first task is to apply the MICS to the SIC and NAICS series on nonsupervisory workers using Table A.6. It is necessary to work with both series at the same time since data for many years are missing: NAICS data for nonsupervisory workers is complete from 1972 onwards but missing for all services from 1947 to 1963, and missing also for transportation, warehousing, and utilities from 1947 to 1971; SIC data is also missing prior to 1964 for services, transportation, and utilities.

To overcome the problem of missing data I proceed as follows. First, I calculate the ratio of nonsupervisory workers in productive activities to 'total private' nonsupervisory workers under NAICS from 1972 to 2011. This ratio is stable at around 70%. From 1964 to 1971 I use 'total private' nonsupervisory workers from the NAICS data and then multiply it by the stable ratio of 70% to get nonsupervisory workers in productive activities only. From 1947 to 1963 I use 'total private' nonsupervisory workers from the SIC data and then multiply it by the stable ratio of 70% to get nonsupervisory workers in productive activities only. Combining the three pieces (1947-1963, 1964-1971, and 1972-2011) I get a complete 1947-2011 estimate of the number of nonsupervisory workers in productive activities. Since I treat all workers in trade and in unproductive activities as unproductive labor I do not need to estimate the share of supervisory workers in them.

I thus have complete series from 1947 to 2011 for both total employees and nonsupervisory workers in productive activities. I then divide one by the other to get annual estimates for the share of nonsupervisory workers in productive activities. I find that on average 18% of all employees in productive activities should be classified as unproductive labor. Letting $\Omega_{i,t}$ indicate the share of nonsupervisory workers in total employment in the industry grouping $i = (PA, Trade, UA)$ we now have:

$$\Omega_{i,t} = \frac{(nonsupervisory\ workers)_{i,t}^{BLS}}{(total\ workers)_{i,t}^{BLS}} \qquad \text{(A.4)}$$

I can then multiply the percentage of nonsupervisory workers in productive activities $(\Omega_{PA,t})$ by the full-time equivalent employees in productive activities $(FEE_{PA,t})$ estimated in Step 4. Notice that I multiply the percentage of nonsupervisory workers by $FEE_{PA,t}$, not $PEP_{PA,t}$, since the persons engaged in production series also includes self-employed workers ($SEP_{PA,t}$).

My method differs from that of Shaikh and Tonak (1994) in regard to the procedure of estimating the compensation of unproductive and productive workers. As much as possible I try not to blend series from different sources, and hence I refrain from using wage and compensation data from the Bureau of Labor Statistics (BLS). I also avoid mixing data on employment by sector from the BLS with data on employment compensation from the BEA. The only instance in which I employ data from the BLS is to calculate the percentage of nonsupervisory workers in productive activities. Even more, within productive activities I exclude supervisory workers solely from the full-time equivalent (FEE) employees, contrary to Shaikh and Tonak's procedure of also excluding the supervisory jobs of self-employed persons (SEP). From my perspective there is no meaning in separating unincorporated businesses into supervisory and nonsupervisory workers.

Mohun (2005; 2006; 2013) is critical of Shaikh and Tonak's (1994) procedure of estimating employees' compensation and the share of nonsupervisory workers, especially in the service sectors. Even though my estimates follow a different computational procedure than that of Shaikh and Tonak, my estimates would still have some of the aggregation problems that Mohun (2005) uncovered. However, my procedure offers a way of estimating Marxist categories for the entire 1947-2011 period taking into account the discrepancies between the SIC and NAICS systems that Mohun did not face in his dataset that begins only in 1964. Given my preference for the whole 1947-2011 period and the fact that I classify knowledge production as an unproductive activity, the lack of more detailed data for several years

prevents me from implementing the fine-tuning that Mohun proposed. In any case, Mohun's estimates still contain some simplifications that I avoid here — see Paitaridis and Tsoulfidis (2012, p.221, footnote 4).

Step 7: Estimate the Value of Labor Power

I estimate variable capital (V), or the value of labor power, as the compensation of productive workers in productive activities. The estimate of variable capital has two components: the compensation of nonsupervisory full-time equivalent workers in productive activities $\left(\Omega_{PA,t} \,.\, EC_{PA,t}^{FEE}\right)$, and the imputed compensation of self-employed workers in productive activities $\left(EC_{PA,t}^{SEP}\right)$. To estimate the compensation of nonsupervisory full-time equivalent workers in productive activities I simply multiply the ratio of nonsupervisory workers to total employees $\left(\Omega_{PA,t}\right)$ calculated from the BLS data by the compensation of full-time equivalent employees in productive activities $\left(EC_{PA,t}^{FEE}\right)$ calculated from the BEA data. The imputed compensation of self-employed workers in productive activities is obtained in Step 5 as $EC_{PA,t}^{SEP} = \frac{EC_{PA,t}^{FEE}}{FEE_{PA,t}} . SEP_{PA,t}$. Using equations A.2 through A.4 I can then estimate variable capital (V) in year t as:

$$V_t = \Omega_{PA,t} \,.\, EC_{PA,t}^{FEE} \; + \; EC_{PA,t}^{SEP} \qquad \text{(A.5)}$$

Step 8: Calculate Stocks of Fixed Assets and Depreciation

To estimate fixed assets and their depreciation per MICS grouping I use the BEA annual data on the current-cost net stock of fixed assets and depreciation by industry for both nonresidential private and government entities as available in the Fixed Assets Accounts (FAA).

For my estimates I use the series on current-cost net stocks of fixed assets by industry, which comprises stocks of buildings, equipment, and software at replacement costs. For stocks of assets and their respective depreciations I combine the datasets from nonresidential private entities with the federal,

state, and local government entities. The official measure of fixed asset depreciation includes the physical deterioration of buildings and equipment as well as the obsolescence due to new technological advances, implying that depreciation also measures early retirements and discards as assets are withdrawn from service while still being useful.

I firstly obtain data on current-cost net stock of fixed assets, yearend estimates, from the FAA under NAICS for the entire 1947-2011 period. I use data for both private and government-owned fixed assets through the BEA Tables 3.1ES, 7.1A, and 7.1B. Total fixed assets include stocks of equipment, software, and structures at replacement costs. I then apply the MICS using Table A.4 to classify and separate industries and subsequently combine the data for private and government-owned fixed assets. To make numbers compatible with other Marxist estimates I finally convert units to millions of dollars. In order to exclude residential assets I estimate net stocks in unproductive activities net of the real estate sector.

The purpose of classifying the stock of fixed assets into the three industry groupings according to the MICS is to break down the annual estimate of the total capital stock (K) in the economy as the sum of the capital stocks in productive activities (K_{PA}), in trade, rental, and leasing (K_{TRL}), and finally in unproductive activities net of real estate (K_{UA}):

$$K_t = K_{PA,t} + K_{TRL,t} + K_{UA,t} \qquad \text{(A.6)}$$

The next task consists of applying a similar procedure to the current-cost depreciation of the stocks of fixed assets using data for both private and government-owned fixed assets from BEA Tables 3.4ES, 7.3A, and 7.3B. I apply the MICS according to Table A.4 so as to classify and separate industries and subsequently combine the data for private and government-owned fixed assets. To make numbers compatible with other Marxist estimates I finally convert all units to millions of dollars. Also, in order to

exclude the depreciation of residential assets I estimate the depreciation of net stocks in unproductive activities net of the real estate sector.

The purpose of classifying depreciation according to the three industry groupings in the MICS is to break down the annual estimate of total capital stock depreciation (δ) in the economy as the sum of capital stock depreciations in productive activities (δ_{PA}), in trade, rental, and leasing (δ_{TRL}), and finally in unproductive activities net of real estate (δ_{UA}):

$$\delta_t = \delta_{PA,t} + \delta_{TRL,t} + \delta_{UA,t} \quad \text{(A.7)}$$

Shaikh and Tonak (1994, p.125) estimate the total capital stock K as "fixed nonresidential gross private capital", which excludes government fixed assets but does not net out depreciation. My measure of total K includes government assets but is net of depreciation. Similarly to my estimates, Shaikh and Tonak (1994, p.125) also include in K the nonresidential fixed assets in private unproductive activities. Even though Shaikh and Tonak exclude state assets, they still keep depreciation and unproductive assets in K. I net out depreciation from K but keep state assets in. Unlike Mohun (2014; 2006) and Paitaridis and Tsoulfidis (2012), Moseley (1985; 1992; 1997) does explicitly account for the stock of fixed assets in unproductive activities in his estimates. At the end of this Appendix I compare the effects of excluding government assets from K_{UA}.

Step 9: Estimate Constant Capital

I estimate constant capital (C) as the use up of productive inputs in productive activities. Productive inputs $\left(A_{i,t}^{PA}\right)$ are the outputs of productive activities that are then used as inputs by any other activity i. For the measure of constant capital I only consider the outputs of productive activities that are then used as inputs by productive activities. Constant capital (C) then consists of two parts: the productive inputs directly consumed in productive activities $\left(A_{PA,t}^{PA}\right)$, which correspond to circulating capital, and the depreciation of the stock of fixed assets in productive activities $\left(\delta_{PA,t}\right)$, which

corresponds to the fixed capital used up. Let $A_{i,t}^{j}$ indicate the outputs of activity j that are used as inputs by activity i in time t, then:

$$C_t = A_{PA,t}^{PA} + \delta_{PA,t} \quad \text{(A.8)}$$

The productive inputs used up in productive activities can be obtained from the simplified Marxist I-O tables in Step 2 and also from the annual interpolations for the non-benchmark years in Step 3. The depreciation of the capital stock is obtained in Step 8. As displayed in Figure A.1, since I-O matrices are cast in producers' prices the estimate of $A_{PA,t}^{PA}$ has to include the corresponding rows of trade margins.

Step 10: Estimate Total Value, Marxist Value Added, and Surplus Value

The total value (TV) produced in the United States economy can now be estimated from the series obtained in previous steps. From the simplified Marxist I-O tables and the annual interpolations it is possible to estimate TV for each year from 1947 to 2011 as the sum of the gross output of productive activities (GO_{PA}) and the gross output of trade, rental, and leasing (GO_{TRL}). Since I-O matrices are cast in producers' prices the gross output of TRL needs to be added to the measure of total value. Trade, rental, and leasing clearly belong to the sphere of circulation and therefore are unproductive activities from the Marxist perspective, but because I-O matrices put trade margins in trade industries we then have to add these activities to the measure of total value produced in order to consider both the full production and piecemeal realization of value.

[Figure A.3 about here]

In Figure A.3 I display the correspondences between key Marxist categories and the modified measures of income derived from the official national accounts after the application of the MICS. The mathematical correspondences are as follows. Let $A_{i,t}^{j}$ indicate the outputs of activity j that are used as

inputs by activity i in time t, and let $NO_{i,t}$ indicate the net output of activity i. The gross output of any activity i is the sum of all the inputs used up $\left(\sum_j A_{i,t}^j\right)$ and the net output:

$$GO_{i,t} = \sum_j A_{i,t}^j + NO_{i,t} \tag{A.9}$$

I estimate the Marxist total value in year t as the sum of the gross outputs of productive activities together with trade, rental, and leasing:

$$\begin{aligned} TV_t &= GO_{PA,t} + GO_{TRL,t} \\ &= A_{PA,t}^{PA} + A_{PA,t}^{UA} + NO_{PA,t} + A_{TRL,t}^{PA} + A_{TRL,t}^{UA} + NO_{TRL,t} \end{aligned} \tag{A.10}$$

The Marxist value added (VA) is then estimated as the total value less the value of constant capital. The measure of constant capital from equation A.8 includes depreciation, hence the measure of Marxist value added becomes net of depreciation:

$$VA_t = TV_t - C_t \tag{A.11}$$

I finally estimate the surplus value (S) produced in the United State economy for each year as the Marxist value added minus variable capital, which is the value of labor power calculated through equation A.5:

$$S_t = TV_t - C_t - V_t = VA_t - V_t \tag{A.12}$$

It then becomes simple to estimate other Marxist categories.

To compute the profit-wage ratio from the BEA dataset I divide the gross operating surplus by total employee compensation series from the annual GDP by industry accounts under the Standard

Industry Classification (SIC) system from 1947 to 1986 and under the North-American Industry Classification System (NAICS) from 1987 to 2011.

Step 11: Estimate Measures of Unproductive Accumulation

As long as Steps 1 through 10 are followed correctly it also becomes straightforward to compute measures associated with unproductive accumulation. Using the general scheme depicted in Figures A.1 through A.3, as well as equations A.9 through A.12, we can estimate the gross unproductive burden (GUB), net unproductive burden (NUB), and the unproductive composition of capital (UCC).

The gross income of unproductive activities (GI_{UA}) is estimated analogously to the total value (TV) from productive activities. The net income of unproductive activities (NI_{UA}) is estimated analogously to the value added (VA) from productive activities. I use the input-output matrices and the annual interpolations similarly to what is explained above in Steps 1 to 3.

Since benchmark matrices are only available for certain specific years it becomes necessary to interpolate the years not covered by the benchmark matrices with annual data from the estimated 'value added' of unproductive activities, analogously to what is described in Step 3. Let t be any year from 1947 to 2011, and b any year for which there is a benchmark I-O table. Now let $\mathrm{H}^{\mathrm{IO}}_{\mathrm{UA,t=b}}$ indicate any I-O unproductive sub-category (as in figure A.4) for any year $t = b$ when a benchmark matrix is published; then let $\mathrm{VA}^{\mathrm{GDP}}_{\mathrm{UA,t=b}}$ indicate the 'value added' of unproductive activities calculated from the GDP by industry annual series for the same year ($t = b$) when a benchmark I-O matrix is published. Therefore the benchmark interpolation coefficients are $h_{i,t=b} = \frac{\mathrm{H}^{\mathrm{IO}}_{\mathrm{UA,t=b}}}{\mathrm{VA}^{\mathrm{GDP}}_{\mathrm{VA,t=b}}}$, which I then extrapolate for the non-benchmark years ($t \neq b$) when multiplying them by the value added of unproductive activities, namely $\mathrm{VA}^{\mathrm{GDP}}_{\mathrm{UA,t\neq b}}$. Letting $\mathrm{H}_{\mathrm{i,t\neq b}}$ indicate the extrapolated unproductive sub-category for a non-benchmark year ($t \neq b$), we have:

$$H_{i,t\neq b} = h_{i,t=b} . VA^{GDP}_{UA,t\neq b} = \left(\frac{H^{IO}_{UA,t=b}}{VA^{GDP}_{UA,t=b}}\right). VA^{GDP}_{UA,t\neq b} \quad \text{(A.13)}$$

The interpolation coefficients $h_{i,t=b}$ that I obtain are extrapolated for the years immediately following the benchmark publications until a new benchmark I-O matrix appears. The coefficients are then updated every year in which a new benchmark I-O table is published, and remain fixed for the subsequent years.

Since the Marxist value added of productive activities is net of productive depreciation $(\delta_{PA,t})$, the net income of unproductive activities is also net of unproductive depreciation $(\delta_{UA,t})$.

Step 12: Break Down Unproductive Accumulation into Its Subcomponents

The gross and net incomes of unproductive activities ($GI_{UA,t}$ and $NI_{UA,t}$ respectively) can be further decomposed into five sub-categories: (i) government administration with the exception of productive government enterprises, consisting mostly of the government wage bill at all levels; (ii) finance and insurance, including the former federal commodity credit corporation (CCC); (iii) non-profit organizations and unproductive services, such as legal services and corporate management; (iv) real estate, comprising land-rents accruing to agents, managers, operators, and lessors (excluding imputed owner-occupied rents); (v) knowledge and information rents, comprising all incomes from activities involving advertising, pharmaceuticals, software production, data management, research and development, publishing industries, sound recording, and movie production.

For each Marxist benchmark I-O matrix, as depicted in Figure A.1, I separate unproductive industry columns according to these five sub-categories, and then compute a summary sheet as shown in Figure A.4. Using equation A.13 and Figure A.4 it is possible to arrive at annual estimates for the five unproductive sub-categories for both the gross and net incomes of unproductive activities.

[Figure A.4 about here]

From Step 8 it is also possible to decompose the current-cost nonresidential net stock of fixed assets of unproductive activities (excluding real estate), trade, rental, and leasing into five sub-categories: (i) trade, rental, and leasing; (ii) knowledge and information; (iii) finance and insurance; (iv) unproductive services; and (v) general government, excluding public enterprises. Annual data is available through the BEA FAA under the NAICS for the entire 1947-2011 period.

A.5 Comparison of Profit Rates

Given that government fixed assets represent a very large proportion in the unproductive capital stock K_{UA} and that government wages also play a significant role in W_{UA}, I check how the exclusion of the government impacts the levels and trends of the profit rates.

For a comparison in levels, in Figure A.5 I plot six different measures of the profit rate, all on the same scale. The first measure represents surplus value over the productive capital stock only. The second represents surplus value over the total nonresidential capital stock but excluding state fixed assets, such that it is the return on the fixed assets held by private entities only. The third is the general profit rate computed as the surplus value over the total nonresidential capital stock, as in equation 3 from the main text. The fourth is a net profit rate for productive activities computed as in equation 4, but removing government wages from W_{UA}. The fifth measure is the net profit rate for productive activities computed via equation 4 as surplus value minus the unproductive wage bill W_{UA}, over the productive capital stock. It is clear from figure A.5 that government participation in W_{UA} and in K_{UA} does have a significant influence in the levels of the profit rates.

[Figure A.5 about here]

In Figure A.5 I also plot a *class* net profit rate à la Mohun (2016; 2014; 2006) by shifting the *labor income of capitalists* from W_{UA} to Π, over the productive capital stock. Explanations of what constitutes the capitalist class and how its labor income can be measured are in Mohun (2016). Using IRS

data, his procedure is to classify as 'capitalist' any tax-unit that has enough assets (excluding housing) such that participation in the labor market is voluntary. I therefore estimate the class net profit rate as:

$$r'_{class} = \frac{\Pi + W_{UA}^{capitalists}}{K_{PA}} = \frac{S - W_{UA}^{non-capitalists}}{K_{PA}} \qquad \text{(A.14)}$$

For a comparison of trends, in Figure A.6 I plot the general profit rate without government assets in K_{UA} (on the left axis), the net profit rate without government wages in W_{UA} (on the right axis), and the class net rate of profit as in equation A.14 but netting out government wages from W_{UA} (on the right axis). Figure A.6 should be compared with Figure 10 in the main text. Figure 10 displays these same profit rates but with government assets included in K_{UA} and government wages included in W_{UA}.

In Figure 10 the net profit rate plummets from 22% in 1948 to 5% in 1980 and then recovers to 11% in 1997. In Figure A.6 the net profit rate drops from 29% in 1948 to 14% in 1980 and then recovers to 22% in 1997. Hence, when government wages are included in W_{UA} the net profit rate falls much more in the 1970s and recovers much more up to 1997, compared to the net profit rate with government wages netted out over the same period. In Figure A.6, when government assets are excluded from K_{UA}, the general profit rate drops from 43% in 1966 to 28% in 1980 and recovers to 40% in 1997. In Figure 10 the general profit rate drops from 28% in 1966 to 20% in 1980 and recovers to 29% in 1997. Hence, the fall and recovery in the general profit rate are much more pronounced when government assets are netted out of K_{UA}. As expected, the inclusion of the labor income of capitalists in net profits (as in r'_{class}) shifts the net profit rate up and this shift is much greater after 1980, thus reflecting the substantial increase of the labor incomes of capitalists as a share of value added in the Neoliberal period.

[Figure A.6 about here]

I additionally compute a profit rate for the total private US economy that includes back government wages in the measure of net profit in the numerator and, at the same time, excludes government assets from the denominator:

$$r'_{private\ economy} = \frac{S - W_{UA} + W_{GOV}}{K_{PA} + K_{UA} - K_{GOV}} \qquad \text{(A.15)}$$

The profit rate for the whole private economy contemplates both productive and unproductive activities, but is net of government fixed assets and it employs a measure of net profits that still includes the surplus value that will be used to pay off for government wages. For comparison, the profit rate for the total private economy from Equation A.15 is plotted in Figure A.7 together with the net profit rate for the whole economy: $r' = \frac{S - W_{UA}}{K_{PA} + K_{UA}}$. Despite the differences in terms of levels (since these two series are plotted on different scales), their trends are almost exactly the same. In fact, the correlation coefficient between the profit rate from the total private economy and the net profit rate for the whole economy is 0.97.

[Figure A.7 about here]

[Figure A.8 about here]

The result is the same if we compare the profit rate for the total private economy from Equation A.15 with the net profit rate from Equation 4, which was depicted in Figure 10 in the main text. In Figure A.8 I reproduce Figure 10 but now featuring the profit rate for the total private economy jointly with the general profit rate and also with the net profit rate from Equation 4. Despite the differences in levels, the trends are virtually the same: the correlation coefficient between the profit rate from the total private economy and the net profit rate from Equation 4 is also 0.97.

In summary, the exclusion of government wages and assets changes the levels of the profit rates but the impacts on the trends are only minor. The conclusions drawn in the paper remain in place whether or not the government is included in W_{UA} and K_{UA}.

Tables and Figures for the Appendix

Table A.1: MICS Applied to the 2002 BEA Benchmark Input-Output Matrix

Productive Activities	code	Productive Activities (continued)	code
Oilseed farming	**1111A0**	Rolling mill and other metalworking machinery manufacturing	**33351B**
Grain farming	**1111B0**	Turbine and turbine generator set units manufacturing	**333611**
Vegetable and melon farming	**111200**	Speed changer, industrial high-speed drive, and gear manufacturing	**333612**
Tree nut farming	**111335**	Mechanical power transmission equipment manufacturing	**333613**
Fruit farming	**1113A0**	Other engine equipment manufacturing	**333618**
Greenhouse, nursery, and floriculture production	**111400**	Pump and pumping equipment manufacturing	**333911**
Tobacco farming	**111910**	Air and gas compressor manufacturing	**333912**
Cotton farming	**111920**	Material handling equipment manufacturing	**333920**
Sugarcane and sugar beet farming	**1119A0**	Power-driven handtool manufacturing	**333991**
All other crop farming	**1119B0**	Packaging machinery manufacturing	**333993**
Dairy cattle and milk production	**112120**	Industrial process furnace and oven manufacturing	**333994**
Cattle ranching and farming	**1121A0**	Other general purpose machinery manufacturing	**33399A**
Poultry and egg production	**112300**	Fluid power process machinery	**33399B**
Animal production, except cattle and poultry and eggs	**112A00**	Electronic computer manufacturing	**334111**
Logging	**113300**	Computer storage device manufacturing	**334112**
Forest nurseries, forest products, and timber tracts	**113A00**	Computer terminals and other computer peripheral equipment manufacturing	**33411A**
Fishing	**114100**	Telephone apparatus manufacturing	**334210**
Hunting and trapping	**114200**	Broadcast and wireless communications equipment	**334220**
Support activities for agriculture and forestry	**115000**	Other communications equipment manufacturing	**334290**
Oil and gas extraction	**211000**	Audio and video equipment manufacturing	**334300**
Coal mining	**212100**	Electron tube manufacturing	**334411**
Iron ore mining	**212210**	Bare printed circuit board manufacturing	**334412**
Copper, nickel, lead, and zinc mining	**212230**	Semiconductor and related device manufacturing	**334413**
Gold, silver, and other metal ore mining	**2122A0**	Electronic connector manufacturing	**334417**
Stone mining and quarrying	**212310**	Printed circuit assembly (electronic assembly) manufacturing	**334418**
Sand, gravel, clay, and ceramic and refractory minerals mining and quarrying	**212320**	Other electronic component manufacturing	**334419**
Other nonmetallic mineral mining and quarrying	**212390**	Electronic capacitor, resistor, coil, transformer, and other inductor manufacturing	**33441A**
Drilling oil and gas wells	**213111**	Electromedical and electrotherapeutic apparatus manufacturing	**334510**
Support activities for oil and gas operations	**213112**	Search, detection, and navigation instruments manufacturing	**334511**
Support activities for other mining	**21311A**	Automatic environmental control manufacturing	**334512**
Electric power generation, transmission, and distribution	**221100**	Industrial process variable instruments manufacturing	**334513**

Natural gas distribution	**221200**
Water, sewage and other systems	**221300**
Nonresidential commercial and health care structures	**230101**
Nonresidential manufacturing structures	**230102**
Other nonresidential structures	**230103**
Residential permanent site single- and multi-family structures	**230201**
Other residential structures	**230202**
Nonresidential maintenance and repair	**230301**
Residential maintenance and repair	**230302**
Dog and cat food manufacturing	**311111**
Other animal food manufacturing	**311119**
Flour milling and malt manufacturing	**311210**
Wet corn milling	**311221**
Fats and oils refining and blending	**311225**
Soybean and other oilseed processing	**31122A**
Breakfast cereal manufacturing	**311230**
Beet sugar manufacturing	**311313**
Sugar cane mills and refining	**31131A**
Chocolate and confectionery manufacturing from cacao beans	**311320**
Confectionery manufacturing from purchased chocolate	**311330**
Nonchocolate confectionery manufacturing	**311340**
Frozen food manufacturing	**311410**
Fruit and vegetable canning, pickling, and drying	**311420**
Cheese manufacturing	**311513**
Dry, condensed, and evaporated dairy product manufacturing	**311514**
Fluid milk and butter manufacturing	**31151A**
Ice cream and frozen dessert manufacturing	**311520**
Poultry processing	**311615**
Animal (except poultry) slaughtering, rendering, and processing	**31161A**
Seafood product preparation and packaging	**311700**
Bread and bakery product manufacturing	**311810**
Cookie, cracker, and pasta manufacturing	**311820**
Tortilla manufacturing	**311830**
Snack food manufacturing	**311910**
Coffee and tea manufacturing	**311920**
Flavoring syrup and concentrate manufacturing	**311930**
Seasoning and dressing manufacturing	**311940**
All other food manufacturing	**311990**
Soft drink and ice manufacturing	**312110**
Breweries	**312120**

Totalizing fluid meters and counting devices manufacturing	**334514**
Electricity and signal testing instruments manufacturing	**334515**
Analytical laboratory instrument manufacturing	**334516**
Irradiation apparatus manufacturing	**334517**
Watch, clock, and other measuring and controlling device manufacturing	**33451A**
Magnetic and optical recording media manufacturing	**334613**
Electric lamp bulb and part manufacturing	**335110**
Lighting fixture manufacturing	**335120**
Small electrical appliance manufacturing	**335210**
Household cooking appliance manufacturing	**335221**
Household refrigerator and home freezer manufacturing	**335222**
Household laundry equipment manufacturing	**335224**
Other major household appliance manufacturing	**335228**
Power, distribution, and specialty transformer manufacturing	**335311**
Motor and generator manufacturing	**335312**
Switchgear and switchboard apparatus manufacturing	**335313**
Relay and industrial control manufacturing	**335314**
Storage battery manufacturing	**335911**
Primary battery manufacturing	**335912**
Communication and energy wire and cable manufacturing	**335920**
Wiring device manufacturing	**335930**
Carbon and graphite product manufacturing	**335991**
All other miscellaneous electrical equipment and component manufacturing	**335999**
Automobile manufacturing	**336111**
Light truck and utility vehicle manufacturing	**336112**
Heavy duty truck manufacturing	**336120**
Motor vehicle body manufacturing	**336211**
Truck trailer manufacturing	**336212**
Motor home manufacturing	**336213**
Travel trailer and camper manufacturing	**336214**
Motor vehicle parts manufacturing	**336300**
Aircraft manufacturing	**336411**
Aircraft engine and engine parts manufacturing	**336412**
Other aircraft parts and auxiliary equipment manufacturing	**336413**
Guided missile and space vehicle manufacturing	**336414**
Railroad rolling stock manufacturing	**336500**
Ship building and repairing	**336611**
Boat building	**336612**
Motorcycle, bicycle, and parts manufacturing	**336991**
Military armored vehicle, tank, and tank component manufacturing	**336992**

Wineries	**312130**
Distilleries	**312140**
Tobacco product manufacturing	**3122A0**
Fiber, yarn, and thread mills	**313100**
Broadwoven fabric mills	**313210**
Narrow fabric mills and schiffli machine embroidery	**313220**
Nonwoven fabric mills	**313230**
Knit fabric mills	**313240**
Textile and fabric finishing mills	**313310**
Fabric coating mills	**313320**
Carpet and rug mills	**314110**
Curtain and linen mills	**314120**
Textile bag and canvas mills	**314910**
All other textile product mills	**314990**
Apparel knitting mills	**315100**
Cut and sew apparel contractors	**315210**
Men's and boys' cut and sew apparel manufacturing	**315220**
Women's and girls' cut and sew apparel manufacturing	**315230**
Other cut and sew apparel manufacturing	**315290**
Apparel accessories and other apparel manufacturing	**315900**
Leather and hide tanning and finishing	**316100**
Footwear manufacturing	**316200**
Other leather and allied product manufacturing	**316900**
Sawmills and wood preservation	**321100**
Reconstituted wood product manufacturing	**321219**
Veneer and plywood manufacturing	**32121A**
Engineered wood member and truss manufacturing	**32121B**
Wood windows and doors and millwork	**321910**
Wood container and pallet manufacturing	**321920**
Manufactured home (mobile home) manufacturing	**321991**
Prefabricated wood building manufacturing	**321992**
All other miscellaneous wood product manufacturing	**321999**
Pulp mills	**322110**
Paper mills	**322120**
Paperboard mills	**322130**
Paperboard container manufacturing	**322210**
Coated and laminated paper, packaging paper and plastics film manufacturing	**32222A**
All other paper bag and coated and treated paper manufacturing	**32222B**
Stationery product manufacturing	**322230**
Sanitary paper product manufacturing	**322291**
All other converted paper product manufacturing	**322299**
All other transportation equipment manufacturing	**336999**
Wood kitchen cabinet and countertop manufacturing	**337110**
Upholstered household furniture manufacturing	**337121**
Nonupholstered wood household furniture manufacturing	**337122**
Institutional furniture manufacturing	**337127**
Propulsion units and parts for space vehicle and guided missiles	**33641A**
Metal and other household furniture (except wood) manufacturing	**33712A**
Office furniture and custom architectural woodwork and millwork manufacturing	**337212**
Showcase, partition, shelving, and locker manufacturing	**337215**
Wood television, radio, and sewing machine cabinet manufacturing	**33721A**
Mattress manufacturing	**337910**
Blind and shade manufacturing	**337920**
Laboratory apparatus and furniture manufacturing	**339111**
Surgical and medical instrument manufacturing	**339112**
Surgical appliance and supplies manufacturing	**339113**
Dental equipment and supplies manufacturing	**339114**
Ophthalmic goods manufacturing	**339115**
Dental laboratories	**339116**
Jewelry and silverware manufacturing	**339910**
Sporting and athletic goods manufacturing	**339920**
Doll, toy, and game manufacturing	**339930**
Office supplies (except paper) manufacturing	**339940**
Sign manufacturing	**339950**
Gasket, packing, and sealing device manufacturing	**339991**
Musical instrument manufacturing	**339992**
Broom, brush, and mop manufacturing	**339994**
All other miscellaneous manufacturing	**33999A**
Air transportation	**481000**
Rail transportation	**482000**
Water transportation	**483000**
Truck transportation	**484000**
Transit and ground passenger transportation	**485000**
Pipeline transportation	**486000**
Scenic and sightseeing transportation and support activities for transportation	**48A000**
Postal service	**491000**
Couriers and messengers	**492000**
Warehousing and storage	**493000**
Radio and television broadcasting	**515100**
Cable and other subscription programming	**515200**
Telecommunications	**517000**
Accounting, tax preparation, bookkeeping, and payroll services	**541200**

Printing	**323110**
Support activities for printing	**323120**
Petroleum refineries	**324110**
Asphalt paving mixture and block manufacturing	**324121**
Asphalt shingle and coating materials manufacturing	**324122**
Petroleum lubricating oil and grease manufacturing	**324191**
All other petroleum and coal products manufacturing	**324199**
Petrochemical manufacturing	**325110**
Industrial gas manufacturing	**325120**
Synthetic dye and pigment manufacturing	**325130**
Alkalies and chlorine manufacturing	**325181**
Carbon black manufacturing	**325182**
All other basic inorganic chemical manufacturing	**325188**
Other basic organic chemical manufacturing	**325190**
Plastics material and resin manufacturing	**325211**
Synthetic rubber manufacturing	**325212**
Artificial and synthetic fibers and filaments manufacturing	**325220**
Fertilizer manufacturing	**325310**
Pesticide and other agricultural chemical manufacturing	**325320**
Paint and coating manufacturing	**325510**
Adhesive manufacturing	**325520**
Soap and cleaning compound manufacturing	**325610**
Toilet preparation manufacturing	**325620**
Printing ink manufacturing	**325910**
All other chemical product and preparation manufacturing	**3259A0**
Plastics packaging materials and unlaminated film and sheet manufacturing	**326110**
Unlaminated plastics profile shape manufacturing	**326121**
Plastics pipe and pipe fitting manufacturing	**326122**
Laminated plastics plate, sheet (except packaging), and shape manufacturing	**326130**
Polystyrene foam product manufacturing	**326140**
Urethane and other foam product (except polystyrene) manufacturing	**326150**
Plastics bottle manufacturing	**326160**
Other plastics product manufacturing	**32619A**
Tire manufacturing	**326210**
Rubber and plastics hoses and belting manufacturing	**326220**
Other rubber product manufacturing	**326290**
Pottery, ceramics, and plumbing fixture manufacturing	**32711A**
Brick, tile, and other structural clay product manufacturing	**32712A**
Clay and nonclay refractory manufacturing	**32712B**
Flat glass manufacturing	**327211**

Architectural, engineering, and related services	**541300**
Specialized design services	**541400**
Other computer related services, including facilities management	**54151A**
Management, scientific, and technical consulting services	**541610**
Environmental and other technical consulting services	**5416A0**
All other miscellaneous professional, scientific, and technical services	**5419A0**
Photographic services	**541920**
Veterinary services	**541940**
Office administrative services	**561100**
Facilities support services	**561200**
Employment services	**561300**
Business support services	**561400**
Travel arrangement and reservation services	**561500**
Investigation and security services	**561600**
Services to buildings and dwellings	**561700**
Other support services	**561900**
Waste management and remediation services	**562000**
Elementary and secondary schools	**611100**
Junior colleges, colleges, universities, and professional schools	**611A00**
Other educational services	**611B00**
Home health care services	**621600**
Offices of physicians, dentists, and other health practitioners	**621A00**
Medical and diagnostic labs and outpatient and other ambulatory care services	**621B00**
Hospitals	**622000**
Nursing and residential care facilities	**623000**
Community food, housing, and other relief services, including rehabilitation services	**624200**
Child day care services	**624400**
Individual and family services	**624A00**
Performing arts companies	**711100**
Spectator sports	**711200**
Independent artists, writers, and performers	**711500**
Promoters of performing arts and sports and agents for public figures	**711A00**
Museums, historical sites, zoos, and parks	**712000**
Fitness and recreational sports centers	**713940**
Bowling centers	**713950**
Amusement parks, arcades, and gambling industries	**713A00**
Other amusement and recreation industries	**713B00**
Hotels and motels, including casino hotels	**7211A0**
Other accommodations	**721A00**
Food services and drinking places	**722000**

Other pressed and blown glass and glassware manufacturing	**327212**
Glass container manufacturing	**327213**
Glass product manufacturing made of purchased glass	**327215**
Cement manufacturing	**327310**
Ready-mix concrete manufacturing	**327320**
Concrete pipe, brick, and block manufacturing	**327330**
Other concrete product manufacturing	**327390**
Lime and gypsum product manufacturing	**3274A0**
Abrasive product manufacturing	**327910**
Cut stone and stone product manufacturing	**327991**
Ground or treated mineral and earth manufacturing	**327992**
Mineral wool manufacturing	**327993**
Miscellaneous nonmetallic mineral products	**327999**
Iron and steel mills and ferroalloy manufacturing	**331110**
Steel product manufacturing from purchased steel	**331200**
Secondary smelting and alloying of aluminum	**331314**
Alumina refining and primary aluminum production	**33131A**
Aluminum product manufacturing from purchased aluminum	**33131B**
Primary smelting and refining of copper	**331411**
Primary smelting and refining of nonferrous metal (except copper and aluminum)	**331419**
Copper rolling, drawing, extruding and alloying	**331420**
Nonferrous metal (except copper and aluminum) rolling, drawing, extruding and alloying	**331490**
Ferrous metal foundries	**331510**
Nonferrous metal foundries	**331520**
Custom roll forming	**332114**
All other forging, stamping, and sintering	**33211A**
Crown and closure manufacturing and metal stamping	**33211B**
Cutlery, utensil, pot, and pan manufacturing	**33221A**
Handtool manufacturing	**33221B**
Plate work and fabricated structural product manufacturing	**332310**
Ornamental and architectural metal products manufacturing	**332320**
Power boiler and heat exchanger manufacturing	**332410**
Metal tank (heavy gauge) manufacturing	**332420**
Metal can, box, and other metal container (light gauge) manufacturing	**332430**
Hardware manufacturing	**332500**
Spring and wire product manufacturing	**332600**
Machine shops	**332710**
Turned product and screw, nut, and bolt manufacturing	**332720**
Coating, engraving, heat treating and allied activities	**332800**
Plumbing fixture fitting and trim manufacturing	**332913**
Car washes	**811192**
Automotive repair and maintenance, except car washes	**8111A0**
Electronic and precision equipment repair and maintenance	**811200**
Commercial and industrial machinery and equipment repair and maintenance	**811300**
Personal and household goods repair and maintenance	**811400**
Personal care services	**812100**
Death care services	**812200**
Dry-cleaning and laundry services	**812300**
Other personal services	**812900**
Federal electric utilities	**S00101**
Other state and local government enterprises	**S00203**
Noncomparable imports	**S00300**
Scrap	**S00401**
Used and secondhand goods	**S00402**

Trade, Rental, Leasing	**code**
Wholesale trade	**420000**
Retail trade	**4A0000**
Automotive equipment rental and leasing	**532100**
Commercial and industrial machinery and equipment rental and leasing	**532400**
General and consumer goods rental except video tapes and discs	**532A00**

Unproductive Activities	**code**
Medicinal and botanical manufacturing	**325411**
Pharmaceutical preparation manufacturing	**325412**
In-vitro diagnostic substance manufacturing	**325413**
Biological product (except diagnostic) manufacturing	**325414**
Software, audio, and video media reproducing	**33461A**
Newspaper publishers	**511110**
Periodical publishers	**511120**
Book publishers	**511130**
Directory, mailing list, and other publishers	**5111A0**
Software publishers	**511200**
Motion picture and video industries	**512100**
Sound recording industries	**512200**
Internet publishing and broadcasting	**516110**
Internet service providers and web search portals	**518100**

Valve and fittings other than plumbing	**33291A**	Data processing, hosting, and related services	**518200**
Ball and roller bearing manufacturing	**332991**	Other information services	**519100**
Fabricated pipe and pipe fitting manufacturing	**332996**	Nondepository credit intermediation and related activities	**522A00**
Ammunition manufacturing	**33299A**	Securities, commodity contracts, investments, and related activities	**523000**
Arms, ordnance, and accessories manufacturing	**33299B**	Insurance carriers	**524100**
Other fabricated metal manufacturing	**33299C**	Insurance agencies, brokerages, and related activities	**524200**
Farm machinery and equipment manufacturing	**333111**	Funds, trusts, and other financial vehicles	**525000**
Lawn and garden equipment manufacturing	**333112**	Monetary authorities and depository credit intermediation	**52A000**
Construction machinery manufacturing	**333120**	Real estate	**531000**
Mining and oil and gas field machinery manufacturing	**333130**	Video tape and disc rental	**532230**
Plastics and rubber industry machinery manufacturing	**333220**	Lessors of nonfinancial intangible assets	**533000**
Semiconductor machinery manufacturing	**333295**	Custom computer programming services	**541511**
Other industrial machinery manufacturing	**33329A**	Computer systems design services	**541512**
Optical instrument and lens manufacturing	**333314**	Legal services	**541100**
Photographic and photocopying equipment manufacturing	**333315**	Scientific research and development services	**541700**
Other commercial and service industry machinery manufacturing	**333319**	Advertising and related services	**541800**
Vending, commercial, industrial, and office machinery manufacturing	**33331A**	Management of companies and enterprises	**550000**
Heating equipment (except warm air furnaces) manufacturing	**333414**	Religious organizations	**813100**
Air conditioning, refrigeration, and warm air heating equipment manufacturing	**333415**	Grantmaking, giving, and social advocacy organizations	**813A00**
Air purification and ventilation equipment manufacturing	**33341A**	Civic, social, professional, and similar organizations	**813B00**
Industrial mold manufacturing	**333511**	Other Federal Government enterprises	**S00102**
Special tool, die, jig, and fixture manufacturing	**333514**	General Federal defense government services	**S00500**
Cutting tool and machine tool accessory manufacturing	**333515**	General Federal nondefense government services	**S00600**
Metal cutting and forming machine tool manufacturing	**33351A**	General state and local government services	**S00700**

Table A.2: MICS Applied to the 1947-1997 BEA GDP by Industry Accounts under SIC

Productive Activities	Trade, Rental, Leasing
Agriculture, forestry, and fishing	Wholesale trade
Mining	
Construction	Retail trade
Manufacturing	
Transportation	
Electric, gas, and sanitary services	
Telephone and telegraph	**Unproductive Activities**
Radio and television	
	Banking
Hotels and other lodging places	Credit agencies other than banks
Personal services	Security and commodity brokers
	Insurance carriers
Auto repair, services, and parking	Insurance agents, brokers, and service
Miscellaneous repair services	Holding and other investment offices
Amusement and recreation services	Other real estate
Health services	
	Motion pictures
Educational services	
Social services	Legal services
Business services	Membership organizations
Statistical discrepancy	Miscellaneous professional services
Federal Government enterprises	Federal General government
State and local Government enterprises	State and local General government

Table A.3: MICS Applied to the 1977-2011 BEA GDP by Industry Accounts under NAICS

Productive Activities	Trade, Rental, Leasing
Agriculture, forestry, fishing, and hunting	Wholesale trade
Mining	
Utilities	Retail trade
Construction	
Manufacturing	Rental and leasing services and lessors of intangible assets
Transportation and warehousing	
Broadcasting and telecommunications	
	Unproductive Activities
Educational services, health care, and social assistance	
Arts, entertainment, recreation, accommodation, and food services	Administrative and waste management services
	Administrative and support services
Other services, except government	Waste management and remediation services
Federal Government enterprises	Publishing industries (includes software)
	Motion picture and sound recording industries
State and local Government enterprises	Information and data processing services
	Finance and insurance
	Real estate
	Legal services
	Computer systems design and related services
	Miscellaneous professional, scientific, and technical services
	Management of companies and enterprises
	Federal General government
	State and local General government

Table A.4: MICS Applied to the BEA 1947-2011 Fixed Assets and Depreciation Accounts under NAICS

Productive Activities	Trade, Rental, Leasing
Agriculture, forestry, fishing, and hunting	Wholesale trade
Mining	
Utilities	Retail trade
Construction	
Manufacturing	Rental and leasing services and lessors of intangible assets
Transportation and warehousing	
Broadcasting and telecommunications	
	Unproductive Activities
Educational services	
	Publishing industries (includes software)
Health care and social assistance	Motion picture and sound recording industries
Arts, entertainment, and recreation	Information and data processing services
Accommodation and food services	Finance and insurance
Other services, except government	Real estate
Government enterprise fixed assets	Legal services
	Computer systems design and related services
	Miscellaneous professional, scientific, and technical services
	Management of companies and enterprises
	Administrative and support services
	Waste management and remediation services
	General government fixed assets

Table A.5: MICS Applied to the BLS 1947-2011 Series on Total Workers under NAICS

Productive Activities	industry code
Mining and logging	**10000000**
Construction	**20000000**
Manufacturing	**30000000**
Transportation + warehousing + utilities	**calculated**
Professional and business services	**60000000**
Education and health services	**65000000**
Leisure and hospitality	**70000000**
Other services	**80000000**

Trade, Rental, Leasing	industry code
Wholesale + Retail	**calculated**

Unproductive Activities	industry code
Information (includes publishing, software, motion picture and sound recording, video production, movie production, movie exhibition, broadcasting, TV, radio, cable TV, telecommunications, wired carriers, wireless carriers, data processing, hosting, internet)	**50000000**
Financial activities (includes finance, insurance, real estate, rental, leasing, lessors, lessors of intangible assets)	**55000000**
Government	**90000000**

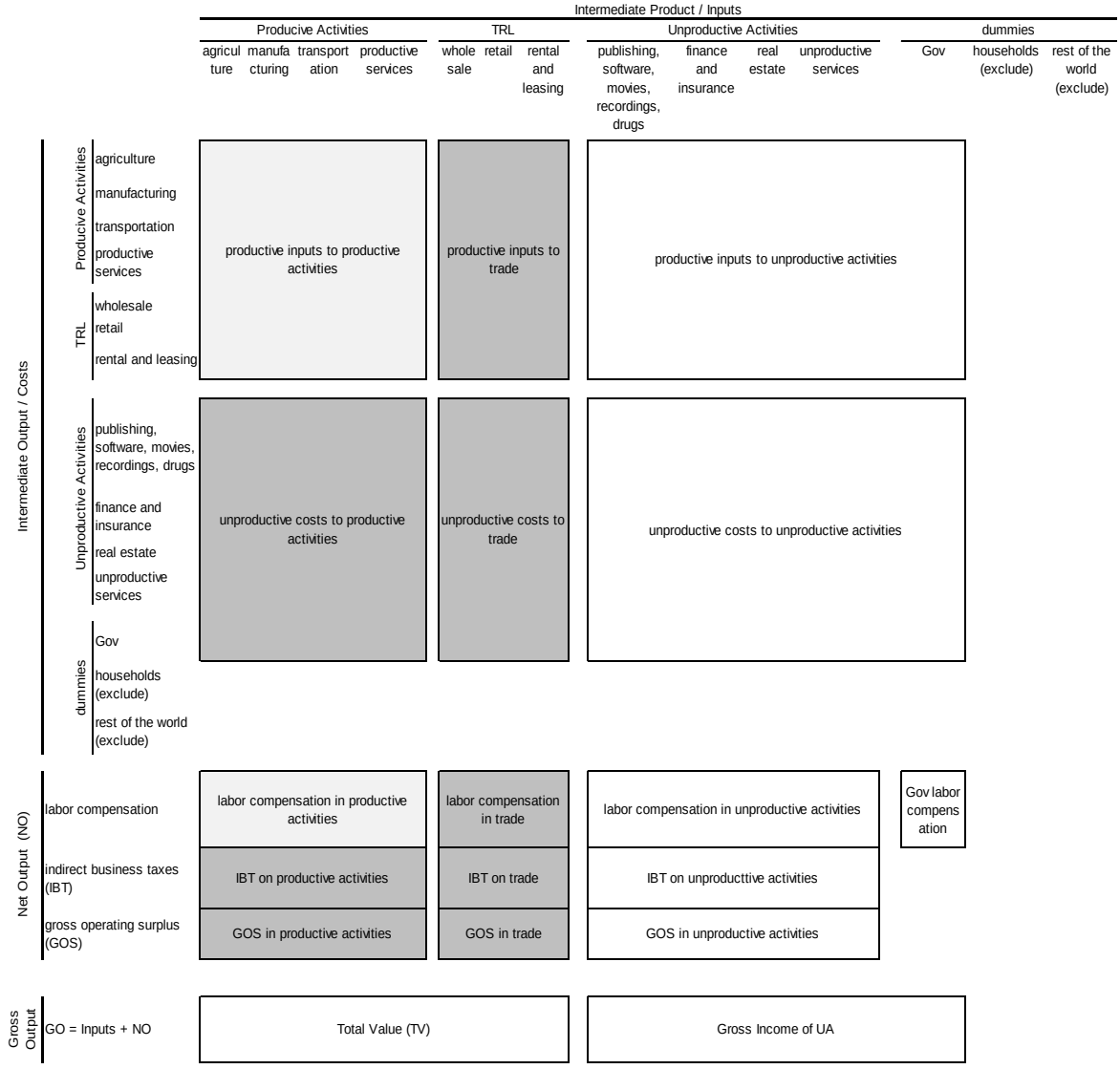
Table A.6: MICS Applied to the BLS 1947-2011 Series on Nonsupervisory Workers under SIC and NAICS

system	Productive Activities	industry code	series code
NAICS	Mining and logging	**10000000**	**CEU1000000006**
SIC	Mining	**100000**	**EEU10000003**
NAICS	Construction	**20000000**	**CEU2000000006**
SIC	Construction	**200000**	**EEU20000003**
NAICS	Manufacturing	**30000000**	**CEU3000000006**
SIC	Manufacturing	**300000**	**EEU30000003**
NAICS	Transportation + warehousing + utilities	**calculated**	
NAICS	Professional and business services	**60000000**	**CEU6000000006**
NAICS	Education and health services	**65000000**	**CEU6500000006**
NAICS	Leisure and hospitality	**70000000**	**CEU7000000006**
NAICS	Other services	**80000000**	**CEU8000000006**
SIC	Transportation and public utilities	**400000**	**EEU40000003**
SIC	Services	**800000**	**EEU80000003**
SIC	Transportation + Utilities + Services	**calculated**	

system	Trade, Rental, Leasing	industry code	series code
NAICS	Wholesale + Retail	**calculated**	
SIC	Wholesale and retail trade	**500000**	**EEU50000003**

system	Unproductive Activities	industry code	series code
NAICS	Information	**50000000**	**CEU5000000006**
NAICS	Financial activities	**55000000**	**CEU5500000006**
SIC	Finance, insurance, and real estate	**700000**	**EEU70000003**

Figure A.1: Stylized Marxist Input-Output Matrix Using MICS



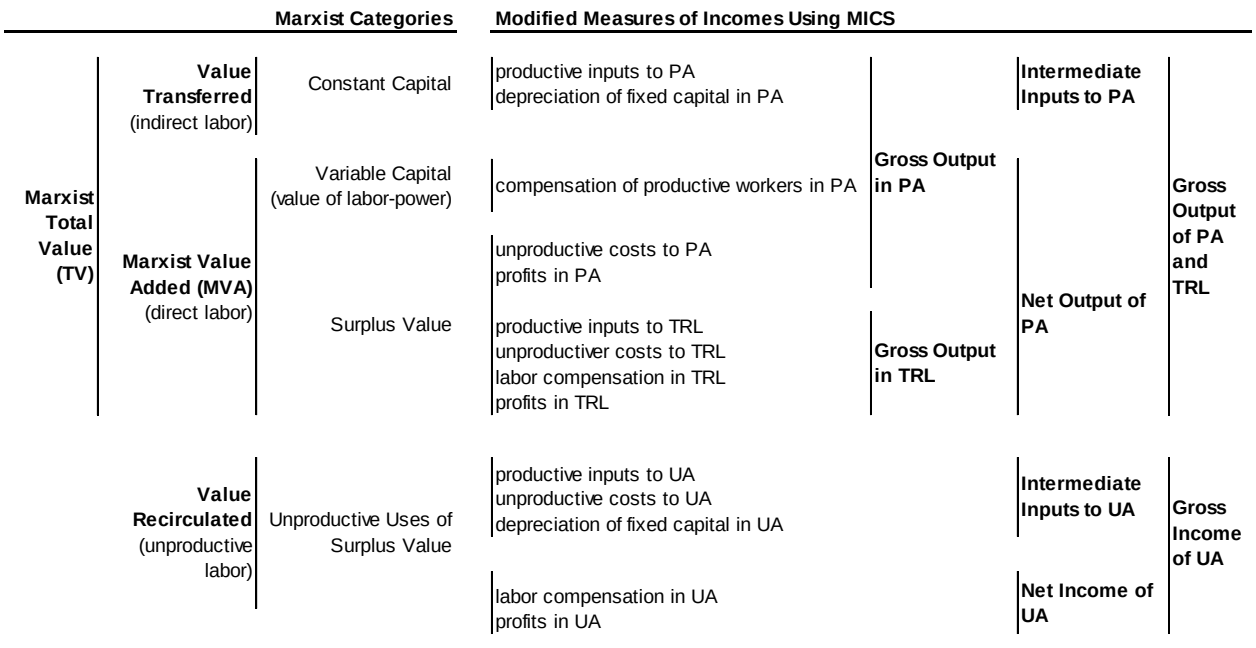
Notes: The total shaded grey area represents total value (TV) produced. The dark grey shaded are represents a first approximation to surplus value (S). The top-left light grey area represents the circulating (non-fixed) part of constant capital (C), while the lower light grey area represents a first approximation to variable capital (V). This stylized matrix is similar to that of Shaikh and Tonak (1994, p.74) but with the inclusion of knowledge and information production as unproductive activity.

Figure A.2: Simplified Marxist Input-Output Matrix Using MICS for 2002

	Productive Activities	Trade+Rental+Leasing	Unproductive Activities
Productive Activities	**3,866,754**	**284,844**	**1,082,179**
Trade + Rental + Leasing	**432,703**	**57,137**	**67,975**
Unproductive Activities	**1,122,032**	**259,425**	**1,079,658**
Value Added	**4,852,474**	**1,285,745**	**3,818,040**
Compensation of employees	3,164,865	699,708	2,203,645
Taxes on production and imports, less subsidies	205,795	278,253	140,699
Gross operating surplus	1,481,813	307,784	1,409,941

Sources: Author's calculations; BEA.
Note: Nominal figures in millions of 2002 dollars.

Figure A.3: Mapping between Marxist Categories and Modified Measures of Incomes using MICS



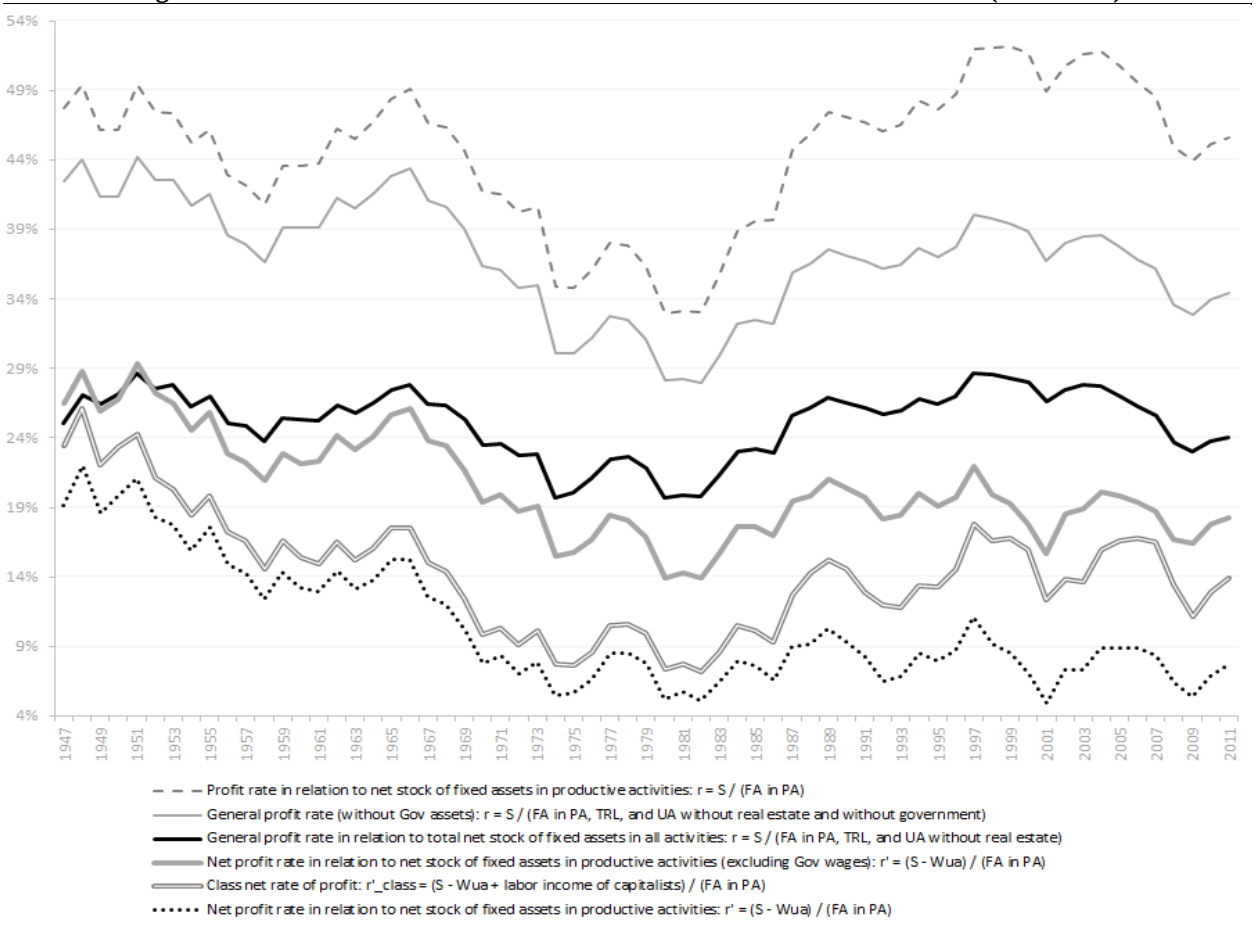
Notes: PA = productive activities; TRL = trade, rental, and leasing; UA = unproductive activities; MICS = Marxist Industry Classification System.

Figure A.4: Decomposition of Unproductive Activities for the 2002 Input-Output Matrix

Decomposition of Unproductive Activities	Net Income (VA or NIua)	Gross Income (GIua)
Knowledge and Information (knowldge-rents)	**663,075**	**1,083,920**
Real Estate (agents, managers, operators, and lessors)	**642,766**	**815,660**
Finance and Insurance	**884,082**	**1,514,384**
Non-Profit Org, Unproductive Services, Legal Services	**486,637**	**801,786**
Government services (except productive enterprises)	**1,141,479**	**1,832,104**
Total	**3,818,040**	**6,047,852**

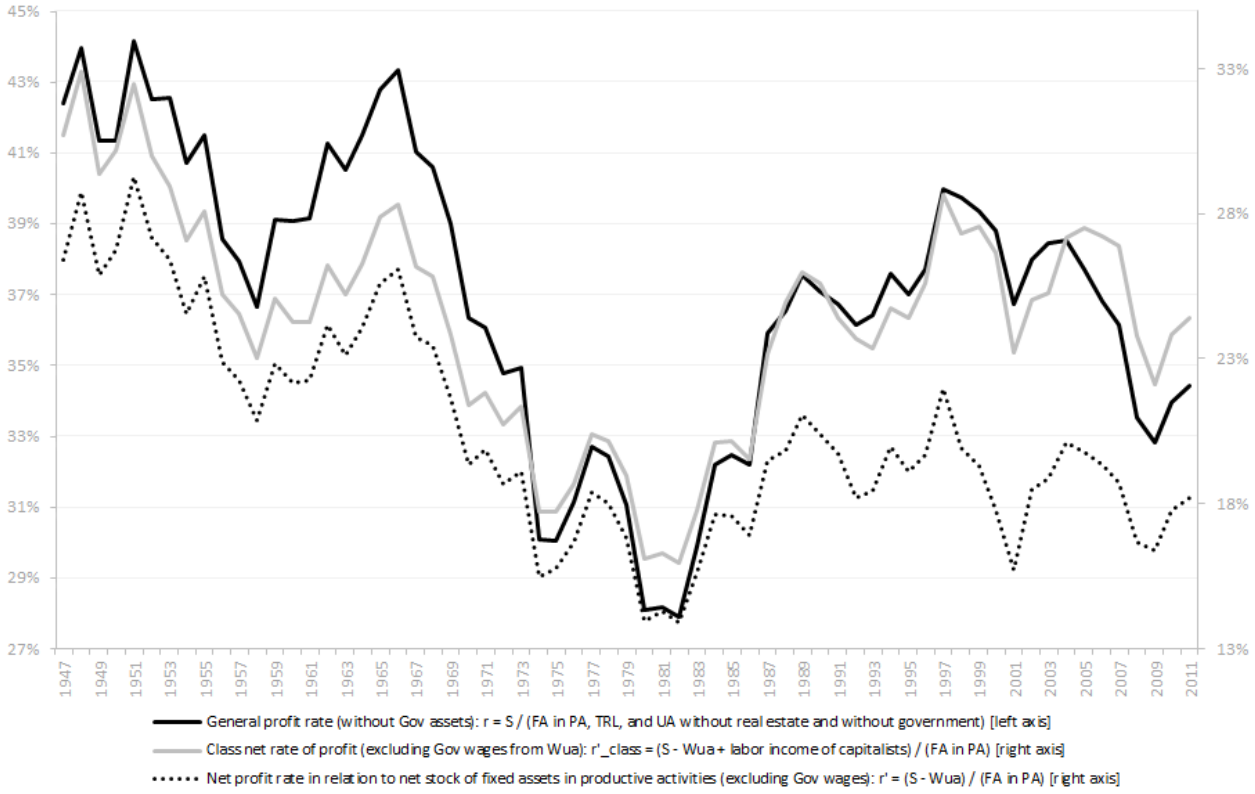
Sources: Author's calculations; BEA.
Note: Nominal figures in millions of 2002 dollars.

Figure A.5: General and Net Profit Rates - With and Without Government (1947-2011)



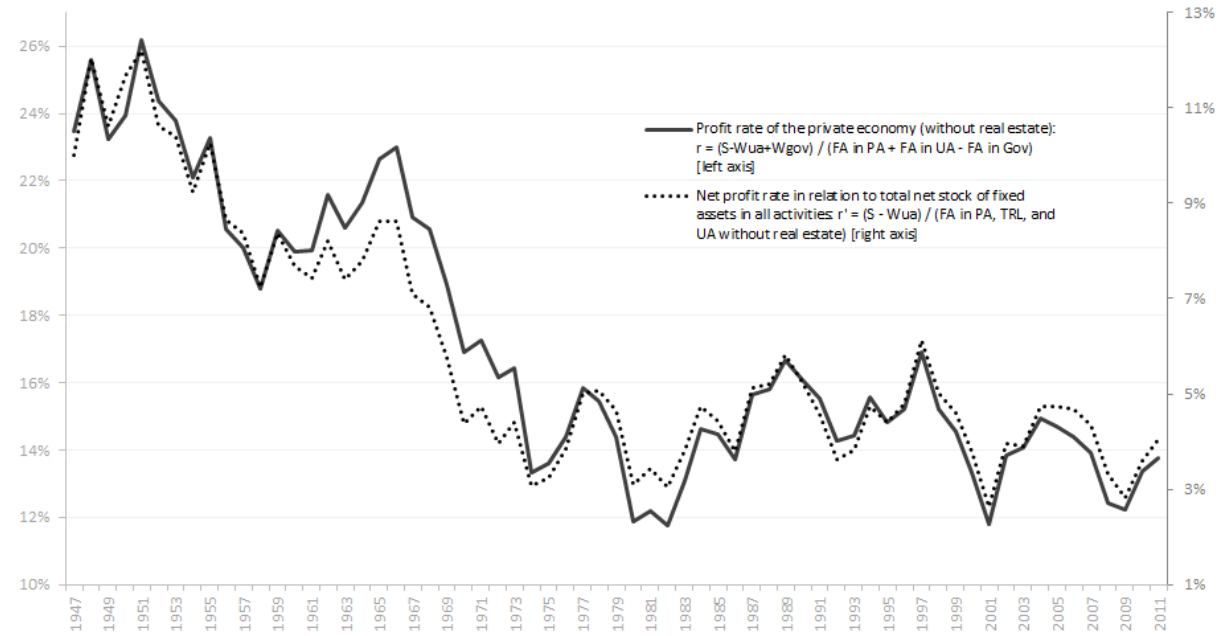
Sources: Author's calculations. Labor incomes of capitalists are from Mohun (2016).
Note: S = surplus value; Wua = total compensation of unproductive labor; PA = productive activities; TRL = trade, rental, and leasing; UA = unproductive activities; FA = fixed assets.

Figure A.6: General and Net Profit Rates - Without Government (1947-2011)



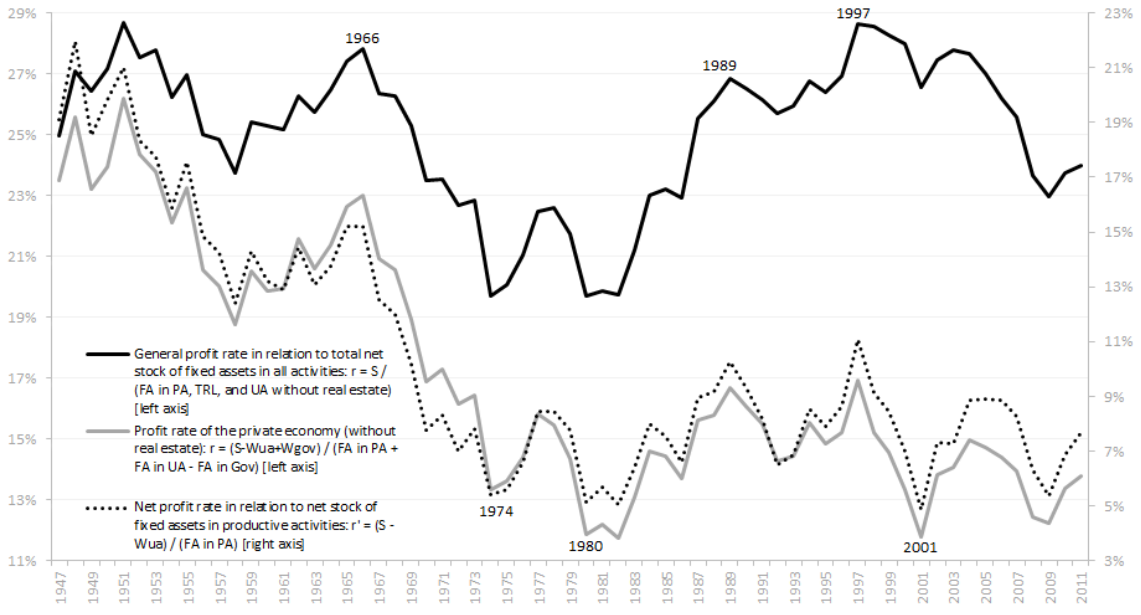
Sources: Author's calculations. The general profit rate nets out government assets from Kua, and the net profit rates net out government wages from Wua. Labor incomes of capitalists are from Mohun (2016).
Note: S = surplus value; Wua = total compensation of unproductive labor; PA = productive activities; TRL = trade, rental, and leasing; UA = unproductive activities; FA = fixed assets.

Figure A.7: Profit Rate of the Total Private Economy (1947-2011)



Sources: Author's calculations.
Note: S = surplus value; Wua = total compensation of unproductive labor; PA = productive activities; TRL = trade, rental, and leasing; UA = unproductive activities; FA = fixed assets.

Figure A.8: Profit Rate of the Total Private Economy and the General Profit Rate (1947-2011)



Sources: Author's calculations.
Note: S = surplus value; Wua = total compensation of unproductive labor; PA = productive activities; TRL = trade, rental, and leasing; UA = unproductive activities; FA = fixed assets.