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## A DISCUSSION OF THOMAS PIKETTY'S CAPITAL IN THE TWENTY-FIRST CENTURY

### Capital and Wealth in the Twenty-First Century<sup>†</sup>

By DAVID N. WEIL\*

Thomas Piketty's *Capital in the Twenty-First Century* is many things, among them an engaging historical narrative, a well-deserved scolding of his fellow economists for their intellectual narrowness, a dystopian forecast about the future path of inequality, and a political call to arms. Above all, the book (along with the papers by Piketty and coauthors on which it draws) is an exercise in measurement. It is on a foundation of new facts, wrested from a multitude of historical and contemporary data sources, that the other elements of Piketty's intellectual edifice rest.

In turn, the central element of Piketty's approach to measurement is that the concepts usually classified as *productive capital* (the input into production that results from past investment) and *wealth* (claims on current or future consumption) can both be measured by a single variable, for which he uses the term *capital*. Piketty defines capital as "the total market value of everything owned by the residents and government of a given country at a given point in time, provided that it can be traded on some market." (Piketty 2014, p. 48). Among the items included in this total are the structures, equipment, and infrastructure that make up more conventional definitions of physical capital, land, mineral deposits, precious objects, and the intellectual property, brand recognition, and market power captured in market valuations of corporate equity. The measurement of capital—both the aggregate quantity and its distribution

among the population—is the book's driving force.

#### I. Market Wealth as a Measure of Productive Capital

As a measure of capital, Piketty's construct has several potential advantages. Market prices capture past value-creating expenditures that are not measured as part of investment in the National Income and Product Accounts. Unlike the alternative of cumulating past investment flows via a perpetual inventory method, the approach of looking at market valuations also incorporates the effects of technological changes, price changes, or other shocks that rendered past investment more or less productive (Pritchett 2000). However, as will be seen below, there are also potential problems with this measure.

In France, where his data are best, the  $K/Y$  ratio was remarkably stable, in the neighborhood of seven, for most of the last 300 years. The middle of the twentieth century stands out as an aberrant period, with  $K/Y$  plummeting and then, in the last 40 years, climbing back toward its old level (at which Piketty expects it to stabilize).  $K/Y$  rose from 3.68 to 6.05 over the period 1990–2010.

The impact of these fluctuations on output can be analyzed using a simple growth accounting framework. In a companion paper (Weil 2015), I calculate the expected contribution to French income growth from the observed rise in  $K/Y$ . Capital deepening should have raised income per worker by 0.83 percent per year, which is most of the actual growth rate of 1.1 percent per year.<sup>1</sup>

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<sup>1</sup> A good deal of the rise in the  $K/Y$  ratio is the result of increased housing wealth. However, even in the non-housing sector, capital deepening accounts for almost half of income growth.

This calculation suggests that things are really going to go very poorly for France once the  $K/Y$  ratio stabilizes. Further, if this development accounting exercise is correct, then it seems like an alternative title to Piketty's book would be *Thank You, Rich People, for Propping Up Our Economy with Your Avarice*. The other two possibilities are that capital is not as productive as the standard model says it is, or that there wasn't as much capital accumulated as Piketty's calculation suggests. Piketty seems to favor the former theory. The best indication of this attitude is what is *not* in the book. Famously, Piketty calls for a global progressive tax on capital in order to eliminate large personal fortunes. But nowhere in the book is there any discussion of an alternative mechanism to encourage someone to hold the wealth that is no longer held by the very wealthy.

Some evidence of possible mismeasurement of capital comes from comparing Piketty's data to the Penn World Tables (version 8.0), where capital stock are created using the perpetual inventory method with depreciation rates varying by asset type (Inklaar and Timmer 2013). In that data, the  $K/Y$  ratio in France rose from 3.26 in 1990 to 3.59 in 2010, an annual growth rate of 0.48 percent, or one-fifth of Piketty's.

An obvious candidate for the source of measurement error in the quantity of capital is changes in asset prices. In the companion paper I show, using data from Piketty (2011), that if not for capital gains, the increase in ratio of private wealth to income over the period 1989–2009 would have been 30 percent, rather than the 78 percent observed in the data.

This raises the question of whether the increase in capital prices represented a rise in expected future productivity (due to a technology change, for example) or a change in the discount applied to future revenue streams. The broad inflation in asset values over the last several decades suggests the latter. Beyond the observable decline in market real interest rates, Piketty's narrative itself makes a strong case that the revaluation of capital was due in part to growing security of capital holders that their assets were safe from the sorts of *de facto* and *de jure* confiscations that plagued them in the middle of the twentieth century.

The observation that asset prices reflect possibilities of future capital confiscations is a useful jumping off point to talk about a broader

difficulty with using market valuation to measure the quantity of capital. Consider the example of imposition of rent control, which is one of the policies that Piketty discusses in the context of reduced capital valuations in the middle of the twentieth century. Mandating a below-market rent lowers the value of the stream of rental payments that a landlord can expect, and thus lowers the market valuation of a piece of rental property. But while rent control destroys market wealth, it doesn't destroy capital (in the short run).

## II. Market Wealth as a Measure of Wealth

Most of Piketty's focus is not on the implications of capital accumulation for aggregate output, as discussed above, but rather on the social and political implications of wealth accumulation and wealth inequality. Unfortunately, limiting his focus to wealth in the form of ownership of physical capital leaves out many wealth-like objects. Here I discuss what are likely to be the two most important quantitatively.

### A. Human Capital

One of Piketty's central concerns is the split in national income between payments to capital and payments to labor. The missing piece of this story is the increase in the fraction of payments to labor that represent payments to human capital. In the world of 1700, most wages were compensation for the raw labor that workers supplied; today, a large fraction of the wage bill represents payment for skills acquired through education and training.

Like physical capital, human capital can be measured either by accumulating and depreciating investment flows, or by considering a market value proxy: the present discounted value of future cash flows. In the companion paper, I perform both of these exercises. Cumulating investment flows suggests that the stock of human capital should be at least half as large as the stock of physical capital. Evaluating the PDV of cash flows, while subject to some conceptual difficulty in determining which parts of the wage bill represent returns to human capital and which returns to raw labor, yields an even larger number. Because human capital has increased so much over the period Piketty studies, inclusion of this form of wealth would undo his conclusion that the wealth/income ratio had

been roughly constant. More importantly, given Piketty's focus, the distribution of human capital is very different from that of market wealth.

Although there is certainly inequality in the distribution of human capital, it is far smaller than the inequality in market wealth, and the two are not perfectly correlated. While there are many reasons for this difference in distributions, the most salient is that the return to human capital is declining in the number of years of schooling that an individual receives. Thus families with limited investable funds will put all of them into children's human capital, while wealthy households will put the bulk of their investment in non-human forms. Thus a broader measure of wealth will look less unequal than market wealth.

### B. Public Transfer Wealth

The relative constancy of the wealth/income ratio over most of the 300 year period that Piketty examines, with the middle of the twentieth century being an apparent exception, is striking in light of the many changes in the structure of the economy over this period. A particular change that should have impacted the market wealth/income ratio is the rise of retirement as a significant life stage for most people. Simple calculations (see Weil 2015) suggest that life cycle wealth several times as large as a year's GDP should have been accumulated.

Such life cycle wealth is not observed for most people in the lower half of the income distribution. The explanation for its absence is that it has been displaced by claims on future government payments, what Lee and Mason (2011) call "public transfer wealth." Poterba (2014) reports that in the second quartile of the income distribution for people 65 and over, 83.5 percent of income comes from Social Security, versus 6.2 percent from private pensions and 3.7 percent from assets. Accounting for this wealth, while not changing the overall wealth to income ratio by too much (because young people have a negative public transfer wealth), greatly changes the picture of inequality painted by Piketty's focus on wealth in the form of market assets.<sup>2</sup>

<sup>2</sup>The transformation of market wealth into an annuitized stream of payments should be familiar to the reader of Balzac's *Pere Goriot*, which is one of Piketty's frequent literary touchstones. The hero of that novel at one point

Because of the progressive structure of the typical public pension system, individuals in the lower part of the distribution of lifetime income see all of the wealth that they would otherwise hold for life cycle reasons displaced by public transfer wealth, while richer individuals do not. Thus the distribution of market wealth is far more skewed than the distribution of market plus transfer wealth.

### III. Conclusion

The definition of capital that Piketty uses in his book—the market value of tradeable assets—is both problematic as a measure of the quantity of physical capital in the economy and incomplete as a measure of wealth. Given that Piketty's primary focus is on changes in the wealth/income ratio over time, as well as the distribution of wealth in the cross section, it is the latter of these two problems that is particularly significant. In 1700, at the beginning of the period that he studies in his book, marketable assets were indeed pretty much the only form of wealth. But over the intervening 300 years, new types of wealth, most notably human capital and transfer wealth, have come to constitute a very significant fraction of total wealth. Thus the constancy of the wealth/income ratio as portrayed in his data is an illusion. More importantly, the distribution of the new types of wealth that he does not measure is far more equal than, and not perfectly correlated with, wealth that falls into his analysis.

In the presence of these other forms of wealth, the case for focusing on market wealth comes to rest most heavily on its being inheritable, and thus subject to growing inequality over time. However, this argument is circular: if market wealth is only a part of aggregate wealth, then aggregate wealth is much less unequal than he has portrayed it as being, and the role of inheritance in producing inequality in aggregate wealth is similarly reduced.

The fact that Piketty misses out on some dimensions of wealth does not undermine the value of the exercise conducted in his book and supporting articles, however. Over recent

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liquidates his holdings of market assets in order purchase for himself an annuity. Admittedly, in this case the annuity is from the private sector rather than the government.

decades, the dynamics of market wealth on which he focuses probably have indeed been the biggest part of the story of wealth evolution. And even if his analysis of wealth inequality over the longer horizon is incomplete, it nonetheless represents an enormously valuable contribution to the state of our knowledge.

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