

**Discussion of paper:**

***“Quantifying the Lasting Harm to the U.S. Economy from the Financial Crisis”***

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## Introduction

Robert Hall's paper is a well-written and remarkably wide-ranging examination of the evolution of the U.S. economy over the past few years.<sup>1</sup> I learned a tremendous amount from reading it—and I'm sure that I would learn even more upon rereading it. It should be read by anyone—policymaker or academic—who is interested in deepening and broadening his or her understanding of the current U.S. macroeconomic situation.

I found the paper's focus on the behavior of the capital stock and total factor productivity (TFP) to be especially informative. Hall emphasizes that a large fraction of the decline in output (relative to trend) over the past seven years is attributable to slow growth in the capital stock and TFP. This point is valuable given how much the public policy conversation focuses on the behavior of aggregate employment.

Hall's ultimate goal is to reach conclusions about the likely future course of the U.S. macroeconomy and about the likely impact of particular kinds of policy choices on that projected evolution. The conclusions are well-summarized in Table 10 of the paper. My discussion uses Table 10 as a jumping-off point and proceeds in two distinct directions. The first direction is empirical. I discuss the behavior of U.S. macroeconomic data in the mid-20th century. My main theme is that, in these data, seemingly permanent changes in the macroeconomy did reverse and that these reversals occurred over surprisingly short time periods.

The second direction is theoretical. I argue that typical modeling of aggregate resource constraints implies that, regardless of the current state, it is *possible* for employment and output to rise remarkably rapidly over short time frames. This perspective implies that we should think about the future course of the American economy as being determined by the choices of private citizens and policymakers, and not as a matter of statistical inevitability. We can divide the relevant choice problem into two distinct questions about the future course of the economy. The first is a collective one for American society: Given the projected path for macroeconomic aggregates like consumption, output, and employment, are there alternative (but resource-feasible) paths that would be preferred? The second is a technical one for economists: Given a desired path, what policy choices (specifically, taxes and subsidies) would give rise to that desired path?

The answer to this second technical question is typically model-dependent. However, I suggest that a long-favored prescription of public finance economists — to lower the tax rate on physical investment — would give rise to higher output, consumption, capital, and employment in a wide range of models.

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<sup>1</sup> I thank Richard Condor, Terry Fitzgerald, Fabrizio Perri, and Sam Schulhofer-Wohl for their comments. The views expressed in this discussion are my own, and are not necessarily those of others in the Federal Reserve System.

This potential approach seems especially relevant given Hall's focus on the decline in capital over the past five or six years.<sup>2</sup>

### Mid-20th Century Evidence

The first part of my discussion centers on the evolution of macroeconomic data during and after the Great Depression. The Great Depression started in the United States in 1929. By 1933, key macroeconomic aggregates like TFP, real output, employment, and capital had declined sharply relative to their historical trends. The unemployment rate had soared from under 5 percent to over 20 percent. I examine the recovery of each of these variables in turn.

I'll begin with total factor productivity. Cole and Ohanian (1999) document that, by 1933, TFP was about 15 percent below trend.<sup>3</sup> It might well seem intuitive that such a profound decline would be challenging to reverse. But during the Depression, TFP grew so rapidly that it had recovered to its pre-Depression trend *within three years* after bottoming out in 1933.<sup>4</sup>

There was also a dramatic turnaround in real output, employment, and unemployment, but this turnaround was much more delayed. Ten years after the start of the Great Depression, real output remained about 25 percent below trend, employment was about 18 percent below trend, and the unemployment rate remained above 15 percent. It would have been natural to conclude that such persistent changes would prove to be permanent. Of course, such was not the case. Real gross domestic product (GDP) almost doubled from 1939 to 1944.<sup>5</sup> The unemployment rate fell by 13 percentage points in *three years*, falling from nearly 15 percent in 1940 to under 2 percent by 1943.<sup>6</sup> Employment rose by 50 percent from 1939 to 1943.<sup>7</sup> Importantly, these reversals proved to be enduring: As of 1950, all three variables were close to what one might have expected as of 1929.<sup>8</sup>

Finally, let me turn to the capital stock. Hall suggests that the decline in the size of the capital stock, relative to trend, over the past few years will be challenging to reverse. The mid-20th century data are

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<sup>2</sup> Just to be clear: I'm not suggesting that the declines in economic activity described by Hall are attributable to increased tax rates.

<sup>3</sup> Ohanian (2001) argues that little of this change can be explained by reductions in factor utilization or by compositional effects.

<sup>4</sup> See Cole and Ohanian (1999). See also Field (2011).

<sup>5</sup> See the Bureau of Economic Analysis (BEA) [National Economic Accounts](#). Data are from the "Current-dollar and 'real' GDP" spreadsheet.

<sup>6</sup> See Lebergott (1957).

<sup>7</sup> As measured by BEA full-time employment equivalents. See "Table 6.5A. Full-Time Equivalent Employees by Industry" in Section 6 of the [National Income and Product Accounts](#).

<sup>8</sup> In terms of employment, this statement is based on 1948 data (the BEA's series on full-time equivalents has a change in its estimation procedure starting in 1949).

consistent with this perspective. Even as late as 1950, fixed assets in the United States remained around 20 percent below trend.<sup>9</sup>

To sum up, in the early years of the Great Depression, there were sharp declines relative to trend in several key aggregate variables. However, for most of these variables, the declines were reversed over short periods of time. Strikingly, for real GDP, employment, and unemployment, these reversals occurred after they had persisted for over a decade. Consistent with Hall's emphasis, though, the capital stock was a notable exception to this pattern of recovery. It remained well below trend over 20 years after the Great Depression.

### **A Theoretical Perspective**

It is typical to dismiss the mid-20th century recoveries in real GDP, employment, and unemployment because of the obvious connection of those recoveries to World War II. But this dismissal seems overly glib to me for three reasons. First, in principle, the U.S. economy could have engaged in the same increased production, without the results of that increased production ever being used in the act of war. Second, the recoveries persisted well after the end of the war (and indeed proved to be essentially permanent). The final reason is theoretical: The usual modeling of aggregate resource constraints implies that rapid increases in aggregate inputs and outputs are in fact physically possible. I will spend the rest of my discussion on this last perspective and its implications.

The typical macroeconomic model is based on an aggregate production function that is unbounded from above and increasing with respect to labor and capital. Hence, given this function, it is possible for output to increase rapidly as long as the labor input increases sufficiently. In a similar vein, aggregate models of physical capital accumulation typically assume that the future capital stock is an unbounded and increasing function of physical investment. According to this formulation, it is possible for the capital stock to rise rapidly, as long as physical investment increases sufficiently.

Thus, the typical aggregate models imply that it is physically possible for future U.S. economic activity to be distinctly higher than what might be expected to unfold. This implication means that these models give rise to the following key policy question: Is the United States willing to pay the costs required to generate that materially higher path for economic activity? It is important to be clear about the meaning of the term "costs." As a society, we can only increase labor input by forgoing leisure and home production. And as a society, we can only increase investment by increasing labor input or by reducing consumption. Hence, I see the following as the key policy question: Is the United States, as a society, willing to forgo the leisure, home production, and/or near-term consumption required to generate materially higher future economic activity?

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<sup>9</sup> BEA plus 3 percent trend line starting in 1929. See "Table 1.2. Chain-Type Quantity Indexes for Net Stock of Fixed Assets and Consumer Durable Goods" in Section 1 of the [Fixed Assets Accounts Tables](#) in the BEA National Data. Data are from line 2, "Fixed Assets."

I don't see this question as one that I can answer using my tools as an economist. Rather, I see it as a social choice problem that can only be resolved through a collective decision by Americans. But let me stipulate, for the purposes of this discussion, that Americans *are* collectively willing to give up leisure and consumption so as to generate a higher path for future economic activity. What policy choices should be made so as to ensure that higher path actually materializes?

This second, technical, question can be answered—at least in the abstract—through the tools of public finance. Consider some feasible allocation. What prevents that feasible allocation from emerging as an equilibrium outcome? The answer is that the marginal societal trade-offs implied by that desired allocation may not align with the marginal private incentives that arise in equilibrium.<sup>10</sup> But this problem can be fixed by choosing a system of taxes and subsidies that fills in the gaps between marginal societal and private trade-offs. Given that system, the desired allocation then emerges as an equilibrium outcome.<sup>11</sup>

As I say, in the abstract, this is all well-understood in public finance. In macroeconomics, this basic approach has been used to great effect by a number of authors since the pioneering work of Lucas and Stokey (1983).

Of course, the problem with this abstract approach is that it is hardly model-free. Different models imply different marginal private incentives, and those give rise in turn to different implications for appropriate taxes and subsidies. Given the current economic situation, I would—overly crudely—divide the empirically relevant models into two classes: demand-constrained and supply-constrained. The demand-constrained models imply that the key private incentives have to do with the willingness of households and firms to spend given the current real interest rate. The supply-constrained models imply that the key private incentives have to do with the willingness of businesses to expand production given their assessments of costs (including taxes and regulation). The two kinds of models can have very different implications for appropriate taxes and subsidies. For example, the supply-constrained models typically imply that employment will rise if there is a temporary cut in the payroll tax rate paid by employers. Eggertsson (2011) shows that this implication is, in fact, reversed in demand-constrained models.

Fortunately, there is (at least) one kind of tax reduction that will work to stimulate future economic activity in both demand-constrained models and supply-constrained models. Suppose that the government were to reduce the tax rate on physical investment. Eggertsson (2011) shows that, in a demand-constrained model, such a policy change would stimulate investment demand and so generate higher economic activity. But this policy change is also effective in supply-constrained models. In those

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<sup>10</sup> I'm abstracting from the kinds of informational restrictions on tax systems that are explored in some detail in Kocherlakota (2010). For plausible models of individual heterogeneity, these informational restrictions impose few limits on the set of aggregate outcomes that are *achievable* by a society. However, these informational restrictions do impose limits on social insurance and redistribution, and so may well affect societal preferences over aggregate outcomes.

<sup>11</sup> I'm assuming that the government has access to affine taxes, so that potential budget imbalances can be solved through an appropriate choice of an intercept for the tax system (as in Werning 2007). I'm also ignoring the potentially important issue of implementation (to guarantee that there is no other undesirable equilibrium allocation).

models, it leads to a higher rate of capital accumulation, which stimulates future economic activity by lowering the future costs of production.<sup>12</sup>

I should be precise about what I mean by the phrase “reducing the tax rate on physical investment.” I don’t mean “reducing the tax rate on the income from financial wealth.” In a demand-constrained model, that would deter spending by households and firms and lead to worse outcomes. Nor am I referring to reducing the tax rate on dividend income, capital gains, or corporate profits. Such reductions may have effects other than reducing the tax rate on physical investment. Rather, I’m referring specifically to reducing the tax rate on the process of transforming current goods into future goods. In practice, the government can accomplish such a reduction in a relatively targeted fashion by allowing businesses to completely expense any investments into equipment, structures, or R&D.

### **Wrap-Up**

Let me conclude.

The main theme of my discussion is that the future course of the U.S. economy is not predetermined by the events of the past seven years. Both history and theory have the same lesson: It is possible to undo what might now appear to be permanent changes. The question is not whether such reversals are possible. The question is whether they are, in fact, socially desirable in light of the associated losses in terms of consumption and/or home production. In general, different models have different implications for what kinds of policies will stimulate current and future economic activity. However, reducing the tax rate on physical investment is an effective form of stimulus in a wide class of models.

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<sup>12</sup> Also see Fernández-Villaverde, Guerrón-Quintana, and Rubio-Ramírez (2012) for a discussion of future supply-side reforms that can serve as a current demand-side stimulus.

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