

Late Nineteenth-Century Tariffs and American Economic Growth

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Introduction

This paper carries a well-known message: America's high late nineteenth-century tariffs did not accelerate economic growth, or enhance America's standard of living.² It is, nevertheless, a message that needs to be reiterated for two reasons.

The first is Louis Johnston's dissertation,³ *Endogenous Growth and the American Economy 1840-1900*. The line of thought that it exemplifies opens up new lines of argument, and raises new—or perhaps very old—questions in economic history. Since the

¹ Portions of the work underlying this paper were supported by the Alfred P. Sloan and the National Science Foundations. Portions were carried out while I was working for the U.S Treasury, as Deputy Assistant Secretary for Economic Policy. A related paper is forthcoming in a Brookings Institution book: Susan Collins, ed., *Trade and America's Standard of Living*. I would like to thank Bill Bareeda, Susan Collins, Barry Eichengreen, Louis Johnston, Marty Olney, Christina Romer, David Romer, Paul Romer, Sherman Robinson, Andrei Shleifer, Peter Temin, Robert Waldmann, and David Walters for helpful comments and discussions.

The views set forward here are the opinions of the author alone, and not of any institution or government.

² The pre-Civil War tariff, however, appears to raise more complex and subtle questions. See, among many others, John James, "The Optimal Tariff in the Ante-Bellum United States," *American Economic Review* 71, 4 (September 1981): pp. 726-34; C. Knick Harley, "The Antebellum American Tariff: Food Exports and Manufacturing," *Explorations in Economic History* 29, 4 (October 1992): pp. 375-400; Clayne Pope, "The Impact of the Ante-Bellum Tariff on Income Distribution," *Explorations in Economic History* 9 (July 1972), pp. 375-421.

³ Louis Johnston, *Endogenous Growth and the American Economy, 1840-1900* (Berkeley, CA: U. Cal. Berkeley Ph.D. Diss., 1990). Johnston's dissertation is one item in a broader current of thought. See, for example, Sukkoo Kim, "Regions, Resources, and Economic Geography: The Evolution of the U.S.

mid-1950s,⁴ the models of economic growth licensed to economic historians by academic economists have assumed that the incomes paid to factors of production were more-or-less their marginal social product. Such models assumed away any large-scale externalities or linkages connecting productivity, accumulation, education, and other factors by taking for granted that total factor productivity was largely independent of factor accumulation.⁵

These baseline assumptions led to the conclusion that long-run rates of growth were very hard to move. No realistic changes in economic policies or environments could possibly have a persistent visible impact on rates of economic growth.⁶

In the 1980s economic theorists changed their minds: under the impact of the theoretical modelling work of Paul Romer and others, academic economic theorists began to think that perhaps total factor productivity growth was due to economic decisions—investments in techniques, embodied technologies, or in learning about best-practice. These economic decisions could be profoundly affected by factor accumulation.⁷

Now this new theoretical license is available for use in economic history. It has the potential to reopen a large number of old and important questions that had seemed closed, or at least well-analyzed,⁸ back when the neoclassical approach to economic growth was

Regional Economies, 1860-1987” (St Louis, MO: Washington University working paper, 1995).

⁴ The classic references are Moses Abramovitz, “Resource and Output Trends in the United States since 1870,” *American Economic Review* 46:2 (May 1956), pp. 5-23; and Robert Solow, “Technical Change and the Aggregate Production Function,” *Review of Economics and Statistics* 39:4 (August 1957), pp. 312-20.

⁵ For some perceptive comments on this line of work—that he himself played a major role in starting—see Moses Abramovitz, “The Search for the Sources of Growth: Areas of Ignorance, Old and New,” *Journal of Economic History* 53, 2 (June 1993): pp. 217-43.

⁶ One of the most powerful uses of this framework to argue that many historians had been chasing false scents is Donald McCloskey, “Did Victorian Britain Fail?” *Economic History Review* 23 (1970), reprinted as pp. 94-110 of Donald McCloskey, *Enterprise and Trade in Victorian Britain* (London: George Allen and Unwin, 1981).

⁷ See Paul Romer, “Increasing Returns and Long-Run Growth,” *Journal of Political Economy* 94:5 (October 1986), pp. 1002-37; Paul Romer, “Growth Based on Increasing Returns Due to Specialization,” *American Economic Review* 77:2 (May 1987), pp. 56-62. I have some somewhat sardonic remarks on economic theorists’ granting us license to make arguments that sound a lot like Gerschenkron-Rostow-Diaz-Alejandro in J. Bradford De Long and Lawrence H. Summers, “Equipment Investment and Economic Growth,” *Quarterly Journal of Economics* 106: 2 (May 1991), pp. 445–502.

⁸ See Jeffrey Williamson, “Watersheds and Turning Points: Conjectures on the Long-Term Impact of Civil War Financing,” *Journal of Economic History* 34:3 (September 1974), pp. 636-61; Jeffrey Williamson, *Late Nineteenth-Century American Development: A General Equilibrium History* (Cambridge, U.K.:

dominant. Here I want to push this line of thought forward by examining the relation between U.S. late nineteenth century tariff policy and economic growth.

The second reason for this paper is the growth of a current of thought holding that America's high late nineteenth-century tariffs were very good thing for growth. That this current is weak in academic economics departments is no reason for ignoring it: academic economists' "market share" in our society's knowledge of and debate over the economy and economic policy is much less than it used to be. Today a good journalist like James Fallows plays a larger role in shaping popular, elite, and political visions of economic policy as Robert Solow or Robert Lucas.

And James Fallows strongly believes that America's high late nineteenth-century tariffs played a powerful role in making America a prosperous, leading-edge, high standard of living industrial economy. In his view, a look back at the nineteenth century reveals that belief that free trade is good economic policy:

fail[s] a test of history.... [Free trade principles] do not explain how the industrial old guard—first England, than America—rose to power. Indeed, those countries developed fastest when the paid least attention to today's... [orthodox free-trade] principles of economic growth...

The quote is from James Fallows' book, *Looking at the Sun: The Rise of the New East Asian Economic and Political System*.⁹ The argument that America's post-Civil War tariff plays an important role in an argument that free trade with East Asia is not in America's national interest. Thus the stakes in getting a good picture of the tariff and American late nineteenth-century development are not low.

Against this background—the importance of communicating with a strong current of thought that believes America's late nineteenth-century tariffs were an effective industrial

Cambridge University Press, 1974).

⁹ James Fallows, *Looking at the Sun: The Rise of the New East Asian Economic and Political System* (New York: Pantheon Books, 1994), pp. 193-4. But see also Alice Amsden, *Asia's Next Giant* (New York: Oxford University Press, 1989), William Lazonick, *Business Organization and the Myth of the Market Economy* (Cambridge, U.K.: Cambridge University Press, 1991), and Thomas McCraw, "Mercantilism and the Market: Antecedents of American Industrial Policy," in C.E. Barfield and W.A. Schambra, eds., *The Politics of Industrial Policy* (Washington: American Enterprise Institute, 1986), pp. 33-62, among others.

policy, and the re-opening of old questions as a result of shifts in fashionable economic models—this paper surveys what we can say about the tariff and late nineteenth-century American development.

Its conclusion is that the conventional wisdom of, say, Jeffrey Williamson's *Late Nineteenth-Century American Development* is in good shape, even though the “new growth economics” has revoked Williamson's theoretical license. Because late nineteenth-century America relied on imports for a relatively large share of its capital goods, it is hard to construct a scenario in which the late nineteenth-century tariff—concentrated on foreign manufactures—aided accumulation and boosted productivity. Belief in free trade does not “fail a test of history,” at least not in late nineteenth-century America, because it is very difficult to see any plausible mechanism by which the particular structure of America's tariff aided industrial development.

Late Nineteenth-Century Tariffs

Why did post-Civil War America have a high tariff? Because wars are expensive, the debt resulting from a war is a serious burden, and the pre-income tax amendment federal government had few alternative sources of revenue.¹⁰

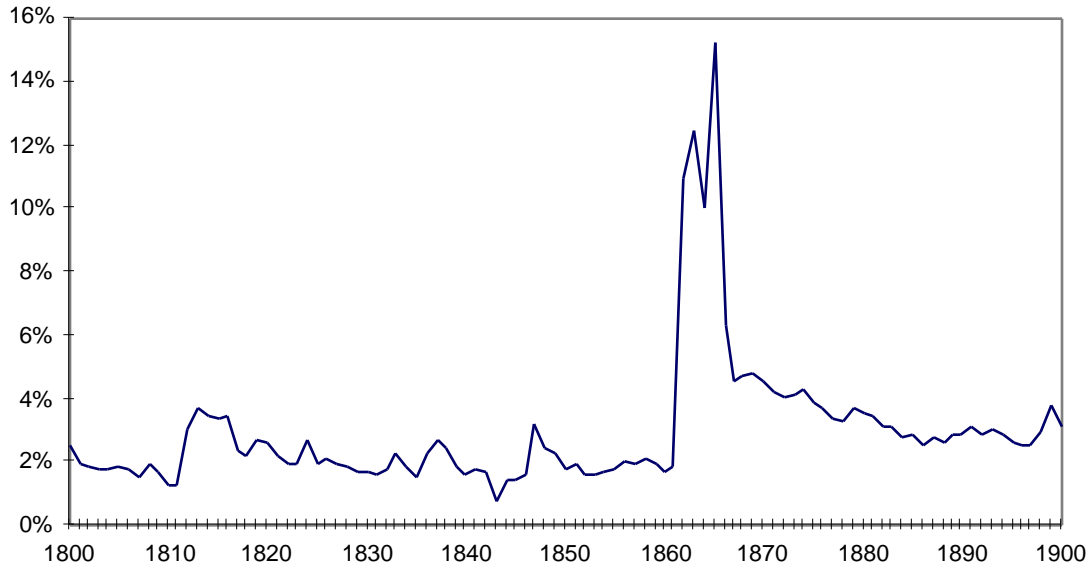
The Civil War

In 1860 total spending by the federal government had amounted to \$63.1 million—somewhat less than two percent of national product. By 1865 the federal government spent \$1.30 billion—the first time a federal budget exceeded a billion dollars, and the only time federal expenditures would surpass a billion dollars until the United States entered World War I. Because of wartime inflation, nominal national product had more than doubled

¹⁰ Jeremy Atack and Peter Passell, *A New Economic View of American History from Colonial Times to 1940* (New York: W.W. Norton, 1994), may well be the single best summary treatment of the nineteenth century American economy.

between 1860 and 1865, and so 1865 federal expenditures amounted to approximately one seventh of national product.

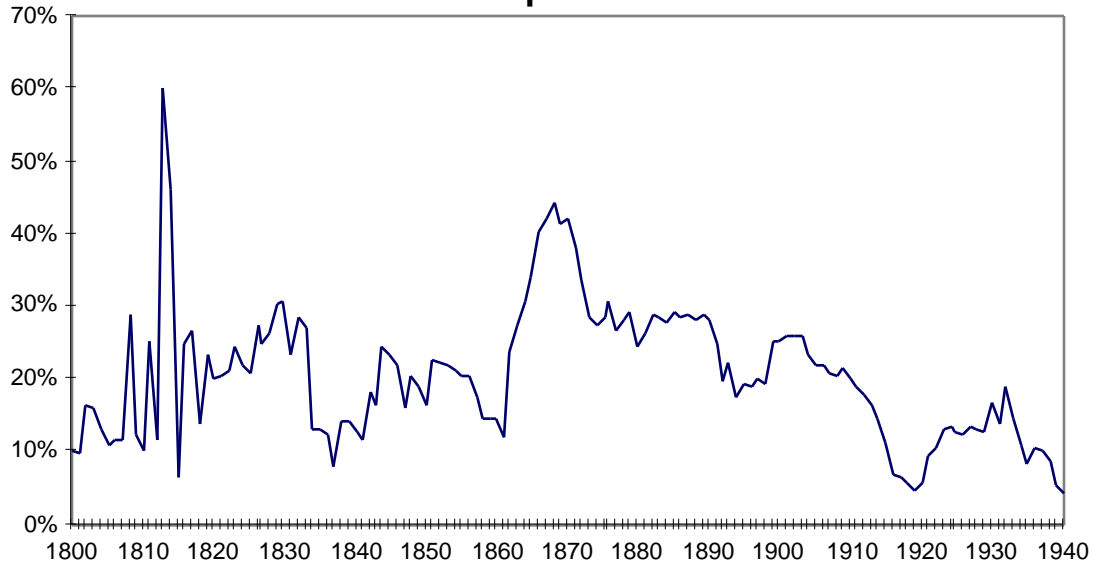
Figure 1: Nineteenth-Century Federal Spending as a Share of National Product (Approximate)



After the Civil War, debt interest alone was as large a share of national product as all federal expenditures had been before the war. A relatively high tariff of thirty percent of imports, levied on imports of between six and seven percent of national product, raised revenue worth some two percent of national product: enough to fund the interest on the debt, leaving other federal revenues free to pay for current operating expenditures and for the retirement of debt principal.

The federal government financed the Civil War through every channel that was conceivable, and some channels that were no conceivable before the war—creation of a national banking system to expropriate private sources of seignorage, large-scale borrowing, the (temporary) institution of a federal income tax, other internal revenues, and on top of these a substantial increase in tariffs.

Figure 2: Tariff Revenue as a Share of Total Imports



The Tariff

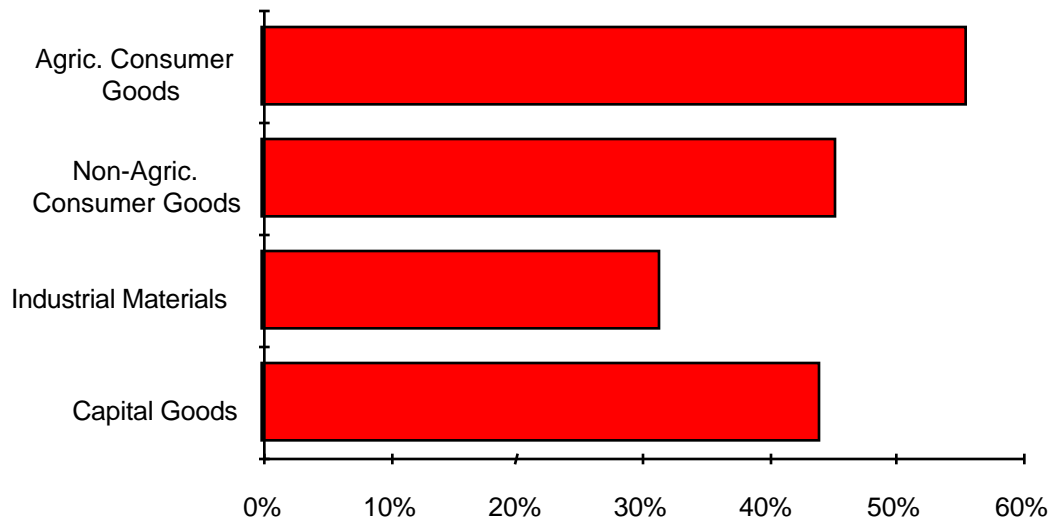
Tariffs tripled as a share of imports as a result of the Civil War, rising from the level of fifteen percent or less it had reached after the tariff cuts of the 1850s. Before the Civil War, tariffs had appeared to be on a long-term downward path. Both the South and the West had an interest in lower tariffs and cheaper manufactures. This potential political coalition appeared over time to be gaining strength, relative to the alternative potential political coalition of the West and Northeast coalescing behind a platform of industrial protection to help northern manufacturers coupled with a tariff revenue-funded program of internal improvements to aid Western development.¹¹

In the absence of the Civil War, it is very hard to envision tariffs reaching their

¹¹ The classic reference is still Frank W. Taussig, *The Tariff History of the United States* (New York: G.P. Putnam's Sons, 1931). Also useful is Clayne Pope, "The Impact of the Ante-Bellum Tariff on Income Distribution," *Explorations in Economic History* 9 (July 1972), pp. 375-421. A very insightful discussion of the politics of pre-Civil War tariff reduction is William Freehling, *Secessionists at Bay: 1776-1854* (New York: Oxford University Press, 1990).

historical late nineteenth-century levels. It is much easier to envision a continuation of the slow erosion of tariffs as a share of imports as politicians took steps to satisfy Southern and Western importers and consumers. The same process of tariff reduction did ultimately take place between 1865 and 1930. But in the absence of the Civil War it would have started from a lower base of ten to fifteen percent rather than the thirty to forty percent of the late 1860s. And proportional reductions in tariff revenue might well have proceeded somewhat faster in the absence of the requirement of amortizing the Civil War debt.¹²

Figure 3: *Ad Valorem* Tariff Rates, 1870



As figure 3 shows, the post-Civil War tariff structure was roughly even across broad groups of commodities. Agricultural product-based consumer goods faced the highest average tariffs of nearly fifty-five percent, but the average tariffs on other consumer goods and on capital goods were forty percent or so. A small break was given to industrial

¹² See, again, Frank W. Taussig, *The Tariff History of the United States* (New York: G.P. Putnam's Sons, 1931). See also Bennett D. Baack and Edward John Ray, "The Political Economy of Tariff Policy: A Case Study of the United States," *Explorations in Economic History* 20:1 (January 1983), pp. 73-93; Bennett D. Baack and Edward John Ray, "Tariff Policy and Comparative Advantage in the Iron and Steel Industry:

materials on average, with an average tariff of thirty percent or so *ad valorem*.

At a finer level of disaggregation, of course, tariff levels varied widely: a low of ten percent on imports of dyestuffs, and a high of 252 percent on distilled liquors.

For more than twenty years after 1870, the tariff structure was nearly frozen in the form it had reached in the aftermath of the Civil War. Over time, duties on some pure revenue goods—like tea and coffee—were eliminated. Tariffs on some imports were lowered to satisfy consumer sentiment. Tariffs on other goods were explicitly raised. Some goods were reclassified to fit into a higher tariff category, in response to protectionist pressures. Yet all in all, as figure 2 above shows, there was little reduction in tariffs as a share of imports for a generation or so after 1870.¹³

There were attempts to decrease and increase tariffs in the post-Civil War era: Democrats tried to win elections by promising tariff reductions favorable to Western consumer interests. Republicans took some election victories as an excuse to raise industrial tariffs—which were then rapidly reversed. For consumers, reductions in any tariffs were equally welcome. Industries that had grown comfortable behind the protectionist walls created by the more-or-less uniform tariff increases of the war lobbied for the preservation of their own duties.

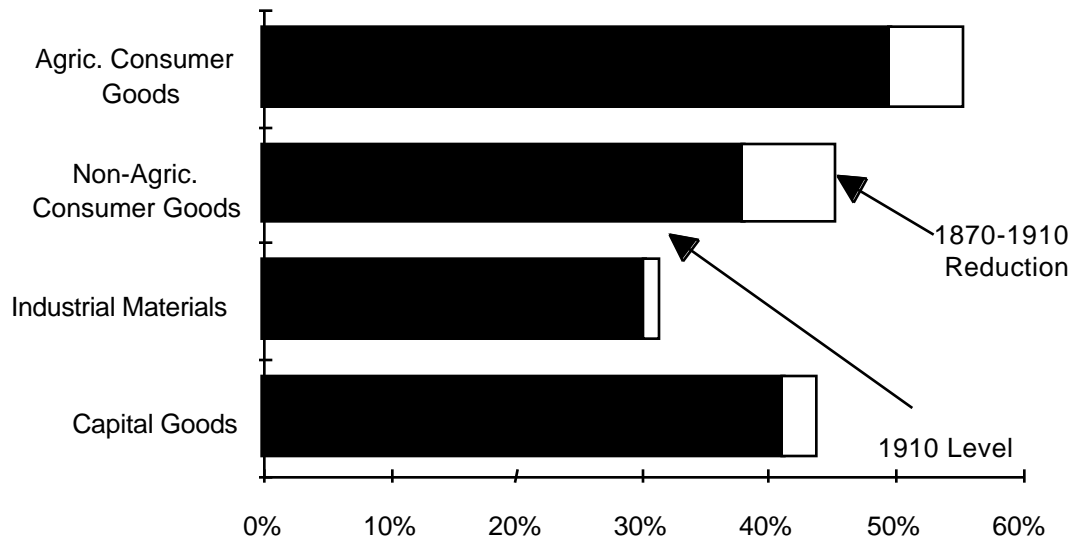
Thus the less a commodity was produced in the United States, the greater was the reduction in its tariff in the post-Civil War rounds of tariff reductions. As figure 4 below shows, *ad valorem* duties on classes of articles fell most for non-agricultural consumer goods, with *ad valorem* tariffs on capital goods remaining in 1910 nearly at their 1870 levels. Note, importantly, that capital goods were certainly not subject to tariff at a rate

1870-1929,” *Explorations in Economic History* 11:1 (January 1974), pp. 33-51.

¹³ Also useful as studies of the political economy of the tariff are John Hansen, “Taxation and the Political Economy of the Tariff,” *International Organization* 44, 4 (Fall 1990): pp. 527-51; Edward Kaplan and Thomas Ryley, *Prelude to Trade Wars: American Tariff Policy, 1890-1922* (Westport, CT: Greenwood Press, 1994); Richard Edwards, “Economic Sophistication in Nineteenth Century Congressional Tariff Debates,” *Journal of Economic History* 30, 4 (December 1970): pp. 802-838; and Judith Goldstein, *Ideas, Interests, and American Trade Policy* (Ithaca, NY: Cornell University Press, 1993).

lower than average in the post-Civil War United States.

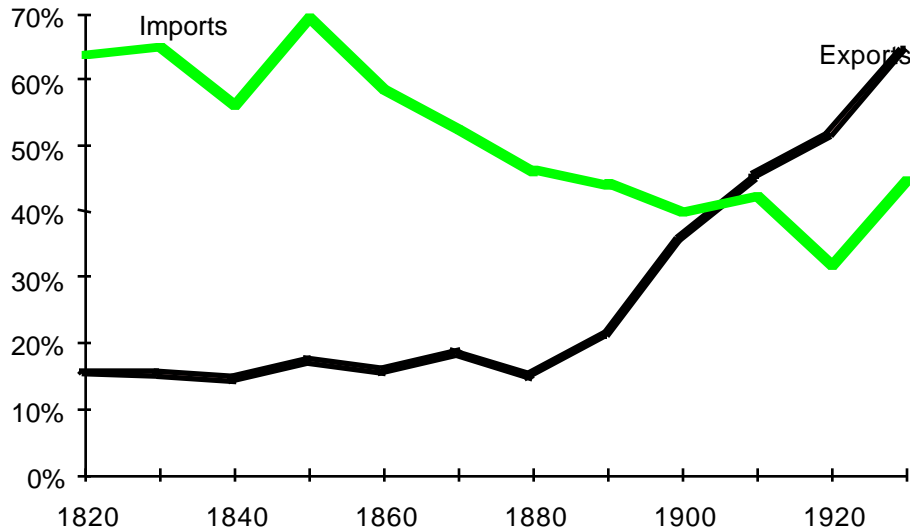
Figure 4: *Ad Valorem* Tariff Rates 1910, and 1870-1910 Tariff Reduction



Tariff revenues as a share of imports in 1910 were nearly one-third lower than in the 1870s and 1880s. But the main cause was the changing pattern of trade. The United States swung from a financial capital- and manufactures-importing nation to a capital- and manufactures-exporting nation. Imports of manufactured goods subject to heavy tariffs fell in relative terms. Imports of consumption goods subject to lighter tariffs or to no tariffs rose more than proportionally.¹⁴ As figure 5 below shows, the U.S.—which had always been an important exporter of food product manufactured goods—had become an important exporter of non-food manufactures as well by the early years of the twentieth century. By 1910 the United States was running a positive balance of trade in non-food product manufactured goods.

¹⁴ Robert L. Lipsey, "U.S. Foreign Trade and the Balance of Payments, 1800-1913," Working Paper 4710 (Cambridge, MA: NBER, 1994).

Figure 5: Non-Food Manufactures Share of Trade



How Might the Tariff Have Affected Productivity?

The standard neoclassical analysis of the post-Civil War tariff is straightforward. Suppose for the simplicity's sake that the elasticity of demand for imports was one. Then a thirty-percent tariff (a little lower than the average value over 1800-1940) would reduce the import share of national demand from a counterfactual level of nine percent to the actual level of about seven percent of national product. The consumer and producer surplus foregone on each discouraged import would amount, on average, to fifteen percent of the import's value.

The net result? A reduction in real total factor productivity of some 0.3 percent of national product as the U.S. was forced to shift economic activity away from its most efficient pattern of specialization in the world division of labor. More generally, a thirty percent tariff would generate a reduction of $0.3(e^2)$ percent in total factor productivity,

where e is the elasticity of demand for imports.

There is little reason to think that such a reduction in real incomes would fall disproportionately on capital rather than on labor, and so equalize the distribution of income and wealth. There is good reason to think that such a reduction in real incomes would transfer wealth from Western farmers to Eastern industrialists, and so make late nineteenth-century America a more unequal society.¹⁵

Pursuing the chain of implications a bit further, the $0.3(e^2)$ reduction in real incomes (holding production patterns fixed) is amplified over time: the poorer tariff-ridden economy is saving less, and using its savings less productively than the counterfactual richer, tariff-free late nineteenth-century United States would have

Only if Eastern industrialists had a markedly higher propensity to save than Western farmers,¹⁶ or if eastern workers responded to better opportunities in industry by investing especially heavily in their own educations—and we have no good reason to think that either of these was the case—would the standard neoclassical growth analysis suggest that the late nineteenth century tariff might have boosted the growth of the American economy.

How does this standard analysis change when we break down the wall between factor accumulation, on the one hand, and the determinants of total factor productivity, on the other?

Increasing Returns External to the Firm

One line of thought—the line explored by Louis Johnston in reinvestigating analyses of the possible impact of Civil War debt repayment¹⁷—is that, in a sense, the

¹⁵ See Jeffrey Williamson, *Inequality, Poverty, and History* (Cambridge, MA: Basil Blackwell, 1991).

¹⁶ For some evidence that this was not the case, see John James and Jonathan Skinner, “Sources of Savings in the Nineteenth Century United States,” in Peter Kilby, ed., *Quantity and Quiddity: Essays in U.S. Economic History* (Middletown, CT: Wesleyan University Press, 1977), and Susan B. Carter and Richard Sutch, “The Myth of the Industrial Scrap Heap: A Revisionist View of Turn-of-the-Century American Retirement,” *Journal of Economic History* 56, 1 (forthcoming March 1996).

¹⁷ In addition to Louis Johnston, *Endogenous Growth and the American Economy* (Berkeley, CA: Berkeley Ph.D. Diss., 1990), see also John James, “Public Debt Management Policy and Nineteenth Century

economy's "stock of industrial knowledge" is proportional to its stock of industrial capital. Past *net* (not replacement) investments produce not only capital but knowledge: knowledge about how to employ new production technologies, about how to make machines run more efficiently, about how to manage workers and businesses in an industrial environment: knowledge that cannot be kept the "private" property and resource of the firm that did the investing, but rapidly becomes available to all producers through inspection of their competitors' operations and the hiring away of their competitors' engineers.

In this case, start from the standard neoclassical production function:

$$(1) \quad y = \alpha (n) + (1 - \alpha)(k) + a$$

where "y" is the proportional change in total production, "n" is the proportional change in the economy's labor supply, "k" is the proportional change in the accumulated net capital stock, " α " is the share of national income earned by labor, and "a" is the proportional change in "technological knowledge" determined by some process of invention and innovation, unrelated to factor accumulation, elsewhere in the society.

But "new growth" models allow for feedback from factor accumulation to technological knowledge, and replace "a" with " $a' + \mu k$ "—a portion a' of advances in technological knowledge that truly is generated by factors outside the macroeconomy, and a portion μk that is a byproduct of increases in the total net stock of accumulated capital.

The aggregate production function is thus:

$$(2) \quad y = \alpha (n) + (1 - \alpha)(k) + a' + \mu k$$

$$(3) \quad y = \alpha (n) + (1 - \alpha + \mu)(k) + a'$$

A given increment to the capital stock boosts production by more in “new growth” models because a given investment not only increases the productivity of the investing firm, but adds to the stock of practical experience and social knowledge about how to use modern machine technologies productively.

Businesses, however, do not take into account the effect of their investment decisions on overall economy-wide productivity: because all their competitors rapidly gain access to the same “technological knowledge” as well, benefits of increased economy-wide productivity show up one-for-one in higher wages, and have no effect on firm profits. But the economy as a whole exhibits *increasing returns*. Thus policies that boost savings, investment, and overall capital accumulation make a significant difference in faster productivity and economic growth, and higher standards of living.

Could adopting this approach reverse the presumption that high late-nineteenth century tariffs lowered output and retarded growth? The answer is “No.” The key problem is that the United States levied its heavy tariffs on those manufactured capital goods whose accumulation is the trigger for advances in knowledge and total factor productivity.

To see this, close the model above with a simple capital accumulation equation: the proportional rate of growth of the capital stock k depends on the depreciation rate δ , on the economy’s savings rate s , and on the price of capital goods, p^k , relative to the price of output in general:

$$(4) \quad k = \frac{s}{p^k} \frac{Y}{K} - \delta$$

where capital Y and capital K are the *levels* of production and of the accumulated net capital stock, respectively. And, for simplicity, assume that labor force growth n and the exogenous component of productivity growth a (or a') are constant.

Johnston used this model to analyze the effect of debt-retirement policies after the Civil War. But it can easily be used to analyze the tariff. Consider three cases: the

neoclassical model, in which total factor productivity growth is unconnected with factor accumulation ($\mu=0$); the particular specification used by Louis Johnston ($\mu=0.05$), with the magnitude increasing returns estimated from his study of industry location in the nineteenth century; and a specification giving a stronger role to increasing returns ($\mu=0.10$).

The parameter values needed for the models made up of (1) and (4) or (3) and (4) to replicate growth over the post-Civil War generation 1870-1910 in the “baseline” high-tariff case are shown in table 1 below.

Table 1: Parameter Values, One-Sector Model

	Parameter	Neoclassical Model	"Low Externality" Model	"High Externality" Model
n	Annual labor force growth	2.7%	2.7%	2.7%
s	Savings rate	19.5%	19.5%	19.5%
pk	Relative price of capital goods	1, 1.1, 1.2	1, 1.1, 1.2	1, 1.1, 1.2
	Annual depreciation	3%	3%	3%
	Labor share of income	68%	68%	68%
a	Annual exogenous TFP growth	1.13%	0.87%	0.64%
μ	Productivity effect of investment	—	0.05	0.10

In the neoclassical specification, made up of (1) and (4), annual exogenous total factor productivity growth of 1.13% per year, annual labor force growth of 2.7% per year, a depreciation rate of 3%, a savings share of national product (including foreign capital inflows) of 19.5%, and a labor share of national income of 68 percent together replicate 1870-1900 growth. In the alternative specification, made up of (3) and (4), the dependence of productivity growth on investment forces truly exogenous growth to be lower for the baseline to track history. In the “low externality” ($\mu=0.05$) version, approximately one-quarter of 1870-1900 TFP growth is a byproduct of capital accumulation; in the “high externality” ($\mu=0.10$) version, nearly one-half is a byproduct of accumulation.

What is the effect of removing the tariff on this model? First, there is a one-time boost to total factor productivity. The tariff had artificially depressed the relative price of agricultural goods, in which the U.S. had an enormous comparative advantage. Removal of the tariff allows the U.S. to shift labor and capital from some low value-added non-agricultural sectors to the high value-added agricultural sector. With a counterfactual import share of GDP in the late nineteenth century of eight percent, and with a thirty percent average tariff, the one-time boost to economy-wide total factor productivity as a result of tariff elimination is 0.3 percent under an assumed unit elasticity of demand.

Second, the tariff had artificially elevated the relative prices of industrial goods, including the relative price of capital goods. A higher price of capital goods means that any given savings effort will generate less investment. Thus with a high tariff the rate of growth of the capital stock will be *lower* than with free trade no matter what the original stock of capital. No matter where the economy starts, capital accumulation will be lower with a higher tariff—and so, over time, productivity will fall further behind both because a lower-productivity economy will support a lower savings effort and because the higher price of capital goods translates the lower savings effort into a still lower amount of net investment.

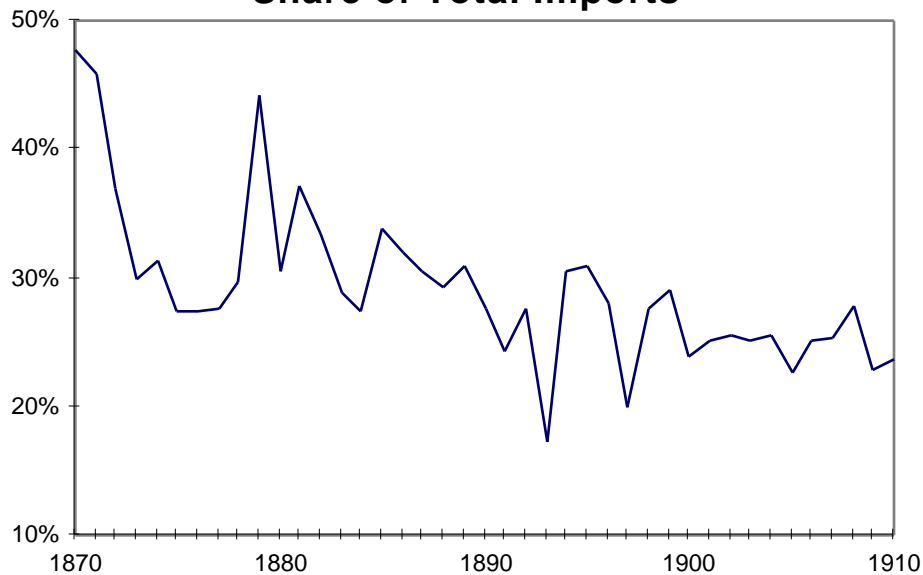
The structure of the post-Civil War American economy was such that a higher price of imported capital goods could do significant damage to economic growth. The tariff made a very wide range of investment goods—from British machine tools and steam engines to steel rails to precision instruments—more expensive. For more than a generation after the end of the Civil War, British machinery and iron and steel exports remained competitive in much of the United States market, implying that the roughly 50 percent tariffs imposed on imports of capital goods from abroad had an impact not only on the one to two percent or so of national product spent on imported goods for investment, but on prices of domestically-produced capital goods as well.

The effect of the tariff on the quantity of investment in domestically-produced capital goods is hard to assess. In the post-Civil War generation, some 16 percent of

national product on average was invested in domestically-produced, non-residential construction investment. If each \$1 of tariff imposed on a foreign-made capital good raised the cost of its domestic substitute by as little as 12.5¢, then a 50 percent tariff on imported manufactures would diminish the share of national product devoted total investment in by two percentage points of national product.

If each \$1 of tariff imposed on a foreign-made capital good raised the cost of its domestic substitute by 37.5¢, then a 50 percent tariff on imported manufactures would diminish the share of national product devoted to investment by four percentage points of national product. Use this range of two to four percent of national product for the boost to investment, holding the savings rate constant, generated by tariff elimination.

Figure 6: Finished Manufactures as a Share of Total Imports



**Table 2: Effect of Tariff on Economic Growth,
One-Sector Model**

	Boost to Output Over 30 Years	Boost to Annual Growth
<i>Neoclassical Model</i>		
Tariff elimination: low effect	4.3%	0.14%
Tariff elimination: high effect	7.8%	0.25%
<i>Increasing Returns—Moderate Case (23.5% of TFP growth due to "externalities")</i>		
Tariff elimination: low effect	5.1%	0.16%
Tariff elimination: high effect	9.4%	0.30%
<i>Increasing Returns—High Case (46.5% of TFP growth due to "externalities")</i>		
Tariff elimination: low effect	5.8%	0.19%
Tariff elimination: high effect	11.4%	0.36%

Table 2 shows the effect of tariff elimination in these three specifications for two cases: the “low effect” case in which removal of the tariff would have boosted net investment by only two percent of national product, and the “high effect” case in which removal of the tariff would have boosted net investment by four percent of national product.

In the neoclassical “no externalities” model, removal of the tariff would have generated a substantial boost to economic growth: total national product in 1900 is 4.3 to 7.8 percent higher, depending on whether tariff elimination has a relatively small or a relatively large effect on the price of investment goods in the U.S., if the U.S. had eliminated its tariff in 1870 and used alternative taxes to fund the Civil War debt.

When analyzed in “new growth” models—models that assume a link between investment, learning-by-doing, and the stock of social “technological knowledge” that boosts total factor productivity—the late nineteenth-century tariff imposed even higher costs on the U.S. economy. National product in 1900 was depressed by between 5.1 and 11.4 percent because of the late nineteenth-century tariff.

In all the models, the mechanisms by which tariffs retard growth are the same. A high-tariff economy throws away some of the potential gains from the international division

of labor. A high tariff economy is a low-investment economy, hence a slower growth economy. And these effects are larger because the link between investment and growth is stronger as we move away from the simple neoclassical specification.

Multi-Sector Models

The one-sector model above contains the skeleton of the argument: the late nineteenth-century tariff appears more destructive in the “new growth” models that posit externalities from investment because the most significant channel through which the tariff affected U.S. growth was its impact on the price of manufactured goods, and thus the amount of real investment the U.S. achieved from its national savings effort.

Is this case that a nineteenth century tariff reduced economic growth airtight? No. The argument contains three key assumptions: First, that the savings rate does not depend on the distribution of income across sectors and factors of production—that Western farmers have as high a marginal propensity to save and invest as do Eastern manufacturers. Second, that “investment” in publicly available new technologies and techniques is in some sense “like”—or at least proportional to—investment in physical capital.

These assumptions could be subjected to challenge. Perhaps the tariff transferred income from Western farmers with a low propensity to save and invest to Eastern industrialists with a high propensity to accumulate. Perhaps a more general model that did not tie advances in productivity so closely to investments in physical capital, and thus did not necessarily force a tariff that made it harder to purchase imported manufactures to also diminish the pace of productivity growth, might be more favorable to the hypothesis that America’s late nineteenth-century tariff was an aid to overall growth. But there is no particular reason to think that these factors are particularly powerful.

There is a third possible way around the argument of the previous section. The argument assumed that all forms of production and investment are the same as far as learning-by-doing and generating technological knowledge through invention and

production are concerned—that the economy is well-described by a one-sector model. In the section above, investment in agriculture and investment in industry had identical effects at boosting Americans’ abilities to use modern machine technologies efficiently.

Suppose not? Suppose only investments in *nonfarm sector* capital goods had the potential to set in motion the upward spiral of learning-by-doing, increased adaptability at handling modern technologies, increased productivity, and increased investment to generate more learning-by-doing?

It is important to state that there is little reason to think this is the case: little reason to think that the investments in agricultural machinery, in transport, in food storage and processing, in everything that made late nineteenth-century American agriculture the most mechanized and capital intensive agriculture ever seen—little reason to think that these investments were in any way less efficacious than investments in industry proper. Particularly when you reflect on Alfred Chandler’s vision of the key role played by the agricultural product-transporting U.S. railroads in the development of modern enterprise, there seems little reason to adopt *a priori* the view that “industrial” production generated powerful technology-boosting externalities and “agricultural” production did not.¹⁸

A Two-Sector Model

But suppose it did. Adapt a model from Jeffrey Williamson’s *Late Nineteenth Century American Development* and assume that there are two sectors, farm (f) and nonfarm (i) with production functions given by:

$$(5) \quad y^f = \alpha^f n^f + a^f$$

and

$$(6) \quad y^i = \alpha^i n^i + (1 - \alpha^i + \mu) k + a^i$$

The proportional rate of growth of agricultural production is equal to labor’s share in

¹⁸ See Alfred D. Chandler, *The Visible Hand: The Managerial Revolution in American Business* (Cambridge,

agriculture, α^f , times the rate of growth of the agricultural labor force, plus the rate of growth of overall farm-sector productivity. The proportional rate of growth of nonfarm production is equal to labor's share in the nonfarm economy, α^i , plus nonfarm total factor productivity growth, plus the proportional growth in the capital stock, μ , times a term that is the sum of capital's share in the nonfarm economy $1 - \alpha^i$ and the external effects on productivity of higher nonfarm capital accumulation μ .

Total output is the sum of farm and nonfarm output:

$$(7) \quad Y = Y^f + Y^i$$

Investment and the proportional growth of the nonfarm capital stock depend on the savings rate, the price of capital goods, the current capital-output ratio, and the depreciation rate:

$$(8) \quad k = \frac{s}{p^k} \frac{Y}{K} - \delta$$

The farm and nonfarm labor forces together add up to the total, exogenously-growing labor force:

$$(9) \quad N = N^f + N^i$$

The proportion of the labor force in agriculture falls over time, with the speed of the decline depending on the gap between nonfarm and farm wages:

$$(10) \quad \frac{N^f}{N} = -\lambda \frac{w^i - w^f}{w^f}$$

And farm and nonfarm wages are calculated as equal to labor's share in the sector times per worker productivity:

$$(11) \quad w^f = \alpha^f \frac{Y^f}{N^f} \qquad (12) \quad w^i = \alpha^i \frac{Y^i}{N^i}$$

Table 3 reports the parameter values needed for this two-sector model to track post-Civil War American growth. Relative factor shares in the production function, and the depreciation rate have been taken from Jeffrey Williamson's *Late Nineteenth Century American Development*. The other parameters are the values needed to match the historical pattern of long-run growth.

What would have been the effect of dropping the tariff entirely, and funding the post-Civil War government out of broad-based taxes, in this two-sector model? The first effect would have been to boost prices in the agricultural sector. A likely second effect would be to reduce the relative price of capital goods even more than the relative price of nonfarm output in general—and thus to provide a boost to the real share of national product devoted to nonfarm investment.

Table 3: Parameter Values, Two-Sector Model

	Parameter	Neoclassical Model	Externalities Model
n	Annual labor force growth	2.7%	2.7%
s	Nonfarm investment rate	17%, 19%	17%, 19%
p ^k	Relative price of nonfarm goods	1, 1.15	1, 1.15
	Annual depreciation	3%	3%
f	Labor share in farm sector	70%	70%
n	Labor share in nonfarm sector	55%	55%
	Labor migration coefficient	1.4%	1.4%
a ^f	Annual farm productivity growth	1.0%	1.0%
a ⁿ	Nonfarm exogenous TFP growth	0.80%	0.44%
μ	Productivity effect of investment	—	0.05

Table 4 reports results from the two flavors of the two sector model—the neoclassical version, and the version with increasing returns in nonfarm production as estimated in Louis Johnston's *Endogenous Growth and the American Economy*—under the assumptions that tariff removal raised the price of farm-sector output relative to output in general by half the eliminated tariff, and that tariff removal lowered the price of non-residential capital goods by ten percent and boosted the real nonfarm investment share of

national product by two percentage points. For each model, the first line reports the effect of shifting farm prices alone; the second line reports the full effect of eliminating the tariff.

Table 4: Effect of Tariff Removal, Two-Sector Model

	End-of-Period Boost to Production	Boost to Economic Growth Rate	Shift in Agricultural Labor Force
<i>Neoclassical Model</i>			
No shift in investment share	0.5%	0.01%	10%
Shift in investment share	6.3%	0.15%	5%
<i>Increasing Returns</i>			
No shift in investment share	0.6%	0.02%	9%
Shift in investment share	7.5%	0.18%	3%

The two sector model shows an American economy in the first decade of the twentieth century very different from actual history. The first line shows that, in the neoclassical no-increasing-returns specification, the boost to farm prices from the elimination of the tariff leads to a gain in real national product of some 0.5 percent because more of the American economy remains concentrated in high-value temperate agriculture: the farm labor force is one-tenth higher in the first decade of this century in the absence of the tariff.

Gains to real GDP leap to 6.3 percent—and the boost to the turn-of-the-century farm labor force is reduced from one-tenth to one-twentieth—when we take account of the boost to real investment from the decline in relative capital goods prices as well. In the two-sector neoclassical model, the effect of eliminating the tariff is a boost on the order of half a percent of national product from improved allocation of resources across sectors, and a boost on the order of five percent of national product because tariff removal cheapens investment, and allows for faster capital accumulation. Note that this two-sector story is, so far, exactly the same as the conclusions of the one-sector model above.

Now consider the impact of removing the tariff in the flavor of the model with external productivity benefits from nonfarm capital accumulation. Removing the tariff

raises the relative price of farm goods, retards the rate at which the labor force flowed from farms into the cities, and shifts America to a more agricultural-heavy pattern of development. But the economy does not suffer—although fewer Americans are at work in industry, more capital is invested in industry (with a constant savings rate) because richer farmers need a place to put their savings. America’s industrial economy at the turn of the century employs fewer workers but has more capital, a higher capital-output ratio, and higher manufacturing productivity.

These effects are greatly amplified when we take account of how removing the tariff boosted the investment share by lowering the price of capital goods relative to nonfarm output in general. According to the flavor of the model with increasing returns to capital accumulation, American national product in the first years of this century would have been eight percent higher in the absence of the post-Civil War tariff.

Thus the particular structure of the late nineteenth-century American tariff makes it hard to see how the fact that production is carried on in different sectors might reverse the one-sector model’s conclusion that the tariff was bad for growth. Perhaps a tariff that focused on light manufactures or consumer goods, and left investment goods free of duty might have been good for economic growth. But a tariff that lay heavily on capital goods needed for industrialization and accumulation was not.

Conclusion

The central message I have is that the dynamic effects of factor accumulation on productivity promised by the “new growth theory” are a sharp sword with two-edges. Yes, the theorists of the new growth theory have issued us a license to think of policies as possibly having effects orders of magnitude larger than in conventional neoclassical approaches to growth. However, destructive policies—like tariffs that diminish national product and make investment especially expensive—have their quantitative effects amplified as well.

Thus it will not be simple or straightforward to argue that the benefits of the late nineteenth-century tariff, in concentrating labor in industrial sectors where external economies and effects *may* have been important, were an order of magnitude larger than the costs of the late nineteenth-century tariff in raising the price of imported manufactures and capital goods, and thus making it more difficult and costly to construct the network of factories and railroads that made the U.S. an industrial economy.

It may be that shifting income from farm to city would have boosted the savings rate. It may be that a different model that tied external productivity benefits not to investment and capital accumulation but to production might generate different results.

Most important, perhaps, it may be that a model that paid greater attention to the wider world might lead to different conclusions. This paper has let trade be free but kept international factor mobility at historical levels. But in the absence of the late nineteenth century tariff, certainly more farmers would have left Europe to farm the Great Plains: immigration would have been even higher. And would investment from abroad—the flow of capital to build the Erie and Northern Pacific railroads, and to fund Andrew Carnegie and George Westinghouse—have been higher or lower in the absence of the tariff? These issues have been completely ignored in this analysis. And in a better—longer—bite at the apple they would not have been.

Even with these caveats, however, it remains the case that it will be very hard for anyone to use the new growth theory to “revise” our current view of the post-Civil War tariff’s effect on the American economy. You cannot argue that the benefits of the tariff for growth had dynamic effects that greatly multiply their impact on national product without also implicitly arguing that the costs—a higher price of investment goods, and thus a reduced flow of investment and a slower pace of capital deepening—had dynamic effects that greatly multiplied their impact as well.

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