Secular Stagnation: The Long View

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What does history have to say about the dangers of secular stagnation? History doesn't actually "say" anything, but it points to observations, patterns, and discrepancies between past predictions and outcomes which may be helpful for formulating answers to such questions.

Historical investigation is complicated by competing definitions and hypotheses. Here I define secular stagnation as a downward tendency of the real interest rate, reflecting an excess of desired saving over desired investment, resulting in a persistent output gap and/or slow rate of economic growth. I distinguish four tendencies that might explain such a phenomenon: a rise in savings rates due to the emergence of emerging markets; a decline in investment rates due to reflecting a dearth of attractive investment opportunities, a decline in the relative price of investment goods, and a decline in the rate of population growth.

Modern discussions of secular stagnation point to the decline in real interest rates since 1980. Thus, two Bank of Canada researchers writing in 2006 (Brigitte Desroches and Michael Francis 2006) highlight the decline in long-term real interest rates in the G7 countries "over the past 25 years."[1] The IMF (2014) observes that "real interest rates worldwide have declined substantially since the 1980s." While there are hints that recent movements may, in part, reflect mean reversion (Desroches and Francis write of how real interest rates have declined "to levels not seen since the 1960s"), there is no consideration of the long-term record.[2]

Figure 1 shows nominal and real interest rates for the United States over the last two centuries: the yield on ten year constant maturity government bonds with and without adjustment for realized consumer price inflation, where the adjustment involves subtracting a seven-year moving average of CPI inflation (the current year and past six).[3] For much of the 19th century, when the U.S. was on the gold standard, the nominal interest rate may be more informative, insofar as inflation was a random walk with expectation zero.[4] The figure points to an alternative interpretation, namely that the decline in real interest rates starting in the 1980s is mean reversion after the period of high interest rates and inflation that preceded it.

Turning to explanations, recent discussion highlighting the possibility of a rise in the global savings rate emphasizes high savings rates in emerging-market economies. This was of course the focus of Ben Bernanke's (2005) "global savings glut" hypothesis and Alan Greenspan's (2005) "conundrum" of anomalously low long-term interest rates (another

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[1] Desroches and Francis estimate inflation expectations by estimating an autoregressive process based on the historical behavior of inflation. The IMF estimates an autoregressive process using rolling windows and, alternatively, utilizes survey data.

[2] Laubach and Williams (2003) extend the picture back to the 1960s.

[3] For the portions of the 1830s and 1840s when there was no federal debt, New York State canal bonds are used. It makes very little different to the picture when a five-year moving average is substituted and when the ex post real interest rate is displayed as a five- or seven-year moving average.

[4] Some would argue that the price level was mean reverting under the gold standard – that inflation should have given rise to expectations of subsequent deflation. The empirical relevance of the argument is disputed by Summers (1983).

incarnation of the same phenomenon considered here). Compared to the advanced economies, emerging markets are financially underdeveloped, forcing households to substitute brute-force accumulation for portfolio diversification. The public sector provides little in the way of a social safety net, encouraging precautionary saving for contingencies and old age security. Central banks and governments in emerging markets rely on reserve accumulation for insurance against financial shocks. In many cases, low old-age dependency ratios make for high levels of life-cycle savings. The implication is that as the share of world GDP accounted for by emerging markets has risen, so too have global savings rates.

Modern analyses focus on the period since the mid-1990s, the first point in time when the vast majority of emerging markets and developing countries increased their output faster than the United States. But it is possible to cast one's net more widely. Historians of the 19th-century United States (e.g. Frank Lewis 1983) have pointed to the country's high immigration and low old-age dependency rates as explanations for relatively high savings rates that allowed it, unlike other countries with equally extensive infrastructure needs, to meet them without relying extensively on foreign capital. This "savings glut" explains how it was that interest rates remained low despite pressure for capital deepening from biased technological change. Analysts of other countries, such as John Hobson (1909), were concerned in this period about the problem of "underconsumption" (read "oversaving"), attributable to the increasing concentration of wealth and income in the hands of the "1 per cent" (a problem given new salience by Thomas Piketty 2014).[5]

Figure 2 shows data on global savings rates from the early 20h century through 2013. The pre-1970 estimates are assembled from national sources. These are GDP weighted average across countries of domestic investment rates (using 2005 GDP in purchasing power parity terms).[6] While there is some evidence of an upward trend over the long term (interrupted by the two world wars and the Great Depression), one has to hard to see any evidence of a growing savings glut after 1980, as opposed to a temporary bulge in the period of high Chinese savings from the turn of the 21st century and the financial crisis.[7]

Estimates of historical investment rates tend to derive from data on the output of investment-goods industries, and the further one goes back in time the more investment is likely to go through the informal sector or reflect household production (as with fencing, field clearing, swamp clearing and barn raising in the agricultural sector) and therefore be missed by such statistical methods. For a very few countries like the United States, historians have augmented the output of capital goods sectors with estimates of home manufacturing and the value of farm improvements made with farm materials in the 19th and early 20th centuries. Figure 3 shows the

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[5] It is interesting to observe that Hobson pointed to imperialism and colonialism as creating an important outlet for the resulting excess saving, analogous to how Hansen (1938) pointed to the end of the frontier era as closing off a vent for excess savings some 30 years later.

[6] National savings rates are, of course, the sum of domestic investment and the current account balance, but current accounts in principle sum to zero across countries. The global current account discrepancy and gaps in country coverage mean that what is shown here is necessarily an approximation.   Alternatively, the country data can be weighted by current year GDP in purchasing power parity terms from the Maddison data base. While these show basically the same pattern, data are available only for a subset of countries.

[7] By limiting their analysis to the period since the early 1980s, Grigoli, Herman and Schmidt-Hebbel (2014) are able to consider a wider range of countries. Their evidence and conclusions are consistent with those I offer here.

estimates of Robert Gallman (1966) spliced to the standard national accounts data since 1925.[8] The U.S. in the 19th century displays the behavior familiar from 21st century emerging markets, with investment rates rising from 16 per cent in 1934-43 to 28 per cent in 1899-1908. Subsequently, U.S. savings rates headed back down. This is a hint as to what is likely to happen to savings in emerging markets as populations age and capital stocks approach equilibrium levels. It suggests that even if high global savings are a factor in current low real interest rates, they may not remain so indefinitely.

A second popular explanation for the low level of real interest rates is a decline in the relative price of investment goods (think cheapening of personal computers). The same investment projects can be pursued, it is hypothesized, by committing a smaller share of GDP, and any additional projects that might be rendered attractive by this lower cost of capital are not enough to offset the decline in the investment share. With less investment spending chasing the same savings, the result can be lower real interest rates and, potentially, a chronic excess of desired saving over desired investment.

IMF (2014) has examined changes in the relative price of investment in the advanced economies since 1980. It documents a downward trend that then levels off in the early 21st century.[9] In explaining this movement, it points to the work of Robert Gordon (1990), who emphasizes the role of research and development that is embodied in cheaper, more efficient investment goods. Finally, the IMF asserts that any induced increase in the volume of investment was insufficient to offset the negative impact of this trend on real interest rates.

There is little dispute that research and development activity has grown with time and that it has been disproportionately embodied in investment goods. But there is less agreement on when this trend began or how long it is likely to last. Focusing on the United States, Jonas Fisher (2006) argues that the real price of equipment, which is closely related to the real price of investment goods, has been falling since the early 1950s, but that its average rate of decline accelerated abruptly in the early 1980s, coincident with the appearance of the downward trend in real interest rates.

Why there should have been this sharp break in the early 1980s, however, is not clear. There is no obvious change in the level or composition of R&D spending between the quarter centuries before and after this date.

It may shed additional light on these issues to consider the relative price of investment goods in the long run for countries like the United States for which we have long time series. Figure 4 shows the available data from Kuznets (1961) and the national income and product accounts after 1929.[10] We see that while the relative price of investment goods rose as well as fell for significant periods, there is a sharp fall in recent decades. One interpretation would situate the break around 1980 (coincident with the timing of the fall in real interest rates, the cost

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[8] Gallman's estimates are also adjusted for changes in net claims against foreigners (Table 3, column 2). I eliminate this adjustment, since I am concerned with savings rates here. Slight refinements which reduce the estimated investment rate slightly without changing the trend over time are in Gallman (1986).

[9] Buiter, Rahbari and Seydl (2014), focusing on he U.S., extend the comparison back to 1970, showing that the investment deflator grew on average by only 3.3 per cent per annum over the subsequent period, compared to 3.7 per cent for the GDP deflator.

[10] Spliced using the overlapping 1929 observation.

of capital being an important component of the cost of investment goods). Another interpretation would put the break around 1950, with an interruption in the 1970s, investment goods being energy intensive and the 'seventies being the period of the oil shock. Data for 11 now-advanced countries from William Collins and Jeffrey Williamson (2001) show the same thing (Figure 5).

A limitation of the evidence is that such series are not adjusted for product quality improvement, unlike studies for the post-World War II period which make an (admittedly imperfect) attempt to do so. Figure 6 shows Gordon's quality-adjusted series through 1983 extended for two additional decades on the assumption that the same relationship between the adjusted and unadjusted series that holds through 1983 continues to hold thereafter.[11] As expected, this makes the post-World War II decline in the relative price of investment look even more dramatic.

Evidently, R&D is not embodied more easily and fully in investment goods than consumption goods in all times and places. The presumption behind "the Baumol effect" – that consumption goods, and in particular that portion provided by the service sector, are difficult to mechanize and therefore become relatively more expensive over time – may not hold as it has in the recent past. Even if the post-1980 decline in the relative price of investment goods is part of the explanation for the concurrent decline in real interest rates, there is no ruling out that it may be reversed in the future.

A third possible explanation for secular stagnation, due originally to Alvin Hansen (1938), is that the rate of investment is being dragged down by a low rate of population growth, as first the advanced economies and now emerging markets undergo the transition to slower rates of natural increase. The logic of Hansen and his followers was that slower population growth meant that capital had less additional labor to work with on the margin, resulting in lower returns and lower investment. What Hansen did not emphasize was that slower population growth and greater longevity also imply lower savings rates on life-cycle grounds. Charles Goodhart and Philipp Erfuth (2014) question on this basis whether slower labor force growth in the advanced economies has contributed to recent decline in real interest rates; they predict that as population growth and savings rates continue to decline, real interest rates will head back up.

The historical data do not show any clear correlation between the growth rates of population and GDP, whether the sample is global or limited to the now-advanced countries. My own work with Molly Fifer (2002) using post-1970 data suggests that increases in old-age dependency ratios have approximately equal negative effects on savings and investment rates and minimal impact on real interest rates and the current account of the balance of payments.

A fourth popular if controversial explanation for low interest rates and the slow growth with which they are evidently associated is a dearth of attractive investment opportunities. This was, of course, the original conjecture of Alvin Hansen (1938), undermined by subsequent experience. More recently, Robert Gordon (2012) has argued that the returns to innovation in the United States, measured in terms of the impact on GDP growth, have slowed since the 1970s. Gordon associates periods of relatively high investment and growth with key technological

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[11] Regressing Gordon's quality adjusted series on the NIPA series yields a coefficient of 0.57 with a t-statistic of 14 and an R2 of 0.86.

clusters: steam and railroads in the early 19th century; electricity, chemicals, petroleum and the internal combustion engine from the late 19th century through the mid-20th centuries; and computers and related technologies since the 1960s. He argues that the slowdown in U.S. productivity growth starting in the 1970s reflects the relatively limited impact of this third, computer-centered cluster, aside from its application to retailing, wholesaling and finance centered in the decade starting in the decade 1995-2005.

There is little dispute over the historical record. Productivity and GDP growth were slower before the late 19th century than subsequently. Productivity growth again slowed in the United States after the early 1970s, the visible acceleration in 1995-2005 notwithstanding. But different economic historians will have different views about what this history implies for the future.

In thinking about the impact of a cluster of innovations on output and productivity growth, I like to distinguish two dimensions of the technology in question, which I refer to as "range of applicability" and "range of adaptation." Range of applicability refers to the number of different sector or activities to which the key innovations can be productively applied. Thus, the steam engine, the key innovation at the center of the first industrial revolution, had only a limited impact on output and productivity growth because for many years its productive application was limited to the textile industry and railways, which accounted for only a relatively small fraction of economic activity (as documented by Nicholas Crafts 2002). Electricity had a larger impact on output and productivity growth because it proved possible to apply the technology to a wide range of manufacturing industries, to the household sector and elsewhere within decades of its development. The "computer revolution" of the second half of the 20th century again had a relatively limited impact on economy-wide rates of output and productivity growth because its productive application was largely limited to finance, to wholesale and retail trade, and to the production of computers themselves.

This perspective suggests that the implications for output and productivity growth of the next cluster of innovations will depend importantly on its range of applicability. Optimists point to the fact that currently promising innovations include new tools (quantum computers), materials (graphine) and processes (genetic modification) which, by their nature, would seem to have a broad range of potential applications. They point to the scope for robotics to supplement human brain- and muscle-power in a wide range of activities and sectors. They point to the Internet of Things as promising to connect embedded devices across the economy. This is not a prediction, but a suggestion to look to the range of applicability of new innovations when thinking about the prospects for output and productivity growth in the medium term.

Range of adaptation refers to how comprehensively economic activity must be reorganized before positive impacts on output and productivity growth materialize, In addition, the greater the required range of adaptation, the higher the likelihood that growth may slow in the short run, as costly investments in adaptation are sunk and existing technological complementarities are disrupted (see Andreas Hornstein and Per Krusell 1996).

Thus, the steam engine had an immediate positive impact on output and productivity in textiles because until the 1830s its application was largely limited to textiles and a few other activities like pumping water from coal mines and did not require widespread reorganization of economic activity elsewhere in the economy. Similarly it had little tendency to depress

productivity growth in the short run because it did little to disrupt existing technological complementarities, such as they were. In contrast, electricity and the internal combustion engine required much more widespread adaptations before their positive impact on productivity could be felt (see Christiano Ristuccia and Solomos Solomou 2014). Networks of roads and transmission lines had to be built. Urban geography had to be redrawn and a wide range of economic activities had to be relocated (see Frank Fetter 1924). Factory production had to be systematically reorganized (see Paul David 1990). In the meantime existing technological complementarities were disrupted. These facts are invoked to explain why productivity growth in the U.S. lagged from the 1890s, from when this "second industrial revolution" dates, to the 1920s, only by which time much of this adaptation had finally taken place.

Here some observers will point to the fact that productivity growth in the United States has been disappointing in recent years as having positive implications for the future. A wide variety of connected activities and sectors, such as health care, education, industrial research and finance, are being disrupted by the latest wave of new technologies. Even while expensive investments are being sunk, existing technological complementarities are being disturbed. As a result, productivity growth has had a tendency to disappoint. But once a broad range of adaptations is complete, productivity growth will accelerate. The current slow rate of productivity growth is, in this view, a harbinger of better things to come.

Again, this is not a prediction but a suggestion to look to the range of adaptation required in response to the current wave of innovations when seeking to interpret our slow rate of productivity growth and when pondering our future.

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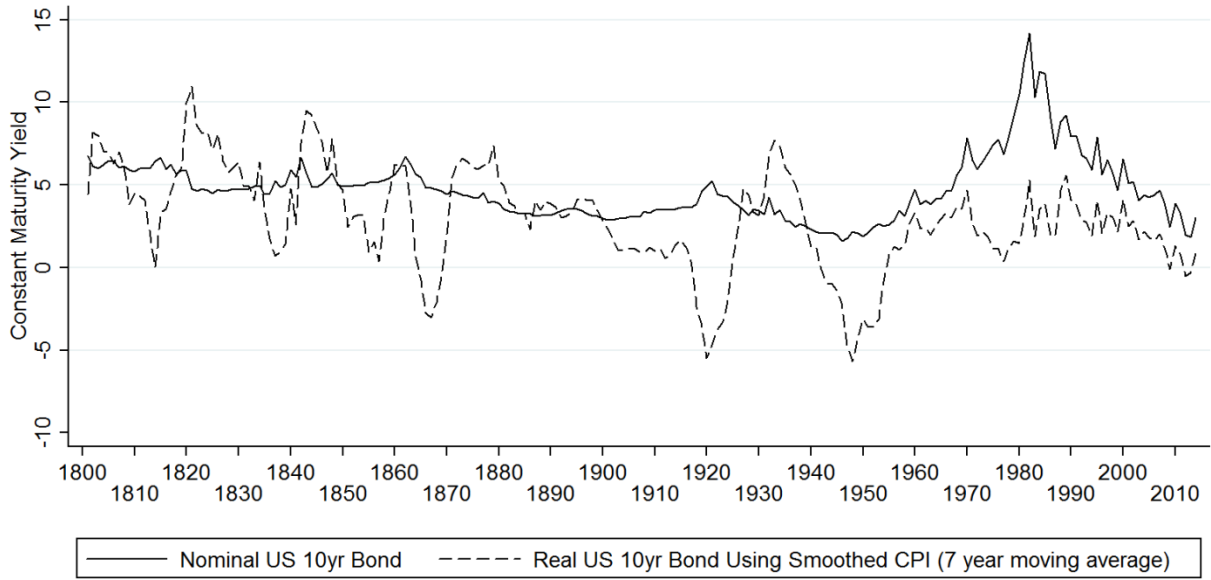Figure 1. Long-Run US Interest Rates
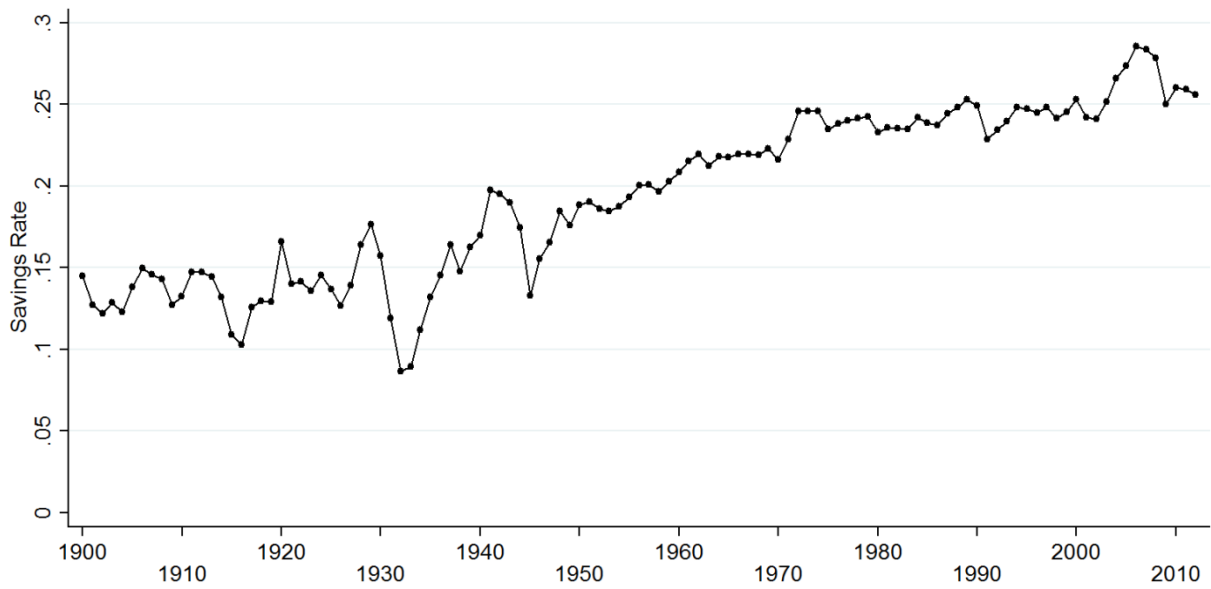

Figure 2. Secular Trend in Global Savings Rate

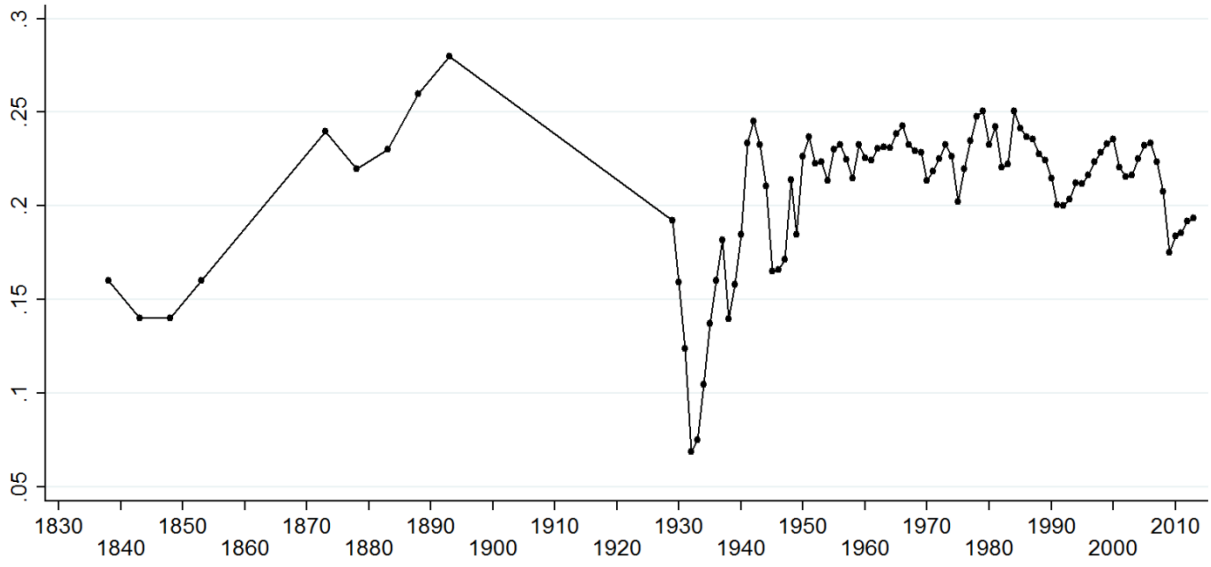Figure 3. Long-Run US Investment Rate

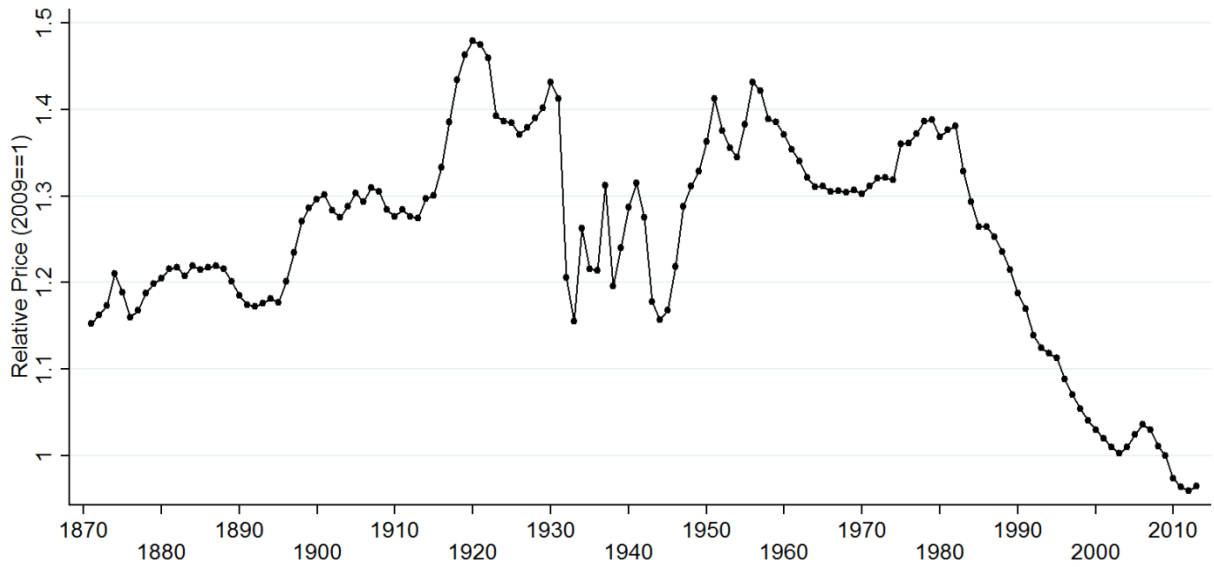Figure 4. Secular Trend in the US Relative Price of Investment

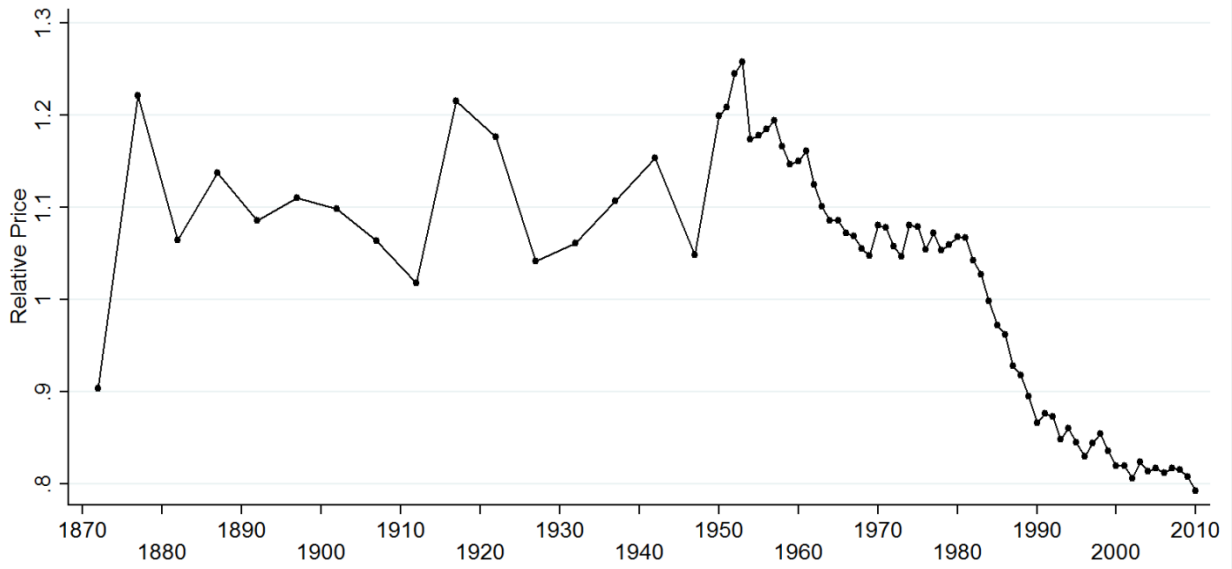Figure 5. Secular Trend in the Relative Price of Investment

Figure 6. Long-Run Trend in Quality-Adjusted Relative Price of Investment