

# Herbert Hoover's Cartelization Policies and the Start of the Great Depression

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## Abstract

This paper addresses the contribution of President Hoover's high wage-cartelization policies to the first two years of the Great Depression (1929-31). I first show that the contraction phase was similar to the recovery failure phase in that (i) industrial wages were well above their market-clearing level, (2) lower industrial output was largely the result of lower employment, and not productivity, and (3) that there was a large gap between the marginal rate of substitution between consumption and leisure and the real wage. Higher wages, lower employment, and the MRS gap emerge shortly after President Hoover adopts a policy that I interpret as providing protection against unions provided that firms pay high wages. I use an insider-outsider model in which a union can extract rents from sunk capital by threatening to strike, and compute the equilibrium of the Hoover economy. I find that Hoover's policy between 1929-31 reduced real GNP about 9 percent, reduced investment 30-40 percent, and industrial hours about 25 percent.

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# 1 Introduction

There are two stages of the Great Depression: the *Great Contraction*, which began in 1929 and reached a trough in 1933, and the *Recovery Failure* which lasted from 1933 to around 1939. Throughout the 1930s, hours worked per adult were at least 20 percent below normal. Consequently, the key to understanding the Depression is to understand why households did not work more. Cole and Ohanian (1999, 2004) present evidence that high wage-cartelization policies, such as President Roosevelt's National Industrial Recovery Act (NIRA) were a quantitatively important factor that prevented hours from recovering between 1933-39. They argued that Roosevelt's policies raised wages above normal levels and developed an optimizing insider-outsider model that indicated these policies were responsible for roughly 2/3 of the slow recovery.

This paper presents an analysis of the contribution of high wage-cartelization policies to the Contraction, specifically, the 1929-1931 period. Just prior to the start of the Contraction in late 1929, President Hoover adopted high wage policies that were similar to those of Roosevelt. Both Presidents held the view that high wages and "industrial-government cooperation" were fundamental components of economic prosperity. In particular, Hoover believed that high real wages would moderate the recession that he anticipated would follow the October, 1929 stock market decline. In November, 1929, Hoover met with the leaders of the major industrial firms, and told them to keep wages high, and that in return, he would keep union demands at bay. Following this meeting and over the following two years, real wages in large firms in several sectors rose, as hours worked in these sectors plummeted. The largest manufacturers, including U.S. Steel, Ford, General Electric, General Motors, International Harvester, Alcoa, and others very publicly advertised their compliance with President Hoover's high wage policy throughout this period. By late 1931, real manufacturing wages were about 10 percent above their late 1929 values, and manufacturing hours worked had declined more than 40 percent. In contrast, wages in the farm sector declined, and farm hours remained roughly constant during the contraction.

This combination of rising real industrial wages and depression stands in sharp contrast to the 1920s, in which non-union industrial real wages were stagnant despite rapidly growing productivity, profits, and the booming 1920s economy. At the end of 1931, industrial leaders sought further "government - industry cooperation" by asking Hoover to adopt an explicit, large-scale cartel plan that would establish price floors and regulate production. Hoover rejected the plan as unconstitutional and shortly afterwards the largest manufacturers cut wages, abandoned their support of Hoover's wage policy and to some extent, abandoned their support of Hoover. One

year later, Roosevelt defeated Hoover in the Presidential election of 1932.

This paper develops a model of the Hoover policy, and quantifies its contribution to the Depression between 1929-31. The model extends Cole and Ohanian's (2004) insider-outsider model to one in which the insiders can appropriate capital returns by threatening to strike and shut the firm down. I simulate the economy between 1929-31 and find that the policy depresses GDP about 9 percent, investment by about 30 percent, and industrial hours about 25 percent.

Section 2 presents the Contraction data and makes a comparison between industrial labor markets between 1929-31 and industrial labor markets from the Recovery Failure. Section 3 summarizes industrial labor relations in the 1920s with a focus on showing the extent that firms suppressed unions, summarizes the relationship between the threat of unionism and wages changes, and then shows how industry-labor relations changed after the Hoover meeting with industrialists in 1929. Section 4 presents a model with Hoover's high wage policy. Section 5 simulates the model under the Hoover policy to quantify its potential impact on the economy. Section 6 discusses related literature. Section 7 concludes.

## 2 The Contraction and a Comparison with the Recovery Failure

This section summarizes the contraction data from 1929-31 that are the focus of the analysis, with a specific emphasis on establishing that the severity of the contraction in the industrial sector began in late 1929, and identifying the empirical features that are common to both the contraction and the recovery failure. I make this comparison between the contraction and the recovery failure to highlight the potential role of high wage policies for both periods. I focus on 1929-31, rather than the entire contraction, because Hoover's policies began in November, 1929, and clearly weakened by late 1931. The timing of the Hoover policy and its impact on wages is described in the following section.

The similarities for both the contraction (1929-31) and the recovery failure are as follows, which are described in detail below.

- (1) Real manufacturing wages were significantly above the levels predicted by standard competitive theory.

- (2) Depressed *industrial* output was largely the result of lower hours, not lower productivity.

- (3) The industrial sector was much more affected than agriculture: agricultural hours and output were near trend levels, while agricultural wages

were below trend.

(4) The first order condition governing household time allocation is substantially distorted; the MRS between consumption and leisure is much lower than the real manufacturing wage.

I begin by presenting monthly, seasonally adjusted data on industrial hours and production (IP) between early 1929, before the Depression, and the trough of the industrial depression, which is July 1932. Figure 1 shows industrial production (IP), and Figure 2 shows industrial hours worked. (Industrial production is from the Board of Governors, and manufacturing hours are from the NBER macro history database). The data clearly show that industrial depression begins abruptly in late 1929, and is immediately severe. IP and industrial hours were about 4 percent and 2 percent higher in October relative to January, and were about 2 percent below their summertime peaks. But between October 1929 and June 1930, IP and hours are down about 15 percent and 22 percent, respectively, and by September, 1931, they are down about 34 percent and 40 percent, respectively. The rate of decline that begins in late 1929 is roughly constant through 1931. The immediacy and severity of the industrial Depression also occurs throughout most of the industrial sector. Tables 1 - 3 show economic activity in various industrial sectors, including structures investment (source: NBER macro history database), hours worked, and output in several manufacturing and mining industries. In each industry, output and employment begin declining significantly after October 1929, and are significantly depressed by late 1931.

The decline in industrial output is primarily the consequence of lower hours, rather than lower productivity. Table 4 shows industrial labor productivity and the standard Solow measure of manufacturing total factor productivity (TFP). I use factor shares of  $1/3$  for capital and  $2/3$  for labor to measure TFP. Output is industrial production, and the inputs are manufacturing hours and the manufacturing capital stock (source: BEA) interpolated to the monthly frequency. The standard Solow measure of industrial TFP declines by about 5 percent in December 1929, and then remains around that level through August, 1931. Output per hour (labor productivity) rises significantly throughout the first phase. I include this measure since there is some evidence of reduced capital utilization during the Depression, and output per hour may be a better measure of productivity when there are large changes in capital utilization than the standard Solow measure. Output per hour does not indicate a large negative shock to productivity. But even taking the standard Solow measure at face value, a 5 percent TFP decline would reduce hours in the neighborhood of about 5 percent or so (depending on model details), rather than the observed 40 percent. The fact that TFP is not the major depressing factor for industry in 1929-31 is very similar to Cole and Ohanian's (2004) finding that the recovery failure was largely due

to an employment recovery failure; TFP returned to trend by 1936, but hours worked remained 20 percent below trend until just prior to World War II.

Perhaps the most striking feature of both the recovery failure and the contraction is that manufacturing wages were much higher than predicted by standard competitive theory. Table 5 shows real manufacturing wages relative to TFP. Wages rise at the start of the contraction, and continue to rise as the Contraction deepens. In sharp contrast, agricultural wages were below trend during this period. Table 6 compares industrial wages and hours to agricultural wages and hours, averaged over the 1930-31 period and averaged over the recovery failure period. The industrial wage is deflated by manufacturing TFP. The coincidence of relatively high hours and low wages in agriculture, and low hours and high wages in industry during both periods suggest that the industrial labor market was functioning very differently than the agricultural labor market throughout the 1930s.

Recently, several economists have been evaluating wage and employment patterns, and more broadly, evidence of labor market distortions using the household's first order condition for time allocation and comparing the wage to a parameterized marginal rate of substitution between consumption and leisure. In both the recovery failure and contraction, the MRS is much lower than the real wage. There are two interpretations of the gap in this condition. One is that households equated the MRS to the wage, but some unmeasured factor substantially shifted the MRS-W relationship, such as higher tax rates, a preference shift for more leisure, increased productivity in home production, a higher return to search, or a higher return to human capital accumulation. The other interpretation of this gap is that households were at a corner in terms of their labor supply, and were thus unable to equate the MRS to the wage.

Cole and Ohanian (1999, 2004) Mulligan (2002), Chari, Kehoe, and McGrattan (2007) documented roughly a 75 percent deviation in this condition between 1933 and 1939, indicating that given the high real wage, standard theory predicts that households should have been working much more. The large deviation in this first order condition, combined with the fact that President Roosevelt adopted policies that raised wages above market clearing levels, led Cole and Ohanian to conclude that households were indeed at a corner during the recovery period and led them to construct a model of these policies and their impact on the economy.

I also find that the evidence favors the conclusion that households were unable to equate the marginal rate of substitution to the real wage in the industrial sector. One fact, that is also related to the recovery failure, is the large difference between agricultural and industrial labor markets. Wages were very low in agriculture, but agricultural hours at their trend level, suggesting that very low hours and high wages in manufacturing were the con-

sequence of a labor market distortion that impeded industrial labor market clearing.

Another fact indicating corner labor supply is from Simon (2001, *Journal of Economic History*) who collected data on the supply price of labor from "help offered" ads, and shows that the supply price of labor is 40% below the wage paid, adjusting for selection and quality. In sharp contrast, the supply price of labor and the wage were very similar before the Depression, typically within a few percent. Moreover, this 40% difference between the supply price and the wage during the contraction is very similar to the decline in nominal wages and prices in the farm sector.

Additional evidence of corner labor supply is that the self employed - in both the agricultural and non-agricultural sectors - did not reduce their hours during the Depression. This means that individuals who by definition could freely allocate their time to market activities worked considerably more than workers in employer-employee relationships in the industrial sector.

Another reason why I conclude that the labor-leisure MRS gap indicates corner labor supply, rather than households making an interior choice, is because I am unaware of a plausible explanation of the alternative interpretation of this gap: that households were still able to equate the MRS to the real wage, but some factor substantially shifted either the MRS schedule or the measured wage to result in a market clearing equilibrium with much lower market hours, much lower consumption, and a higher manufacturing wage. For example, Cole and Ohanian (1999) examined changes in tax rates during the contraction and found that these tax rates were roughly constant through 1933. I am also unaware of any evidence of large changes in other factors that would shift the MRS, such as the return to human capital accumulation, preference shifts, home production, or subsidies to non-market time allocation.

Taken together, this suggests that households were rationed in the number of hours they could work in the industrial sector. This rationing, together with the high industrial wage, suggests that some factor prevented normal competitive market forces of supply and demand from clearing the industrial labor market. In particular, wages should have declined significantly given low hours and low consumption. This discussion indicates that two key puzzles regarding the contraction is why didn't the industrial wage fall, and why weren't individuals able to equate the MRS to this wage? To pursue this, I hypothesize that the high manufacturing wage and the large MRS gap are the result of an industrial labor market distortion that prevented labor market clearing.

I now investigate the specific source of this industrial labor market distortion. The empirical similarity between the recovery labor industrial labor market and the contraction industrial labor market suggests the possibil-

ity that high wage policies that raised industrial wages above competitive, market-clearing levels - but did not impact the agricultural labor market - may be important for both episodes. I begin by reviewing industrial labor markets and labor market policies in the 1920s, and how they changed later in that decade, particularly in late 1929. I will summarize how President Hoover adopted a high industrial wage policy beginning in November, 1929, which coincides with the start of the change in wage behavior, the start of the gap in the household MRS condition, and the start of the substantial employment loss in the industrial sector.

### **3 1920s Labor Market Policies and Hoover's 1929 Shift**

It is widely agreed by labor historians that the 1920s was a decade in which non-union labor had very little bargaining power and that this kept wage growth abnormally low during the decade. Bernstein (1963), which is the most detailed assessment of the 1920s labor market, titled his book the *The Lean Years* (Houghton, Mifflin) in reference to low wage growth and the inability of most workers to negotiate wage increases during the decade. Figure 3 shows an unusual pattern in the industrial labor market. It shows that output per hour (labor productivity) rises about 25 percent, while the real manufacturing wage rises about five percent. (The manufacturing wage is from Hanes, JEH, 1996). These patterns imply that capital, rather than labor, received most of the productivity gains during this period. Not surprisingly, capital's share of income was at a maximum of nearly 40 percent by 1929. This fact stands in contrast to the normal long-run empirical pattern of wages growing at the same rate as productivity.

Regarding wages, Bernstein and other labor historians cite firm union suppression policies as a key factor contributing to low wages. Specifically, firms were able to suppress union organization using a variety of methods, including company unions and modest corporate welfare programs, claims that union leaders were communists and anarchists, and sometimes employing violent methods. Bernstein documents several union organization attempts and strike attempts during the 1920s, and shows that tactics used by firms included kidnapping union organizers, firing workers who met with organizers, evicting strikers from company-owned homes, denying medical care to striker families from company-directed health providers, arresting and prosecuting union organizers and strikers, and shooting strikers. On some occasions, firms were able to buy local police, and also hired private police forces. Firm actions were often not prosecuted, but union actions often were. Union

organization attempts during this period typically failed.

### 3.1 Industry's Ability to Suppress Unions and Unionization Policy

The largest organization attempt was in 1919, when about 350,000 workers struck against the steel industry for higher pay, shorter hours, and union recognition. In Pennsylvania and Indiana, state police and the National Guard beat strikers, steel firm security guards were deputized, strikers were jailed on false weapons charges and would be released if they agreed to sign a statement disavowing the union. Eight strikers were killed. Several hundred strikers were deported to Russia for being "anarchists", "communists", and "agitators".

Despite the number of workers involved in the strike, stock price data indicate that the complete failure of the strike was anticipated by asset markets. Specifically, there is no clear impact of the strike on the share price of U.S. Steel. The share price changed little before the strike, on the day that the strike was announced, during the strike, or after the strike. Figure 4 shows the price of U.S. Steel common stock price between 1918 and 1920, and Figure 5 shows U.S. Steel's share price relative to the S & P index (source: Shiller). The vertical lines in the graph represent the announcement date of the strike, and the end of the strike. The fact that the largest union recognition strike in the 20th century had no substantial impact on U.S. Steel's share price stands in contrast to work by DiNardo and Hallock, (2001 Working Paper), who find that strikes from the 1925-1937 period generate large negative abnormal returns, averaging about -18 percent for recognition strikes, such as the steel strike. The 1919 Annual Report of U.S. Steel is virtually devoid of any discussion of the strike, noting only that there were "labor difficulties at some mills". The report paid much more attention to the fact that the Commerce Department's assessment of the pricing of steel products was "fair".

Other episodes in which strikes/union organization were violently broken include several coal strikes in West Virginia. The U.S. Army intervened on four separate occasions in West Virginia coal mines, ([www.wvculture.org/history/journal\\_wvh/wvh1.html](http://www.wvculture.org/history/journal_wvh/wvh1.html)), including an armed rebellion of 10,000 coal miners in 1920 following the killing of a union organizer ([www.lutins.org/labor.html](http://www.lutins.org/labor.html)). In June 1922, 36 miners were killed in a coal strike in Illinois. In 1927, picketing miners were killed in Columbine, Colorado. "Palmer raids", named after Attorney General Palmer, were conducted in the early 1920s, and involved government agents taking labor leaders into custody, and prosecuting them for anarchy.

Micro evidence indicates that firms that suppressed unions were very

profitable. Following the failed organization attempt of steel workers, U.S. Steel profits advanced 100 percent between 1923 and 1928, but wages grew two percent. Toledo Edison profits rose 61 percent, and wage rates were unchanged over the same period. American economists discussed low wages of the 1920s and their implications. For example, Paul Douglas remarked:

"Failure of real wages to advance in the 1920s was the cause of rising profits and was an appreciable factor in the extraordinary increase of stock market values." (Bernstein (1963)).

### 3.2 The Threat of Unions and Wages

The preceding discussion suggests that the low wages of the 1920s were associated with limited unionization, and the ability of firms to suppress unions. There is additional evidence that associates changes in unionization and wages. It is widely known that firms were dead set against unionization during the 1920s. Surveys of employers in the 1920s and 1930s strongly indicated that wage increases were given to "keep the union out". J.D. Houser surveyed employers in 1927 and found American businessmen desired above all else to "remain masters in their own plants..union free." (See H. M. Gitelman. "Welfare Capitalism Reconsidered," *Labor History* (Winter 1992) 5-31).

Some large industrial firms formed an organization comprised of their employment departments called the *Special Commerce Committee* to help coordinate on keeping unions out. The objective of the committee was "first and foremost...to exclude unions from their plants." (Gitelman). Unfortunately there are relatively few records of employment and wage policy at the firm level that also include discussions of the Committee, and its relationship with individual firm policies. Perhaps the most detailed of these is a study of International Harvester by Ozanne (1967), who describes the functions and activities of the Special Commerce Committee as well as the goals of Harvester's relations with their workers and potential union organization.

Ozanne noted that "the major objective for International Harvester was that of blocking outside unionism." (p. 156) Harvester and other industrial employers suppressed unionism by providing workers with nominal employee representation and modest welfare programs that included recreation, cafeterias, and other low-cost activities. (p. 127). Labor historians document that welfare capitalism was prompted by inadequate wage payments (Gitelman), and this is consistent with the views of firms at that time, such as General Electric, which noted that "corporate welfare makes the pay envelope go farther". Ozanne and others, including Sanford Jacoby, note that programs such as employee representation plans were part of a well-coordinated program carried out through the Special Conference Committee to keep unions

out. And it was the big firms - those that had 250 or more employees, which was about 3 percent of manufacturing firms, but over 50% of manufacturing employment - that did the bulk of welfare capitalism. Gitelman and others noted that welfare capitalism represented strategic responses to problems of recruitment and retention, and its incidence was strongly related to location, size, the type of labor, and to potential threats from government and unions. According to business leaders, employee representation plans were adopted to forestall unionization in their organizations: "In establishing the various plans and services for the workers, employers are not moved by humanitarianism...they expect concrete benefits...including freedom from labor troubles, lower labor costs." (p. 97). Moreover, the relative decline of corporate welfare during the 1920s was associated with a reduction in the threat of union organization.

In addition to corporate welfare programs, p. 101 the company union was also an effective union block. "One of the major devices now employed to eliminate labor agitation is the company union. p. 98". The company union disposed of existing trade unions and eliminate completely the intervention of any outsider in the shape of a trade union official". Companies with well-established company unions included, but were not limited to Santa Fe Railways, Union Pacific, Bethlehem Steel, Swift Meat Packing, General Electric, Standard Oil companies, Goodyear Tire, International Harvester, Western Union, Westinghouse, Phelps Dodge, and Shell Oil. It is widely recognized that "the company union is a weak and ineffective instrument for the workers" because there was no ability to strike, the union only served advisory functions in other matters, it prohibited workers from meeting in mass, no experts, lawyers, advisors could represent the union, management has final veto in all matters, and independent union organizers are discharged. p. 110 - labor spies commonly used, advertise in trade journals.

p. 125 "The company union proves to be nothing but camouflage and a snare and delusion for workers... Standard Oil Unions are supposed to be the best company unions, but they prevent workers from meeting with workers in other oil companies, including those owned by Standard Oil."

Perhaps not surprisingly, wage growth was low in manufacturing, particularly in heavy industries. between 1923-29 nominal wages rose 1.9%, for chemicals, iron and steel, 1.15%, meat packing, 1.12%, paper 0.8%, rubber, 0.8%, machinery 0.7%, textiles 0.4%, page 11

These approaches of keeping wages low and preventing union organization were used because violent repression of unionism was becoming more difficult to carry out over time, and because as large firm policies became more public, company unions and welfare programs gave the appearance of compliance with workers. For some large companies, many of these policies were coordinated through the Special Conference Committee, which was an

employment policy cartel. First public knowledge of this committee came during 1937 hearings of Senator Robert LaFollette's Civil Liberties Committee, which was investigating abuses of civil and personal rights by industry. The origin of the Special Conference Committee is that the largest industrial companies did not want their employment and wage policies to become public, because they felt that these policies would lead to antitrust prosecution. When unionism rose at the end of World War I, Bethlehem Steel, Dupont, GE, GM, Goodyear, International Harvester, Irving Bank and Trust, Exxon, US Rubber, Westinghouse secretly formed the Special Conference Committee, an exclusive labor relations organization. AT&T and US Steel joined afterwards. The Committee had no telephone listing, no letterhead, no bank account, no dues. Exxon picked up the whole tab, which was later divided among its other members. E.C. Cowdrick became the full time secretary of the organization in 1923. The Committee met for roughly two decades, to discuss and collude on labor relations, wage changes, and national and legislative movements to regulate labor relations. Cowdrick would report on union activities at each meeting, and wage policies were very similar across companies.

At the Committee's meeting of March 20, 1931, GM indicated that they were opposed to cutting wages, as was Bethlehem Steel. Goodyear had preserved wages, but was prepared to go ahead with a wage cut, and Goodyear instructed others how it used "flying squadron" employees to beat union organizers. The Lafolette investigation found gross discrimination against union organization and prounion employees at many of the firms which made up the Committee.

Ozanne and others describe the circumstances prior to the Depression in which firms raised wages and the relationship between wage changes and the threat of unionism. The largest firms typically raised wages only when unionization was perceived to be sufficiently threatening, otherwise wages were left unchanged. Ozanne noted that Harvester gave out wage increases only "to buy off labor and prevent unionism", and even tried to calculate the amount they sacrificed in terms of higher wages in order to prevent unionization. Harvester miscalculated the threat of a strike in 1916. They did not offer higher wages, and subsequently was struck. In contrast, U.S. Steel raised wages in 1916 to avoid strikes and unionization. In 1918, a Chicago unionization drive at U.S. Steel led to Steel offering time and a half for overtime. Note that this was during World War I, which was a period of relative union strength, and in which unions were capable of removing labor from a plant. "Union wage influence was felt through wage concessions by employers who feared being unionized. This magnified many times the influence of the rapidly growing unions." p. 52. Economist Frederick Mills argued that the threat of unions kept non-union wages from being any lower

in the 1920s than they were (Bernstein (1963)).

Not surprisingly, union wages were higher than non-union wages in the 1920s, and more important, union premia rose considerably during the decade. Table 7 shows union and non-union wages (source: Historical Statistics of the United States). Union wages rise about 40 percent, while non-union manufacturing wages rise about 6 percent.<sup>1</sup> Harvester provides interesting micro evidence on the union-non-union wage gap. For example, in May, 1922, the union rate was \$1.25 for wood patternmakers in Chicago, but Harvester paid \$0.74 and Western Electric \$0.80 cents for the same type of work. Faced with no external unions (only a company union), Harvester wages were unchanged after 1923, despite rapidly growing productivity (over 4 percent growth per year) and rising profits. In contrast, during low demand periods, such as the 1921-22 downturn, wages fell quickly, as Harvester cut wages 20 percent in April 1921 and an additional 12.5 percent in November 1921. During the modest, mini-recession that occurred in mid-1927, real wages declined slightly, as industrial production fell about 4 percent between April and December of 1927.

There were a number of Court decisions which limited the effectiveness of union organizing efforts and clearly facilitated firms' ability to limit organization. These Court decisions are described in detail in Ebel and Ritschl (2006, in progress), which I summarize here. The Sherman Act originally treated unions and firms symmetrically regarding restraint of trade, and permitted court injunctions against unions. The Clayton Act of 1914 exempted labor from some aspects of the Sherman Act, which was followed by significant union growth and a large increase in strikes. However, this was followed by key court decisions that weakened labor considerably. *Duplex Printing versus Deering* is considered by legal scholars to be a key case that weakened unions by significantly restricting the extent to which the Clayton Act applied to unions. *American Steel Foundries versus Tri-City Central Trades* further weakened labor by effectively eliminating labor's right to picket, leaving organizers only the right to distribute information, and only far from the workplace entrance. A number of Labor historians note that these decisions considerably weakened labor's ability to organize.

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<sup>1</sup>There is about a 55 percent difference between union and non-union wages this period. Some of this difference may be due to factors other than union market power, such as human capital differences in workers. However, I am focusing on the change in the premium over the 1920s, and not the level of the premium.

### 3.3 Policy Shifts: Court Decisions and Hoover Aid Unions

By the late 1920s, labor policy began to change significantly. Ebel and Ritschl (2006) cite key legislation and Court decisions that overturned the previous decisions that limited labor's ability to organize. The key legislation was the Railway Labor Act, which made collective bargaining at the company level mandatory and provided for state arbitration in labor disputes. Railroads attempted to obviate the Act by forming company unions. When the Texas and New Orleans Railroad replaced an independent union with a company union, the independent union sued and won. The decision was upheld by District Court in 1928, the Court of Appeals in 1929, and the Supreme Court in 1930. This case overturned previous rulings that upheld employer's rights against unions, and the case paved the way for the Norris-Laguardia Act of 1932, which prevented yellow dog contracts and which impeded the use of injunctions against labor, and paved the way for the Wagner (National Labor Relations) Act of 1935.

In addition to this legislation and Court decisions, Hoover also shifted executive policy towards labor and the distribution of income. Following the stock market decline of October 1929, President Hoover brought the leaders of the major industrial firms to the White House in November, including Henry Ford, Alfred Sloan (GM), Pierre Dupont, Gerard Swope (GE). The meeting is described in Hoover's memoirs

([http://www.ecommcode.com/hoover/eBooks/pdf/FULL/B1V3\\_Full.pdf](http://www.ecommcode.com/hoover/eBooks/pdf/FULL/B1V3_Full.pdf)),

and by his Secretary of Commerce Thomas Lamont (1930, *Journal of Business*). President Hoover asked industry to maintain current wage structures, as this would help keep the industrial peace:

"Our immediate duty is to consider the human problem of unemployment...our second problem is to maintain social order and industrial peace...a fundamental view (is) that wages should be maintained for the present...the industrial representatives expressed major agreement...the same afternoon I conferred with the outstanding labor leaders and secured their adherence to the program...this required the patriotic withdrawal of some wage demands..." (Hoover, pp 43-44). Lamont noted "One of the first things which they (business leaders) did was to agree in principle to maintain the level of wages to perpetuate industrial peace". I interpret the Railway Labor Act, the Court decisions, and Hoover's policy as significantly changing union's ability and opportunity to organize industry.

### 3.4 The Impact of Hoover's Policy on Real Wages

This section presents evidence that high manufacturing wages were the result of Hoover's policy. Following their November 1929 meeting with Hoover, major industrial firms followed Hoover's recommendation to keep wages at current levels, despite the impending recession. A number of manufacturers, including Ford, even raised wages following this meeting (Henry Ford Memoirs). Many large industrial firms publicly advertised that they did not reduce wages until mid to late 1931. Hoover indicated in his memoirs that he was very pleased with the wage policies of the major manufacturers and large firms, but noted that wage compliance was not as high among small firms: "Wage agreement held up fairly well, and most of the non-union employers complied" (Hoover memoirs, p. 45).

Hoover also prominently cited the approval of his policies by labor: "On October 6, 1930, William Green, president of the AFL said "the President suggested that peace be preserved in industry and that wages be maintained. The great influence which he exercised upon that occasion served to maintain wage standards...we appreciate the value of the service the President rendered to the wage earners of the country" (Hoover memoirs, p. 46). Hoover also noted: "In the 1931 convention of the American Federation of Labor, the executive council in its report again expressed appreciation of my efforts and of the substantial success. The AFL report noted "in the full year of 1930 there were only seven firms per hundred firms that had cut wages." (Hoover memoirs, page 46).

Shister (1947, AER) documents wage changes in manufacturing across firms of different sizes, and reports that wages were maintained by the largest firms, but that smaller firms cut wages. This pattern of large wage cuts by smaller firms is not surprising, as union organizers tended to target larger firms. In addition, Beney (1936) presents data on manufacturing and industrial wages, including railroad wages across a number of specific railroad occupations (e.g. passenger conductor, freight conductor, passenger engineer, freight engineer, etc.), as well as the average railroad wage. The railroad sector was highly regulated by the government, and labor relations were governed by the Railway Labor Act of 1928, which provided substantial organizing power to independent unions and established collective bargaining in the industry. It is striking that changes in railroad wages were very similar to changes in wages in other manufacturing sectors. This finding is consistent with Hoover's conclusion that wage policies for union and non-union employees were similar, which clearly was one of his goals.

Academic and industrial economists also remarked on Hoover's wage policy. Jacob Viner noted that the "Hoover Administration became apostles of doctrine that high wages are an essential of prosperity...Hoover pledged

industry not to cut wages, and for long time large-scale industry adhered to pledge", 1933. This view was echoed by Commerce Secretary Andrew Mellon, who noted "there has been a concerted and determined effort on the part of both government and business...to prevent any reduction in wages." A number of industrial leaders in January 1931 argued that "wage scales should be adjusted to price reduction...It is not true that high wages make prosperity. Instead, prosperity makes high wages." (New York Times, January, 1931, see *Executive Opinion*, by Herman E Kroos, 1970, Doubleday and Co, NY).

Moreover, there are large changes in wages after a second industrial meeting with Hoover in late 1931 that are consistent with the breakdown of Hoover's influence on industry. Gerard Swope, who was the president of General Electric, met with Hoover in September, 1931. Swope indicated that industry has maintained wages as Hoover requested, and that industry required a policy that "stabilized industry". Swope asked Hoover to support the "Swope Plan", which was a blueprint for several elements of President Roosevelt's 1933 NIRA. The Swope Plan included policies to increase industry cartelization through trade associations with explicit minimum prices, and regulation of output and restriction on competitive practices, all of which were central features of the NIRA. The plan had broad and diverse support, including other industrialists, such as Henry Harriman, the president of the U.S. Chamber of Commerce, Bernar Baruch, the President of Columbia University, the Dean of Harvard Business School, and legislators, including influential Senator Robert LaFollette. Hoover refused, however, to support this plan, stating that it would be unconstitutional.

Hoover's negative reaction to the Swope plan surprised to industry. Himmelberg (1973), among others, describes in detail how Hoover was very similar to President Roosevelt. Throughout Hoover's tenure in government, particularly as Commerce Secretary in the 1920s under Coolidge, Hoover was a strong supporter and developer of industrial trade associations that fostered industrial cooperation to share information and avoid "dog-eat-dog competition".

Hoover's rejection of the Swope Plan likely resolved any uncertainty that industry had about Hoover's intention to directly raise industry profits through government action. The meeting ended with Swope advising Hoover that if there was no support for the Swope plan or an alternative plan, then industry would support the Democratic Presidential nominee in the 1932 election. Following this meeting, nominal manufacturing wages begin to fall substantially. Figure 7 shows nominal wages were starting to decline a bit in 1931, falling about three percent between January 1931 and August 1931. After this, nominal wages decline 10 percent over the following 11 months. Hoover attempted to reduce "destructive competition" in natural resource

industries in 1932, but it was too little and too narrow to reverse Hoover's standing with the industrial sector. Roosevelt was elected in November, 1932.

The timing of the change in manufacturing wage patterns and the timing of the shift in the MRS gap, both of which occur right after the Hoover meetings, along with the conclusions of organized labor, academic economists, government officials, and the advertised wage policies of large industrial firms indicates that industrial wage behavior following October 1929 was the consequence of Hoover's policy. I am unaware of any alternative explanation that can simultaneously account for the timing of change in wages and the change in the household MRS-real wage relationship. Given Hoover's fallout with labor following the Swope meeting and the subsequent large industrial wage cuts, I analyze the impact of his policy between late 1929 and late 1931, and leave the year of 1932 for future work.

I close this section by emphasizing that there is widespread agreement among scholars that the threat of unionism in the United States was extraordinarily low in the early and mid-1920s, and that this threat increased at the end of the decade. By the late 1920s, the days of union suppression through government aided and sanctioned violence was over, and labor policy had begun to shift to a much more pro-union stance.

## 4 Hoover's Wage Policy in an Insider-Outsider Model

I interpret the Hoover policy as follows. If industrial firms pay high real wages, as Hoover advised, then Hoover will protect those firms from unionization demands of further wage increases and Hoover permits each industry in manufacturing to earn rents by colluding. In equilibrium, the firms will follow the Hoover policy.

Off the equilibrium path, if firms do not follow Hoover's policy, then with probability  $\lambda$  the firm is organized, and in this state Hoover provides no protection from unions. With probability  $1 - \lambda$  there is no union organization and the industry colludes and hires labor at the spot wage rate  $w$ . If organized, the insiders make a take it or leave it wage-employment offer to the firms in an industry. If the firms reject the offer, then the workers strike and with probability  $\omega$  they successfully shut the firm down for 1 period. With probability  $1 - \omega$ , the firm continues to operate and hires labor at the spot market wage  $w$ . The negotiation game is played each period. To insure that firms follow the Hoover policy, it will be the case that profits under the Hoover program will be at least equal to expected profits from deviating. I now describe the insider-outsider model that forms the basis for the

off-equilibrium path behavior.

The model is a version of Cole and Ohanian's (2004) insider-outsider model, but differs in two important ways. One is that firms own the capital stock. The other is that firms make their investment decision before wage bargaining takes place. Thus, capital is sunk at the time that the insiders make their wage-employment offer to the firm. This alternative specification of Cole-Ohanian's insider-outsider model provides labor the opportunity to "hold-up" capital by calling a strike. If a strike occurs, the strike shuts production down for 1 period with probability  $\omega$ , and firms have negative profits due to zero revenue and capital depreciation. This model extends the one-final good structure with a gangster union developed in unpublished notes by Cole and Ohanian (2003).<sup>2</sup>

Note that unionization in this model is a form of capital taxation that will have allocative effects by reducing the net return to capital. The "Gangster Union" imposed here is modeled exactly after the type of union that industrialists feared. The gangster union was well-described in the 1926, volume "New Tactics in Social Conflict", Harry W. Laidler and Norman Thomas, Editors, Vanguard Press, NYC, who presented a symposium on industrial-labor relations, with the specific focus on the conflict between capital and labor: " We are concerned by the struggle which inevitably rises, no matter how it may be concealed,...which profits legally belong not to the hired worker but to the owners." "...in practice, labor in America has tended to fight out this struggle in terms of brute conflict. Nowhere in the world has the labor struggle in time of strikes been more bitterly fought than here in America." The union modelled here is one that has the opportunity to grab profits from sunk investments that belong to the owners of capital, and is exactly the type of union strike action that was used during this period, particularly in the mid-1930s.

Time is discrete and denoted by  $t = 0, 1, 2, \dots, \infty$ . There is a representative household whose members supply labor and consume a single consumption good, which is a CES aggregate over an agricultural good and a manufactured good. Investment is produced from just the manufactured good. The agricultural good and the industrial good are a CES aggregate over many individual goods. These goods are distinguished by the *sector*  $s = 1, \dots, S$  and *industry* within the sector  $i \in [0, 1]$  from which they originate. The output of industry  $i$  in sector  $s$  by  $y_s(i)$ . All industries in all sectors share identical constant returns to scale (CRS) Cobb-Douglas technologies for producing output from capital and labor. Labor is completely mobile across industries and sectors. Capital is industry specific, and is owned by the firm.

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<sup>2</sup>The model and analysis developed here is very much in the spirit of earlier work of mine with Hal Cole (Cole and Ohanian (1999), Cole and Ohanian (2004)).

Output for a representative intermediate producer in industry  $i$  at date  $t$  is:

$$y_s(i) = z_t n(i)^\gamma k_s(i)^{1-\gamma}.$$

The two sectors are denoted as  $a$  (agriculture) and  $m$  (manufacturing). Sectoral output,  $Y_s$  is a CRS constant elasticity of substitution (CES) aggregate of industry outputs in that sector with curvature parameter  $\theta$

$$Y_s = \left( \int_0^1 y_s(i)^\theta di \right)^{1/\theta}. \quad (1)$$

Consumption is given by:

$$C = [\alpha(Y_m - X)^\phi + (1 - \alpha)Y_a^\phi]^{1/\phi}. \quad (2)$$

This specification allows the elasticity of substitution between industry outputs in the same sector  $(1 - \theta)^{-1}$  to differ from the substitution elasticity between the aggregated outputs across sectors  $(1 - \phi)^{-1}$ . Note that  $X$  is aggregate investment, thus  $Y_m - X$  is the quantity of the aggregate manufacturing good available for consumption purposes. The evolution of the capital stock in industry  $i$ , sector  $S$ , is given by:

$$K_{st+1}(i) = (1 - \delta)K_{st}(i) + X_{st}(i), \quad (3)$$

$$X_{st}(i) \geq 0 \quad (4)$$

Note that the competitive version of this model is just a two-sector optimal growth model with sector specific capital.

## 4.1 The Household's Problem

Household members either work in the competitive sector, ( $n_a$ ), work in the cartel sector ( $n_m$ ) (if the household member already has a cartel job), search for a job in the cartel sector ( $n_u$ ) or engage in non-market activities (leisure). Work is full time, or not at all. Searching, which consists of waiting for a vacant cartel job, requires the same amount of time as working, and incurs the same utility cost as working. If a cartel job vacancy arises, the job is awarded randomly at the start of the period to an individual who searched the previous period. We denote  $v_t$  as the probability of obtaining a cartel job through search in period  $t$ .

Cartel jobs are not permanent: a household member who currently has a cartel job remains in the cartel the following period with probability  $\chi$ . This job attrition parameter provides a simple way of generating job exit in the model. The exogenous attrition parameter thus stands in for factors that are not included in the model, such as retirement, death, disability and on-the-job injury, mismatch of workers and firms, household relocation, firm and plant shutdown, etc.

As discussed by Cole and Ohanian (2004), the attrition assumption has no implications for the number of insiders when the initial number of insiders is below the cartel steady level of employment. Specifically, the insiders choose to add members until the optimal size is reached. If the initial number of insiders is above the optimal number, then without attrition, the insiders would simply remain at their initial size. This is because the insiders maximize *per-member rents*, and not *total rents*, as in the case of pure monopoly. The attrition assumption thus permits the insiders to achieve their optimal size and allows the model to generate empirically plausible job tenure profiles.<sup>3</sup>

The household's problem is:

$$\max_{\{l_{mt}, l_{ut}, l_{ft}\}} \sum_{t=0}^{\infty} \beta^t [\log(c_t) + A \log(1 - n)]$$

subject to

$$\sum_{t=0}^{\infty} Q_t [w_t h_{ft} + \bar{w}_t h_{mt} - c_t] + \Pi_0 = 0, \quad (5)$$

$$n_{mt} \leq \chi n_{mt-1} + v_{t-1} n_{ut-1}, \quad (6)$$

$$n_t = n_{ft} + n_{mt} + n_{ut}, \quad (7)$$

where  $\bar{w}_t$  is the cartel sector wage. The household's income consists of labor income from the competitive and noncompetitive sectors, and date-zero profits ( $\Pi_0$ ). Equation (6) describes the law of motion for the number of household members with cartel jobs ( $n_{mt}$ ). This is equal to the number of household members who retain their cartel jobs from last period ( $\chi n_{mt-1}$ ), plus the number of household members that obtain vacant cartel jobs from searching the previous period ( $v_{t-1} n_{ut-1}$ ). Assuming that there is an interior

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<sup>3</sup>Other elements could be used to allow insiders to achieve their optimal size, such as differentiating among workers according to skill level, age, number of years of experience, etc., and permitting only those workers who had the necessary attributes to be part of the insider group. The approach used here is much simpler.

solution for cartel job search, which occurs as long as  $n_{mt} > \chi n_{mt-1}$ , we obtain:

$$\mu_t = \sum_{i=0}^{\infty} (\beta\chi)^i \frac{(\bar{w}_{t+i} - w_{t+i})}{c_{t+i}}$$

Thus, the value of the multiplier is the expected present value of the wage premium between the insider-outsider sector and the competitive sector.

## 4.2 The Consumption Good Firm's Problem

A representative consumption good producer, taking all prices parametrically, has a static profit maximization problem:

$$\max \left[ \sum_s \left( \int_0^1 y_s^d(i)^\theta di \right)^{\phi/\theta} \right]^{1/\phi} - \sum_s \left( \int_0^1 p_s(i) y_s^d(i) di \right) \quad (8)$$

where  $y_s^d$  denotes the final good producer's demand for the output from industry  $i$  in sector  $s$ . In equilibrium, demand for the manufactured good will be equal to the output of that good less investment. This problem yields the following efficiency conditions:

$$Y^{1-\phi} Y_s^{\phi-\theta} (y_s^d(i))^{\theta-1} - p_s(i) = 0 \text{ for all } i \in [0, x] \text{ and } s = \{a, m\}. \quad (9)$$

## 4.3 The Agricultural Firm's Problem

The agricultural industry is competitive, and faces the following maximization problem:

$$\max_{n_{st}(i), k_{st+1}(i)} Q_t \left[ \frac{p_{at}(i) z_t (n_{at}(i))^\gamma k_{at}(i)^{1-\gamma}}{+(1-\delta)p_{mt}k_{at}(i)} - w_t n_{at}(i) - p_{mt} k_{at+1}(i) \right] + Q_{t+1} [r_{at+1}(i) k_{at+1}(i)], \quad (10)$$

where  $r_{at+1}(i)$  denotes the return to capital earned in the industry in period  $t+1$ . The return to capital is implicitly given by:

$$r_{at}(i) = p_{at}(i) (1-\gamma) z_t \left( \frac{n_{at}(i)}{k_{at}(i)} \right)^\gamma + (1-\delta) p_{mt}. \quad (11)$$

## 4.4 The Manufacturing (Cartel) Firm's Problem

The manufacturing industries provide an input into the consumption good and also produce the investment good. If the firms in these industries follow the Hoover policy, then each industry acts as a monopolistic competitor and pays the Hoover wage. If the firm does not comply with the policy, then with probability  $\lambda$  the industry is organized by the insiders, and in this case the insiders make a take it or leave it offer consisting of a wage-employment pair,  $(\bar{w}, \bar{n})$ . With probability  $1 - \lambda$  the industry is able to continue to collude but can hire labor from the spot labor market. Recall that the rejection of the Hoover policy is off the equilibrium path.

Agreements are negotiated at the beginning of the period, but after the firm has decided on its current period capital stock. The agreement covers only the current period. Negotiations are done within the context of an explicit bargaining game played between the workers and the firms which is specified below.

### 4.4.1 The Negotiation Game

The bargaining model is a two-stage negotiation game which is played each period in each industry in a subset of the sectors in the economy. There are two players: workers and firms. The bargaining game is symmetric across industries so we focus on a single industry. If firms pay the Hoover wage, then the workers do not organize. If firms do not pay the Hoover wage, then with probability  $\lambda$  the workers organize. If the workers organize, then with probability  $\omega$  the firm is shut down for 1 period if the firm rejects the worker's offer. With probability  $1 - \omega$ , the strike fails to shut the firm down, and in this case the industry hires labor at the spot wage  $w$ .

In stage one the workers make a wage and employment proposal for the current period:  $(\bar{w}_t, \bar{n}_t)$ . The firms then either accept or reject the workers' proposal. If the firms accept, they hire  $\bar{n}_t$  units of labor at the wage  $\bar{w}_t$ , which determines their current output. The industry also colludes with respect to the choice of next period's capital stock. At the beginning of a period, cartelized firms hire any additional workers randomly from the pool of searchers from last period. In equilibrium the probability of a searcher finding a job is equal to the number of new jobs in the cartelized industries divided by the number of searchers.<sup>4</sup>

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<sup>4</sup>If the pool of these searchers is not large enough to cover the number of new jobs, then firms hire additional workers randomly from those who choose to work in the current period. If this occurred then there could be an additional gain from choosing to work, which, in equilibrium, was too small to induce search. This can arise because search is a discrete choice and hence if the gain to being in the cartel sector was sufficiently small then

We construct the sub-game perfect Nash equilibrium of this game that emerges as the limit of our bargaining game played a finite number of periods within an individual industry. In this case, the firm's strategy in equilibrium is to always accept any wage and employment offer  $(\bar{w}, \bar{n})$  that yields a reservation level of profits. We then conjecture that the firms' strategy in the infinitely repeated version of this game takes this form, and characterize the solution to the workers' decision problem. Finally we show our conjectured reservation profit strategy for firms is a best response to the strategy that solves the workers' problem.

#### 4.4.2 The Cartel Problem

We now specify the maximization problems for the firms and workers in a cartelized industry. It is useful to first define the profit function as a function of the wage rate for the monopolist in one of the cartelized sectors. We denote the monopolist's profit function, conditional on capital stock  $k$ , by  $\Pi(k)$ , and the associated optimal employment function by  $N(k)$ , where

$$\Pi(k) = \max_n \left\{ Y^{1-\phi} Y_m^{\phi-\theta} (n^\gamma k^{1-\gamma})^\theta - wn + p_m(1-\delta)k \right\}, \quad (12)$$

$N(k) = n$ , and we denote  $Y_m$  hereafter as manufactured output used in the consumption sector.<sup>5</sup> In a slight abuse of notation we will use  $\Pi(k, w, n)$  as the level of industry's profits, given  $(k, w, n)$ .

In characterizing the steady state, it is convenient to first specify outcomes in a version of the model in which workers and firms only collude for 1 period. This facilitates presenting the recursive formulation that specifies the steady state conditions.

#### 4.4.3 The One-Period Industry Problem:

Assume that workers and firms in a representative cartelized industry bargain only in the current period, and that afterwards workers and firms behave competitively.

**Period 1 :** The industry begins with capital stock  $k_1$ . Determining the firm's reservation profit level requires determining their payoff in the absence

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no one would search in the prior period, even if he was assured of obtaining a cartel job in the current period. We do not discuss this possible case further, since in our quantitative analyses the benefit to being in the cartel sector was either zero or large enough to induce to search.

<sup>5</sup>The functions for  $\Pi_t$  and  $N_t$  also depend upon  $Y$ ,  $Y_m$  and  $r_t$ , but that is captured by the time dependence of the functions.

of collusion. In this case, the level of employment ( $n_s(i)$ ) is given as follows, where non-collusive labor is denoted as  $n_{nc}$ :

$$n_{nc}(k_1) : Y^{1-\phi} Y_s^{\phi-\theta} ((n_{nc})^\gamma k_1^{1-\gamma})^{\theta-1} \gamma \left( \frac{k_1}{n_{nc}} \right)^{1-\gamma} = w,$$

and the gross return to capital is given by

$$R(k_1) = Y^{1-\phi} Y_s^{\phi-\theta} ((n_{nc})^\gamma k_1^{1-\gamma})^\theta - w(n_{nc}) + p_m(1-\delta)k_1$$

Next, determine the firm's payoff with collusion. There are two parts, a *static payoff*, which is the payoff from being reducing employment today and exploiting market power in the current product market, and a *dynamic payoff*, which is the payoff from colluding on investment today. The return to colluding on employment is  $\Pi(w, k)$ . The returns that the firms in the industry earn from colluding on investment is  $P_2$ , which yields:

$$P_2 = \max_{n_s(i), k_s(i)} -\beta^{-1} p_m k'_s(i) + \left[ \begin{array}{l} Y^{1-\phi} Y_s^{\phi-\theta} [n_s(i)^\gamma k_s(i)^{1-\gamma}]^\theta \\ + p_m(1-\delta)k_s(i) - w n_s(i) \end{array} \right] \quad (13)$$

subject to

$$Y^{1-\phi} Y_s^{\phi-\theta} [n_s(i)^\gamma k_s(i)^{1-\gamma}]^{\theta-1} \theta \gamma \left( \frac{k_s(i)}{n_s(i)} \right)^{1-\gamma} = w,$$

Thus, the total payoff from colluding is the sum of monopoly profits earned and investment collusion:  $\Pi(k_1) + \beta P_2(k')$ .

The total expected gross return to the firm from rejecting the union offer is

$$P_1(k_1) = (1-\omega)\Pi(k_1) + \beta P_2(k') + \omega(1-\delta)p_m k_1,$$

where the first term is the payoff conditional on colluding, the second is the payoff conditional on colluding on investment, and the third term is the payoff conditional on shutdown. This yields the reservation profits that must be earned from any union offer. In equilibrium the workers will therefore offer a wage-employment pair that yields a return that is equal to this reservation level:

$$\Pi(k_1, \bar{w}_1, \bar{n}_1) = P_1(k_1)$$

**Recursive Formulation:** The payoff from rejecting the offer is given by

$$P(k) = (1-\omega) [\Pi(k) - p_m k' + \beta P(k')] + \omega [-p_m k' + \beta P'(k') + (1-\delta)p_m k],$$

where  $k'$  denotes the level of the capital stock that the firms will choose. This will be the capital stock along the equilibrium path since the workers will always offer  $(\bar{w}, \bar{n})$  such that the firms just earn their reservation profit level and, while indifferent between accepting and rejecting the workers offer, always accept.

which implies that

$$P(k) = (1 - \omega)\Pi(k) - p_mk' + \beta P(k') + \omega(1 - \delta)p_mk,$$

## 4.5 The Insiders' Problem

The insiders offer a wage/employment pair at each date that maximizes the present discounted value of rents per worker from the cartelized sector.<sup>6</sup> This value depends on the existing stock of workers in the industry at the beginning of the period and the capital stock. We denote the existing number of workers in the industry at the beginning of the period by  $n$ , which is equal to the number of workers at the end of the previous period multiplied by the probability that the workers remain in that industry:

$$n = \phi n_{-1}$$

We denote the number of those who work in the cartel that period by  $\bar{n}$ . If  $\bar{n} < n$ , then  $n - \bar{n}$  of the workers are randomly chosen to leave the industry. Given  $P$ , the solution to the cartel workers' problem is implicitly determined by the following Bellman equation in which  $V(n, k)$  denotes the expected value of being a cartel worker (relative to working in the competitive sector) with  $n$  workers in the industry at the beginning of the period, and  $k$  units of capital in place:

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<sup>6</sup>We assume families are large enough to smooth out a family member's employment risk, but are small enough to work in only an arbitrarily small fraction of the industries. These assumptions imply that the family is risk neutral with respect to the employment outcome of any individual family member. Moreover, this implies that the family does not internalize the aggregate consequences of their actions since the likelihood of a family member obtaining a cartel job is independent of the actions of the industries in which family members work.

$$V(n, k) = \max_{(\bar{w}, \bar{n})} \left\{ \left( \min \left[ 1, \frac{\bar{n}}{n} \right] \right) [\bar{w} - w + \phi(Q'/Q)V(\phi\bar{n}, k')] \right\} \quad (14)$$

subject to  $\Pi(k, \bar{w}, \bar{n}) - p_m k' + \beta P(k') \geq P(k)$ .

The left hand side of the constraint is the firm's payoff if it accepts the workers offer, where  $\Pi(k, \bar{w}, \bar{n})$  denotes the profits that it earns during the period, and  $-p_m k' + \beta P(k')$  is the return from colluding on investment. The right hand side is the firm's expected payoff if it rejects the insiders' offer.

The worker's first order conditions include

If  $\bar{n} < n$  :

$$\begin{aligned} \bar{n} & : 0 = \frac{1}{n} [\bar{w} - w + \phi(Q'/Q)V(\phi\bar{n}, k^C) \\ & \quad + \bar{n}\phi(Q'/Q)V_1(\phi\bar{n}, k^C)\phi] + \rho\Pi_3(k, \bar{w}, \bar{n}) \\ \bar{w} & : 0 = \frac{\bar{n}}{n} + \rho\Pi_2(k, \bar{w}, \bar{n}) = \frac{\bar{n}}{n} - \rho\bar{n} \end{aligned}$$

If  $\bar{n} > n$

$$\begin{aligned} \bar{n} & : 0 = \phi(Q'/Q)V_1(\phi\bar{n}, k^C)\phi + \rho\Pi_3(k, \bar{w}, \bar{n}) \\ \bar{w} & : 0 = 1 + \rho\Pi_2(k, \bar{w}, \bar{n}) = 1 - \rho\bar{n} \end{aligned}$$

along with the constraint, where  $\rho$  is the Lagrange multiplier on the constraint.

Note that

$$V_1(n, k) = \begin{cases} 0 & \text{if } n < \bar{n} \\ -\frac{\bar{n}}{n^2} [\bar{w} - w + \phi(Q'/Q)V(\phi\bar{n}, k^C)] & \text{if } n > \bar{n} \end{cases}$$

In the steady state, the fact that there is positive attrition ( $\phi < 1$ ) implies that  $n < \bar{n}$ ,  $V_1 = 0$ , and yields:

$$\begin{aligned} 0 & = \rho\Pi_3(k, \bar{w}, \bar{n}) \\ 0 & = 1 + \rho\Pi_2(k, \bar{w}, \bar{n}). \end{aligned}$$

The first condition implies that the steady state employment level maximizes profits given  $\bar{w}$ , which is a requirement of an efficient offer. Given this, the second condition implies that  $\bar{w}$  maximizes wages given  $k$ . To see this note that the reservation profit's constraint implies that  $w$  can be implicitly defined as a function of  $k$  and  $n$ . Since  $\Pi(k, w, n)$  is clearly declining in  $w$ , it follows that there is a unique  $w(k, n)$  such that

$$\Pi(k, w(k, n), n) = P(k) + k' - \beta P(k').$$

Denote by  $w^*(k)$ , the highest possible wage that is consistent with profits equal to their reservation level, define

$$w^*(k) = \max_n w(k, n),$$

where  $n^*(k)$  is the associated maximizing employment level. It must be the case that  $\Pi_3(k, w^*(k), n^*(k)) = 0$ . Otherwise, it would be possible to adjust  $n$  in such a way as to raise  $w$  while not violating the reservation profit constraint. Moreover,  $\Pi_3(k, w^*(k), n^*(k)) = 0$  holds only at  $(w^*(k), n^*(k))$  since  $\Pi$  is concave in  $n$  given  $w$ , and monotonically declining in  $w$ . Hence there is a unique  $n$ -peak and associated  $w$  at which the reservation profit condition holds.

Recall that Cole-Ohanian (2004) showed that if  $n$  exceeds  $n^*$  then  $n$  monotonically declines at the decay rate:

$$n_t = \phi n_{t-1}, \bar{n}_t = n_t$$

Recall that the relevant range is when labor is at or below the pure monopoly level, and above the optimal level of the number of insiders. This will be the case for the transition path experiment, as the initial condition will be taken from the competitive version of this economy.

## 4.6 The Macroeconomic Impact of a Gangster Union

I now evaluate the steady state impact of the union on the economy. Parameter values were used such that in the competitive steady state households spend about 1/3 of their time endowment in the market, the return to capital is 5 percent, annual depreciation is 8 percent, and that capital's share of income is .3. The parameter  $\theta$  governs the elasticity of substitution between goods across industries within a sector, and is set so that in a standard monopolistic competition model the mark-up would be about 10 percent. The parameter  $\phi$  governs the substitution elasticity between goods across the aggregated cartelized and non-cartelized sectors. I use a substitution elasticity of 1, which is likely an upper bound on this elasticity as both the relative price and the expenditure share on manufacturing goods have fallen over the postwar period, suggesting a substitution elasticity of less than one<sup>7</sup>.

Given  $\phi$ , the parameter  $\alpha$  determines the fraction of the economy that was subject to Hoover's high wage policy. I choose a value such that each sector

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<sup>7</sup>This fact led Cole and Ohanian (2004) to choose an elasticity of 1/2.

is the same size. While this is larger than the very conservative choice of  $1/3$  in Cole and Ohanian (2004), it is a reasonable choice from the perspective of considering the two sectors agriculture and manufacturing, as manufacturing was a larger share of employment (34 percent) than agriculture (30 percent) in 1929. From a broader perspective, one may consider the high wage sectors to include manufacturing, mining and petroleum, construction, transportation, and government, which combined is roughly 44 percent of employment in 1929. I chose the parameter  $\omega$ , which is the probability of a successful strike, to be quite small at 25 percent, and which delivers a manufacturing wage that is about 7 percent above its competitive value.

Table 8 shows the steady state values of the union model relative to competition. First, the union distortion imposed on manufacturing reduces the size of the industrial sector substantially; manufacturing output falls about 40 percent. The economy-wide capital stock is also about 40 percent lower, reflecting the threat of capital confiscation through the union and the higher relative price of capital. Third, employment in the agricultural sector expands, as this is the only market alternative to working in the industrial sector. Thus, households have the option of substituting into agricultural work, which they indeed do. Consequently, agricultural hours worked are about 6 percent above their competitive level, despite the fact that the return to working in agriculture falls by 27 percent. Real GDP, evaluated at base year (competitive) prices falls 26 percent. Thus, the gangster union can significantly depress the economy.

## 4.7 The 1929-31 Economy Under the Hoover Policy

I next compute the transition path of the economy under the Hoover policy.<sup>8</sup> The Hoover policy is defined implicitly such that the wage paid each period under the Hoover policy delivers profits that are equal to expected profits from deviating. Recall that deviating means that the firm pays the spot market wage, the industry acts as a monopolistic competitor, but then the firm leaves itself open to organization by a gangster union. This means that expected profits from deviating will also be equal to profits under the Hoover policy:

$$\lambda \Pi_t^U + (1 - \lambda) \Pi_t^{NU} = \Pi^H$$

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<sup>8</sup>Note that the transition path of the pure Gangster union economy is one in which industrial labor decays at the exogenous attrition rate, and capital decays at the rate of physical depreciation.

where  $\lambda$  is the probability of being organized,  $\Pi^U$  is profits under union organization,  $\Pi^{NU}$  is profits without union organization, and  $\Pi^H$  is profits under Hoover. To implement the experiment, I need to choose values for the parameters  $\omega$ , which is the probability that the insiders can successfully strike, and the probability  $\lambda$ . I use data on strike outcomes from 1925-37, which is taken from DiNardo and Hallock (2001, working paper) to help choose a value for  $\omega$ . DiNardo and Hallock present data on 36 strikes that occurred between 1925 and 1937, about 60 percent were won by the workers, and about 60 percent of the strikes were violent. (The percentage won by the workers is about the same if I exclude the strikes after the NLRA was passed in 1935). I therefore specify  $\omega = 0.4$ .<sup>9</sup> I then choose a value for  $\lambda$  (around 30 percent) so that the steady state real manufacturing wage under this policy is about 6 percent above its competitive level, which is a conservative choice relative to the actual real manufacturing wage that was about 10 percent above its 1929 value in late 1931. I then calculate the transition path of the economy to this steady state, beginning in 1929:4. I specify the initial capital stocks for both sectors at their competitive steady state levels, and the initial stock of manufacturing workers at the competitive steady state level. I use the version of the model without job search, because there is no incentive to search for a cartel job when the policy is adopted when the number of insiders is larger than the optimal size.

Figures 7-11 show the economy under the Hoover policy. The adoption of the policy leads to a depressed industrial sector, with manufacturing hours falling by about 26 percent by late 1931. GNP also falls significantly, declining about 9 percent by the end of 1931, compared to an actual 1931 decline of about 22 percent (see Cole and Ohanian, 1999). Agricultural hours rise around 3 percent in the model, compared to roughly constant hours worked in the farm sector in the data. Investment is 30-40 percent below normal, as the adoption of the policy reduces the steady state capital stocks in both sectors, which reduces the demand for investment goods. Consumption is significantly higher in the model compared to the data simply because investment is so low; specifically, a greater share of manufacturing output is allocated to the consumption goods sector in the model during the periods immediately following the adoption of the policy. Specifically, manufacturing output can costlessly be shifted one-for-one from investment to consumption in this simple model. If the model was enriched to account for the fact that there is not a one-for-one transformation between consumption and investment goods, then consumption would decline more in the model, though the

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<sup>9</sup>Note that irrespective of the winner of the strike, these strikes could still lead to substantial losses for the firm. From this perspective, the choice of  $\omega = 0.4$  may be conservative.

magnitude of the decline would probably not be as large as in the data.

There are two distinctive empirical features of the Contraction that are noteworthy to analyze within the model. One is that industrial hours drop substantially, despite no immediately large increase in the real manufacturing wage. For example, the real manufacturing wage is about 2 percent higher in mid-1930, but industrial hours are down about 20 percent. This decline in hours is much more than can be accounted for by just the change in the wage (given the Cobb-Douglas technology and the exponents on capital and labor in the production technology). Hours also fall about 20 percent in the model, with a wage increase of just under two percent by mid-1930. In the model, the relatively large decline in hours is due to a significant decline in the demand for industrial goods.

A second distinctive feature of the Contraction is the pattern of price change; specifically, the relative price of manufactured goods does not rise significantly. For example, the price of investment goods relative to the price of nondurable and service consumption goods rises about 3 percent in the data between 1929 and the end of 1931. This relative price pattern stands in sharp contrast to price change during the recovery period, in which the price of goods in the cartelized sectors rose considerably (see Cole and Ohanian (2004) for a summary of these relative price changes).

The fact that the quantity of investment goods falls around 60 percent between 1929 and 1931, compared to a 20 percent decline in the quantity of nondurable and service consumption, means that models with a declining rate of marginal transformation/substitution should generate a higher relative price of manufactured goods during this period. In the model, the relative price of the industrial sector is about 3 percent lower between 1929 and the end of 1931. The reason that the price of manufactured goods does not jump in the model is because the demand for investment goods is low. The fact that the relative price of the industrial sector is roughly unchanged in the data, despite industrial production declining much more than any other sector, implies any model that is consistent with both industrial quantity and price data will require a large and immediate fall in the demand for industrial goods.

The price of food (food CPI) falls about 14 percent relative to the price of investment goods (GNP deflator) between 1929 and 1931. In the model, the price of agricultural goods relative to manufactured goods falls about 3 percent between 1929 and the end of 1931. Enrichening the model to account for the fact that there is not a one-for-one transformation between investment goods and consumption goods would deliver a larger decline in the relative price of farm goods in the model.

Note that in equilibrium the policy depresses output and hours worked without any union/insider action or strikes. It is simply the *increased threat*

*of unionism* from the policy that generates depression. The experiment suggests that these policies could account for around 40 percent of the decline in GNP between 1929-31.

## 5 Related Literature (Incomplete)

A number of scholars have cited high real wages as contributing to the Depression, though this earlier work is quite different in methodology and data analysis. Recent discussions of Hoover's wage policy include Cole and Ohanian (2000, NBER Macro Annual), and Bordo, Erceg, and Evans (1999), who study the Depression in a model with exogenous sticky wages and monetary shocks, and who find that sticky wages combined with deflation depressed the economy considerably.

The most closely related work to this paper is an independent and complementary analysis by Ebel and Ritschl (2006), who discuss in detail the court decisions affecting labor that occurred between the adoption of the Sherman Act and the Depression, and also include a discussion of Hoover's wage policy. Their analysis differs considerably from this one in that Ebel and Ritschl develop a bargaining model along the lines of Mortensen and Pissarides. In their analysis, they assume that prior to the Depression, there was individual bargaining, and after 1929, there was collective bargaining. In their model, the shift from individual bargaining to collective bargaining leads to lower employment. Their conclusion that changes in labor market policies are central for understanding the Depression is similar to my findings presented here.

## 6 Summary and Conclusion

Both the contraction and the recovery failure were characterized by anomalous industrial labor market behavior, with abnormally high industrial wages, low industrial hours, and a very large gap between the MRS and the industrial wage. And the evidence suggests that the MRS-wage gap is consistent with the failure of competition to clear the industrial labor market, resulting in households at a corner in terms of the number of hours they could work in manufacturing. Cole and Ohanian (2004) present evidence that high wage-cartelization legislation in the form of the NIRA and the Wagner Act were central for understanding the failure of industrial labor market clearing and the failure of the economy to recover.

An important aspect of understanding the Contraction is understanding the apparent disfunction of the industrial labor market. The challenge for

any theory of this disfunction is that there was no legislated labor policy shift , as was the case with the NIRA and the NLRA, nor was there particularly extensive union strike activity during the early 1930s. The theory developed here is based on the fact that a similar policy to the NIRA was adopted by President Hoover in late 1929. In a meeting with major industrialists, Hoover implored the industrial sector to pay high wages following the October, 1929 stock market decline. In return, Hoover promised industry that he would keep unions at bay. Hoover's policy shift, together with major Court decisions in the late 1920s clearly raised the potential threat of unionism from its level in the early 1920s. Hoover - and unions - were pleased that real industrial wages rose substantially in the first two years of the Depression, as the major industrial firms publicly advertised their compliance with the Hoover policy. Hoover's high wage policy - and Hoover - lost industrialist support in late 1931 when Hoover refused to adopt a legislated full-scale cartelization for the U.S. economy that would have established price floors and regulated production and investment.

I analyzed the impact of Hoover's policy between late 1929 and late 1931 in an insider-outsider model in which the insiders hold-up capital by threatening a strike that could shut down production. This type of "gangster union" was used with great success against some of the most recalcitrant union-fighting firms, including General Motors and U.S. Steel a few years later. I found that the introduction of the Hoover policy in an otherwise undistorted model significantly depresses the industrial sector, reducing hours about 25 percent by the end of 1931, and depresses real GNP by 10 percent. Of course, there were other factors depressing the economy in the early 1930s. Understanding the impact of the Hoover wage policy in conjunction with other elements of the Depression is an interesting topic for future research.

Why were these policies adopted? It appears that the answer is the same as the answer to why Roosevelt adopted the NIRA and other high wage-cartel policies after Hoover. Both Hoover and Roosevelt viewed high real wages as a necessary component of prosperity, with the view that increasing real wages would lead to higher aggregate demand and thus higher output. Throughout the 1930s, business leaders, as well as economists argued that government had this relationship backwards - high real wages are a *consequence* of high productivity and prosperity, not the *cause* of prosperity. Consequently, both Cole and Ohanian (2004), and this research suggest that the 1930s in its entirety could have been a better economic decade had the government not distorted industrial labor markets with policies that impeded the normal competitive forces that govern supply and demand.

Table 1  
Gross Private Domestic Investment - Structures  
1929:3 = 100

1928:1	109.7
1929:1	106.2
1929:2	98.3
1929:3	100
1929:4	86.1
1930:1	79.4
1930:2	75.1
1930:3	71.1
1930:4	55.8
1931:1	49.6
1931:2	49.7
1931:3	41.1

Table 2  
Monthly Hours Worked Relative to 1929 Peak  
(Monthly Peak =100, indicated for each Sector)

Date	Mfg (Jul)	Autos (Feb)	Chem (Aug)	Shoes (July)
1929:1	95.9	98.2	91.7	102.2
1929:7	100.0	97.5	98.5	100
1929:9	97.7	89.1	97.6	104.2
1929:10	97.6	84.7	97.7	105.5
1929:12	89.5	55.3	87.0	103.9
1930:6	78.4	56.6	80.9	86.5
1930:12	65.5	47.1	72.2	75.8
1931:8	58.2	45.9	72.2	93.8

Table 3  
Average Hours per Worker - 1929:10 = 100

Date	Mfg	Paper	Machinery	Chem	Electric	Iron/Steel	Autos
1929:1	98.6	97.2	96.9	99.4	98.9	99.3	98.3
1929:6	98.2	97.2	98.4	100.2	101.9	98.8	98.9
1929:10	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1929:12	94.5	98.1	97.9	94.3	96.2	90.4	87.7
1930:6	90.3	94.0	87.3	92.9	95.6	88.7	88.4
1930:12	84.0	86.3	73.2	90.6	81.5	74.1	81.8
1931:6	83.8	81.5	73.4	88.4	73.9	75.5	81.4
1931:9	79.9	80.9	66.6	86.1	37.1	75.9	66.0
1931:12	77.9	78.3	66.6	78.0	71.8	72.5	79.7

Table 4  
Mfg TFP and Output per Hour

Date	Mfg TFP	Mfg Output per Hour
1929:1	99.1	99.2
1929:6	102.9	102.7
1929:10	100.0	100.0
1929:12	94.3	96.9
1930:6	97.5	104.1
1930:12	92.5	104.0
1931:6	95.9	109.8
1931:9	93.1	109.2
1931:12	90.2	107.3
<b>Average</b>	<b>96.2</b>	<b>103.7</b>

Table 5  
Real Mfg Wage and Real Mfg Wage/TFP

Date	Real Mfg Wage	Real Mfg Wage/TFP
1929:1	99.0	99.9
1929:6	99.4	96.6
1929:10	100.0	100.0
1929:12	100.0	106.0
1930:6	102.1	104.8
1930:12	105.2	113.8
1931:6	109.2	113.9
1931:9	110.1	118.3
1931:12	109.6	121.5

Table 6  
Real Wages and Hours: Manufacturing & Agriculture (1929=100)

Period	Mfg Hours	Mfg Wage /TFP	Agr Hours	Agr Wage
Contract (1930-31)	69.5	111.0	100.4	90.1
Recovery (1933-39)	66.6	121.7	94.0	81.6

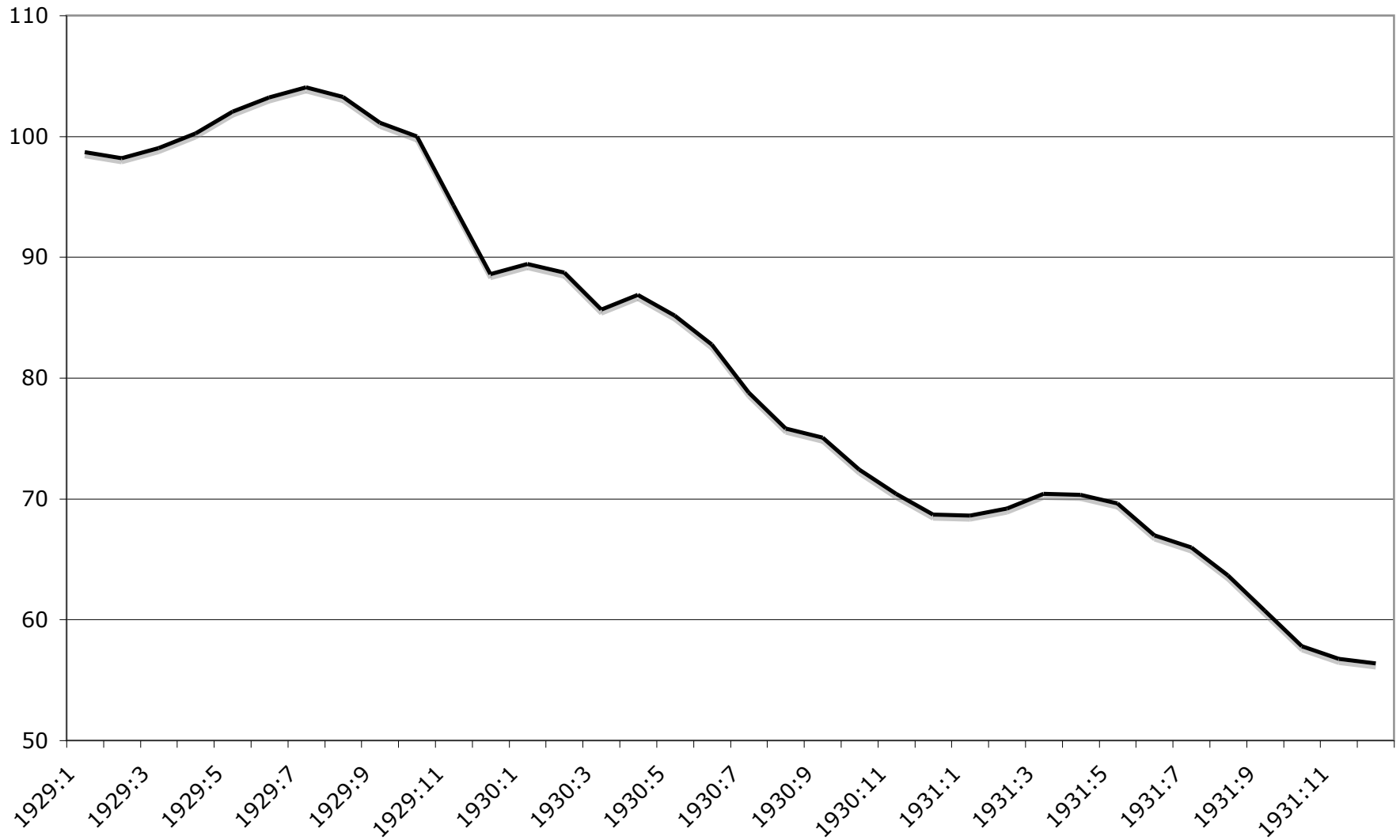
Table 7  
 Union and Non-Union Wages  
 (1919 = 100)

Date	Union	Non-Union
1919	100	100
1920	125	125
1921	130	104
1922	124	99
1923	129	110
1924	137	112
1925	140	110
1926	143	108

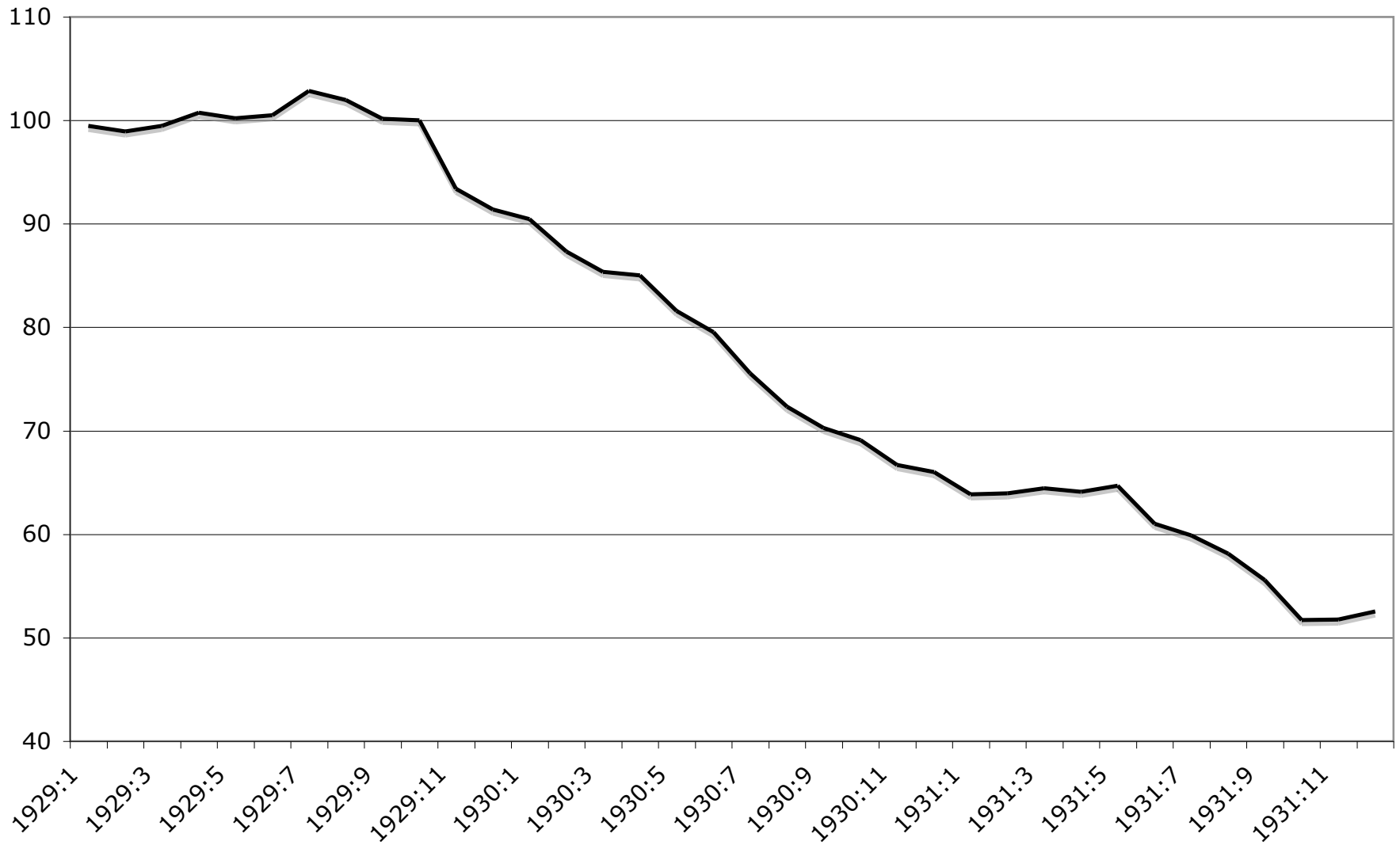
Table 8  
 Steady State Values of the Gangster Union Model  
 Relative to Competitive Steady State  
 (Competitive Values = 100)

$Y$	$K$	$N$	$W_m$	$N_m$	$W_a$	$N_a$
74	58	84	107	64	73	106

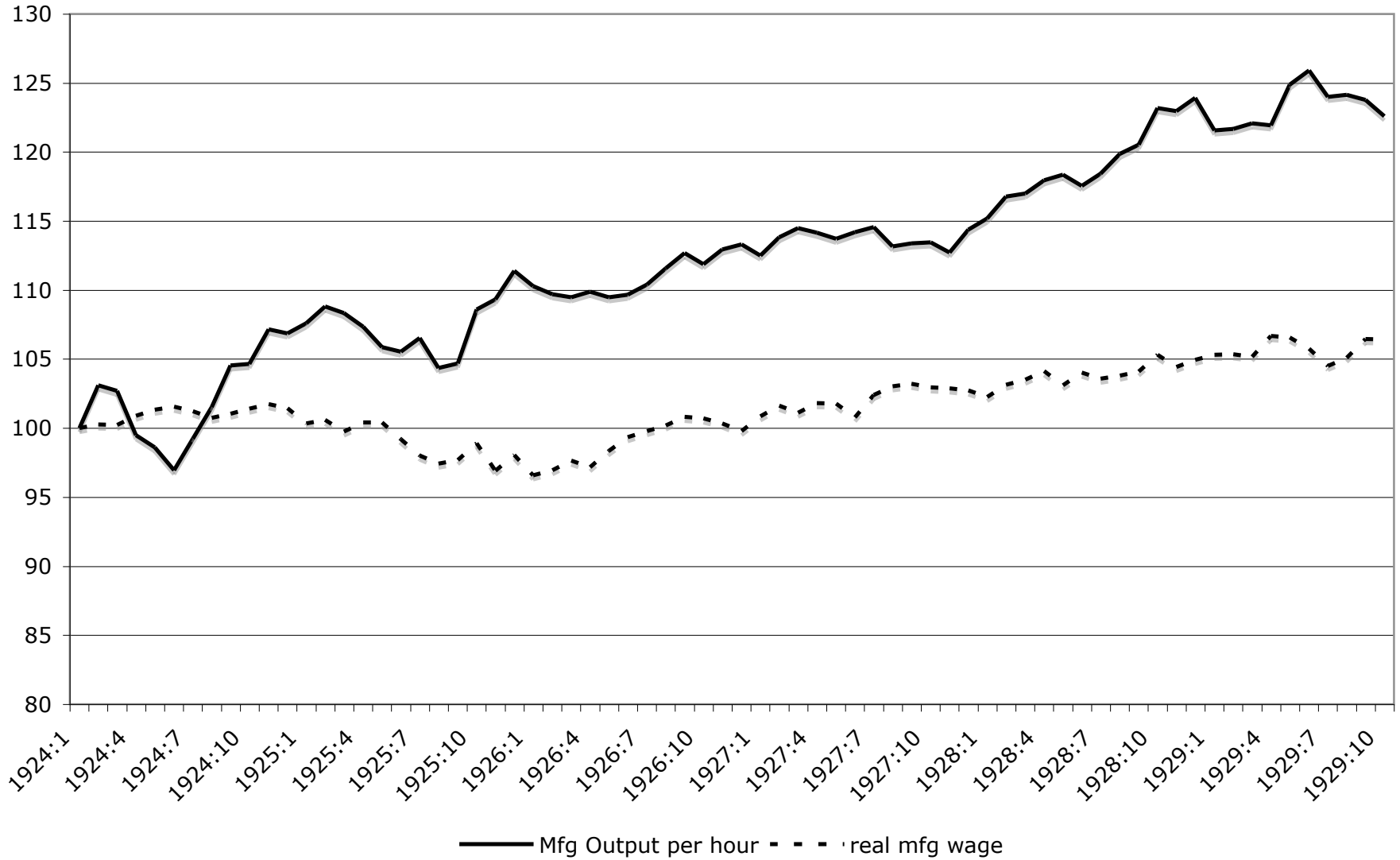
**Figure 1: Industrial Production Per-Capita (1929:10=100)**



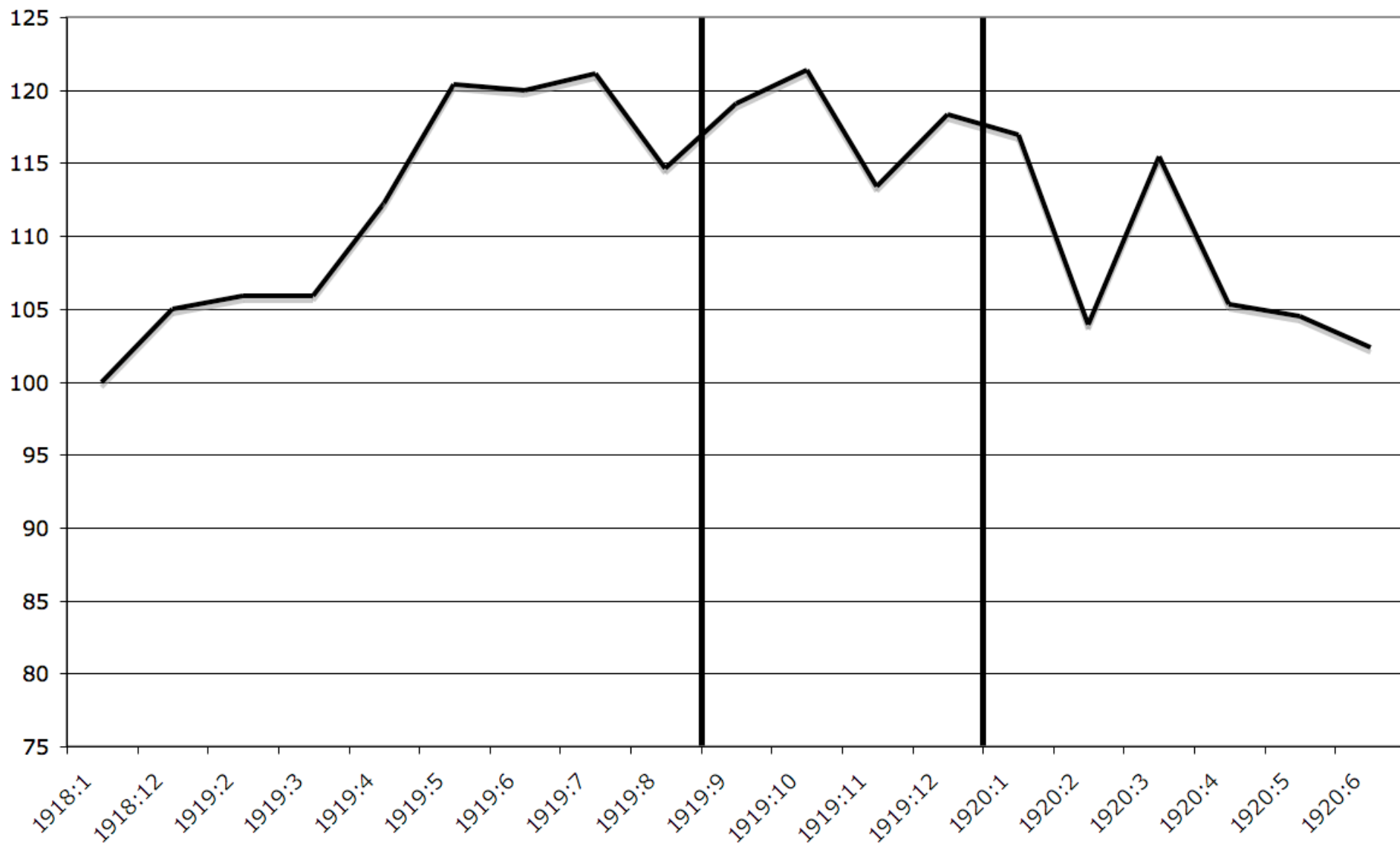
**Figure 2: Manufacturing Hours Per-Capita (1929:10=100)**



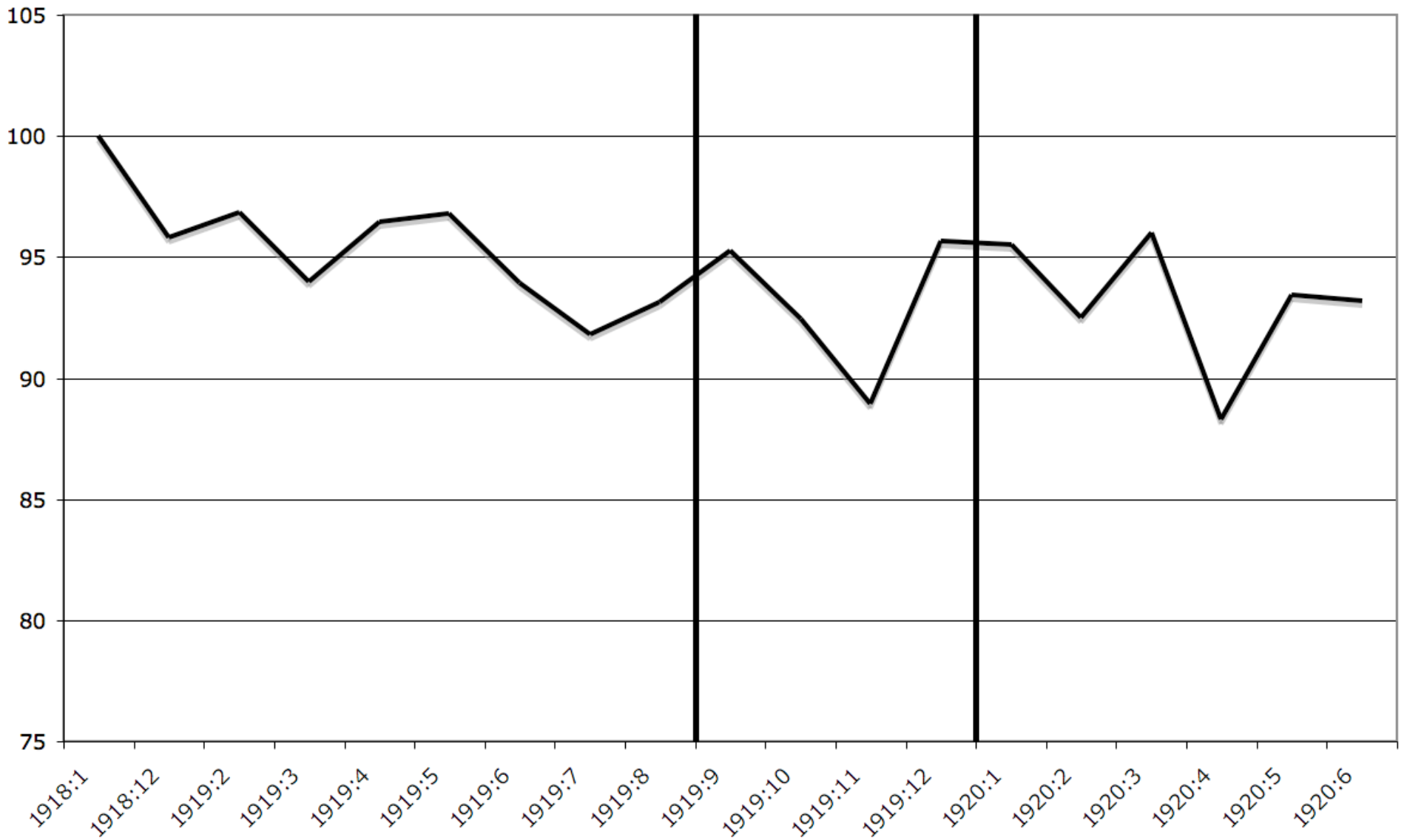
**Figure 3: Mfg Output per Hour and Real Mfg Wage 1924:1-1929:10**



**Figure 4: US Steel Price**



**Figure 5: US Steel Price relative to S & P index**



**Figure 6: Mfg Output per Hour and Real Mfg Wage 1929:10-1931:12**

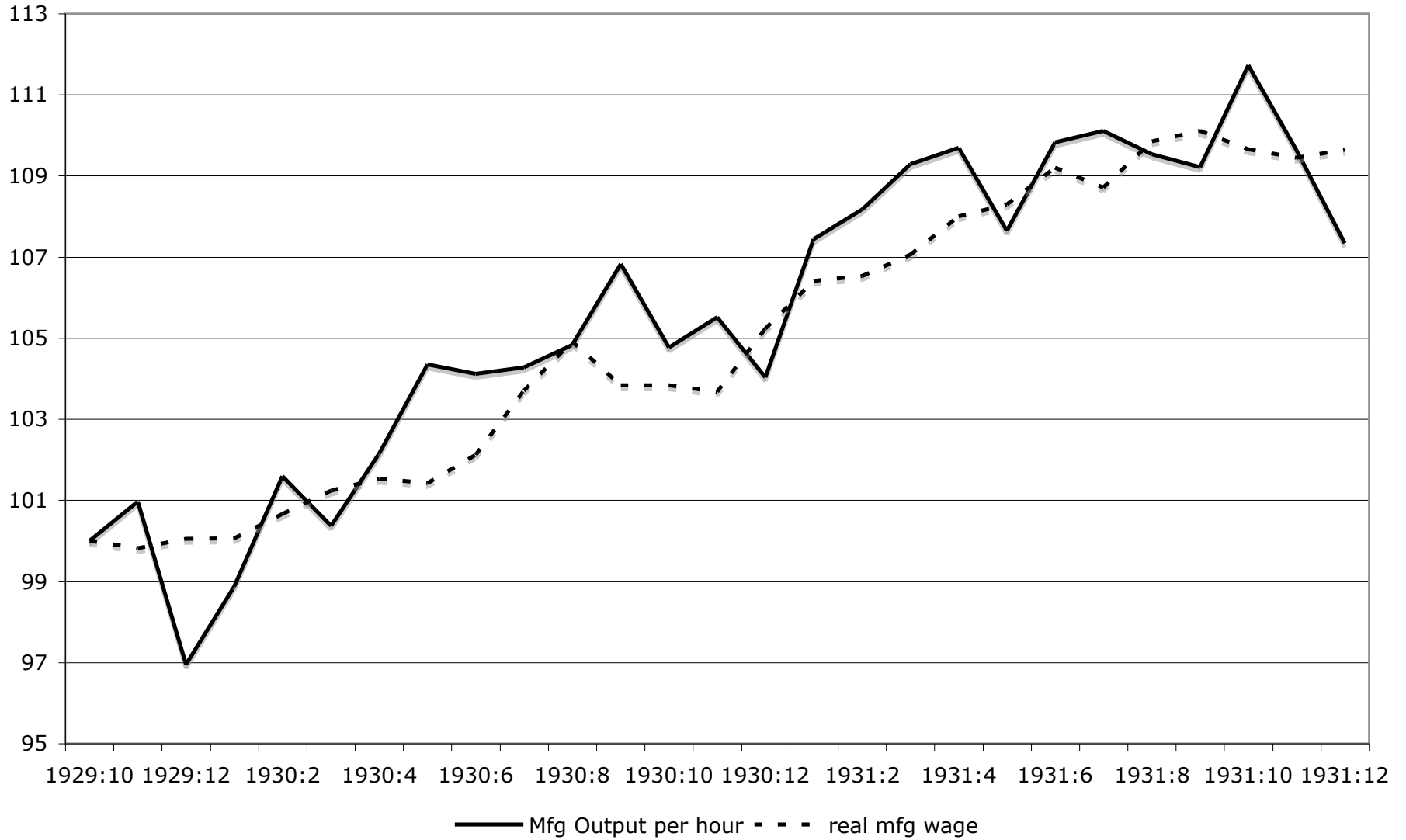


Figure 7 - Real GNP Relative to Competitive Steady State - Hoover Policy

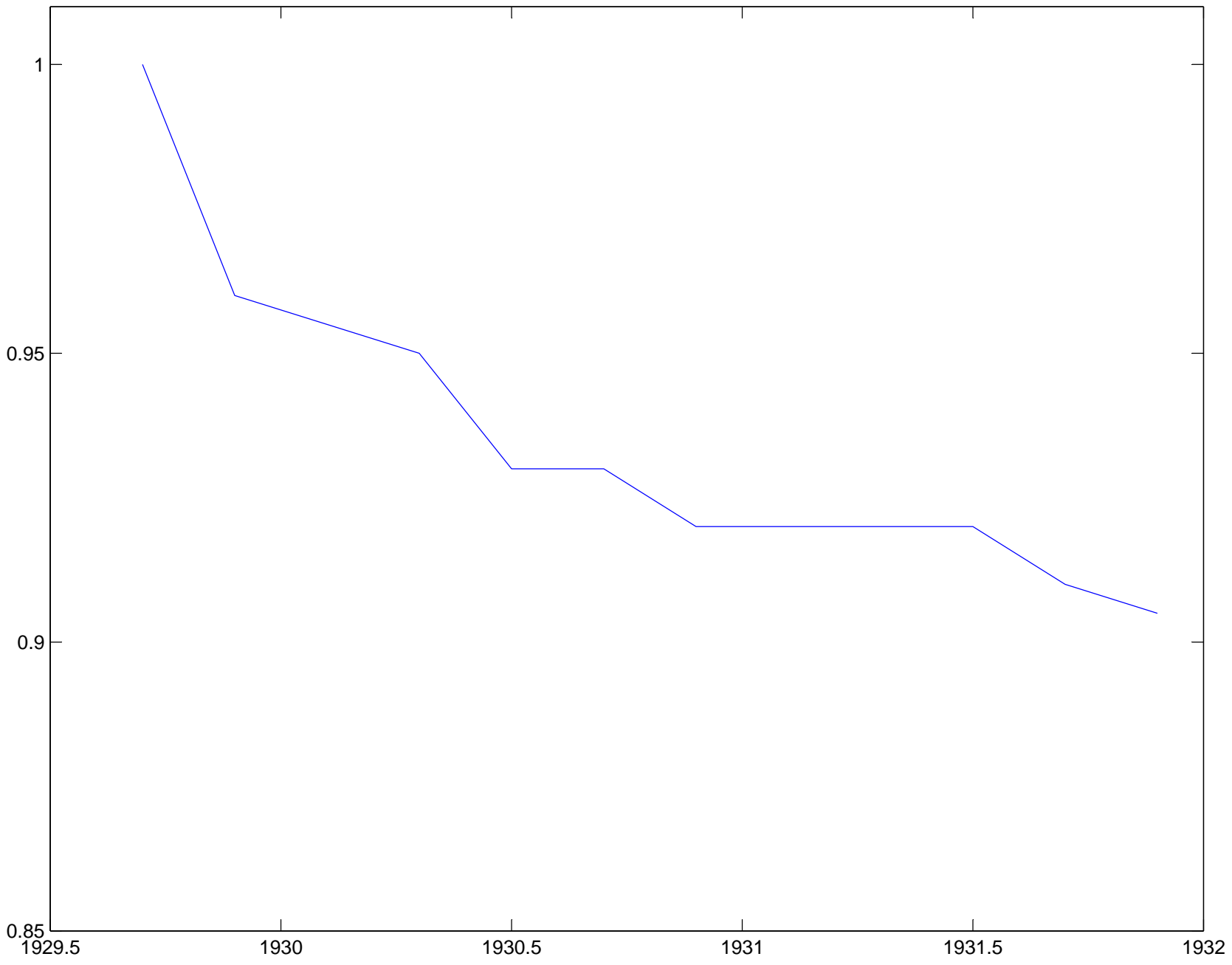


Figure 8 - Investment Relative to Competitive Steady State - Hoover Policy

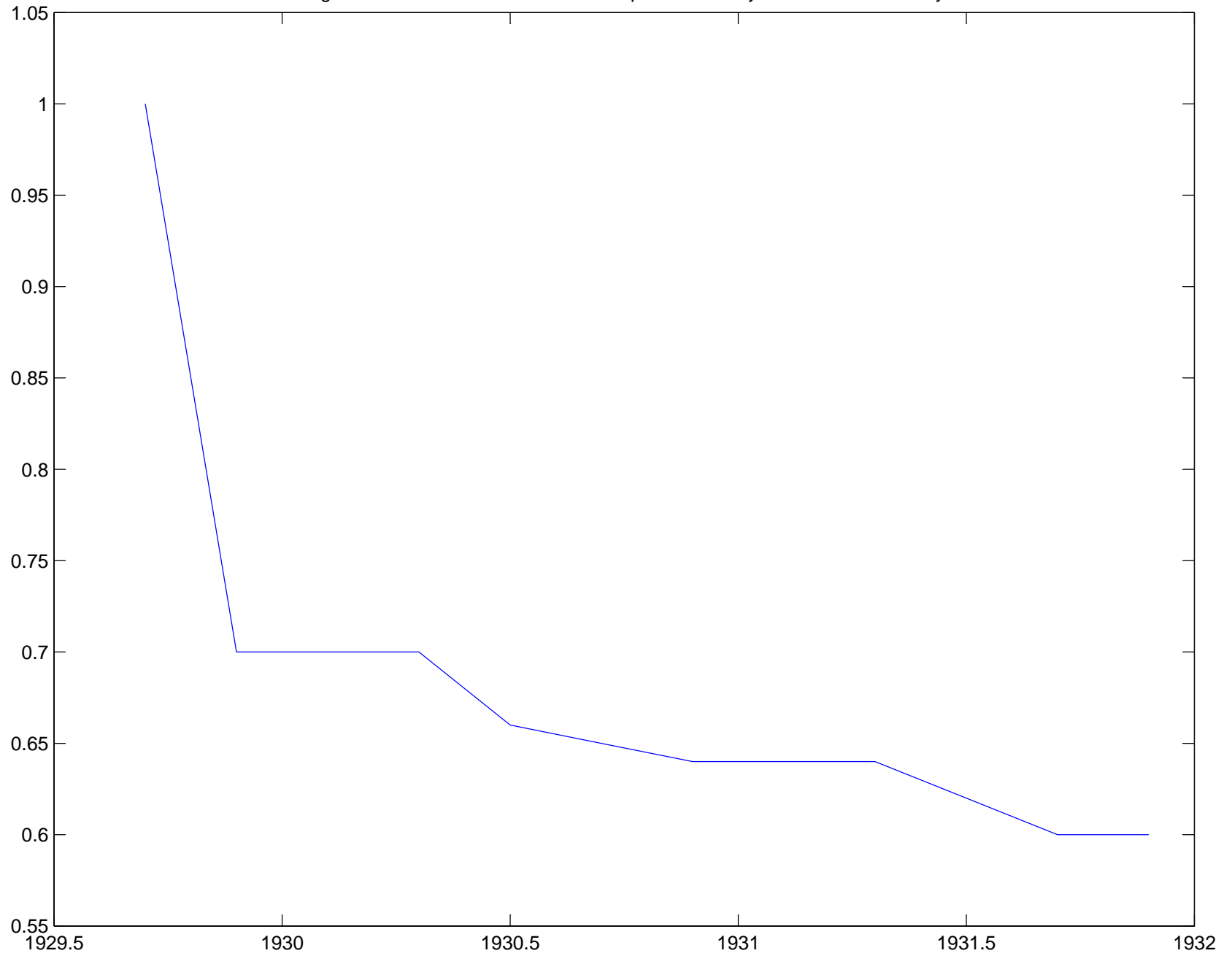


Figure 9 - Consumption Relative to Competitive Steady State - Hoover Policy

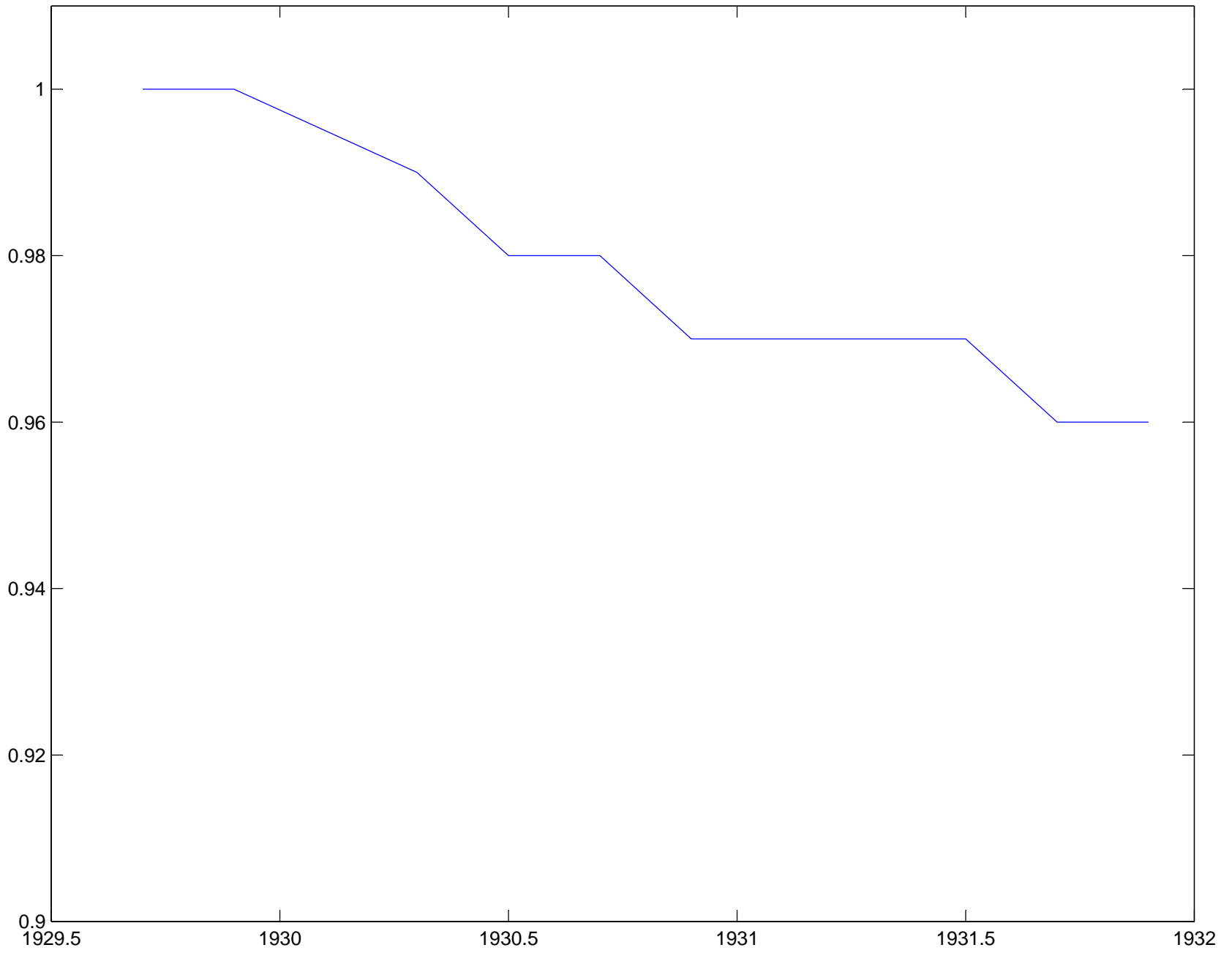


Figure 10 - Mfg Hours (-) & Wage (-) Relative to Competition - Hoover Policy

