

What - or Who - Started the Great Depression?

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Abstract

Herbert Hoover. I develop a theory of labor market failure for the Depression based on Hoover's nominal wage policies that provided industry with protection from union strikes in return for keeping nominal wages fixed. I find that the theory accounts for much of the depth of the Depression, the asymmetry of the depression across sectors, and the substantial decline in investment. The theory also provides an explanation for why low nominal spending had such large real effects during the Depression, but not during other periods of significant deflation..

1 Introduction

Hours worked in the United States were 25 percent below trend throughout the 1930s. Most economists interpret the Great Depression as a chronic excess supply of labor, which implies there was a significant market failure that

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prevented the wage from falling and the labor market from clearing. Understanding the Depression thus requires a theory of this large and protracted labor market failure. Cole and Ohanian (2004) develop a theory of labor market failure for the post-1933 depression, based on President Roosevelt's labor-industrial policies. This paper develops a theory of labor market failure and quantifies its contribution to the pre-Roosevelt Great Depression.

The theory is based on President Hoover's industrial wage program, which was similar to Roosevelt's New Deal labor policies. In November, 1929, Hoover met with the leaders of the major industrial firms and presented his plan to deal with a possible recession. He told them that at a minimum, they should not cut wages, and preferably would raise wages. In return, Hoover would keep union wage demands at bay. Like Roosevelt, Hoover held the view that high wages and "industrial-government cooperation" were fundamental components of economic prosperity. Between 1929 and 1931, the largest manufacturers very publicly advertised their compliance with Hoover's wage program by either raising nominal wages or keeping nominal wages fixed at their 1929 levels. By late 1931, real manufacturing average hourly earnings had increased more than 10 percent as a consequence of the Hoover program and deflation, and manufacturing hours had declined more than 40 percent.

Why would firms be willing to follow the Hoover program? Because in return for paying high wages, Hoover offered protection from unions at a time when firms deeply feared unionization and when the risk of unionization began to rise. To assess this union protection hypothesis, I develop a two-sector insider-outsider model, that is similar to Cole and Ohanian (2004), but differs in that it is tailored to capture the central feature of unions at that time, which was the ability to violently strike and extract rents from capital. I use the model to quantify the benefits of union protection, and find that it was indeed plausible that firms would follow Hoover's program.

To evaluate the quantitative impact of Hoover's program on the U.S. economy, I calculate the equilibrium of the model without unionization, but with firms paying the observed real wage in the industrial sector. I find that Hoover's program has substantial and immediate depressing effects on the economy, reducing aggregate output and hours worked by about 20 percent. The analysis also sheds light on existing puzzles about the Depression, including why the Depression was severe even before real wages rose significantly or before any significant monetary contraction/deflation, why investment fell so much, and why the depression was so different in the farm sector compared to the industrial sector. More broadly, the paper provides a theory for why low nominal spending - insufficient aggregate demand in the language of early business cycle analysts - depressed output so much. In the absence of Hoover's program, deflation would have had much less of an impact on employment and output.

Section 2 presents the data with a focus on comparing industrial labor markets under Hoover and under Roosevelt. 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 union model to assess the potential value of union protection. 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 Depression under Hoover and Roosevelt: Low Employment and High Wages

This section presents data that summarizes the severity of the contraction and focuses on identifying common features between the Hoover economy and the Roosevelt economy. I make this latter comparison to highlight the potential role of wage-cartelization policies for both periods.

The similarities for both the contraction and the recovery failure are as follows

- (1) Real manufacturing wages were above trend, but agricultural wages were below trend
- (2) The industrial sector was considerably more depressed than agriculture; agricultural hours and output were near trend levels
- (2) Depressed industrial output was largely the result of lower hours, not lower output per worker.

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 is from the NBER macro history database). The data show that industrial depression begins abruptly in late 1929, and is immediately severe. IP and industrial hours in October, 1929, were about 2 percent below their summer peak levels. 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 immediacy and severity of the industrial Depression 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.

Economic activity typically begin declining significantly after October 1929, and is substantially depressed by mid-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 total factor productivity (TFP) in this sector. I use factor shares of 1/3 for capital and 2/3 for labor. Output is industrial production, and the inputs are manufacturing hours and the manufacturing capital stock (source: BEA, 1999) interpolated to the monthly frequency. Industrial TFP declines by about 5 percent in December 1929, and then remains around that level through August, 1931. The table also shows output per hour, which may be a better measure for TFP when there is reduced capital utilization. Output per hour, which is strongly procyclical in postwar business cycles, actually rises. Neither measure indicates that productivity was the major factor depressing the industrial economy. This is very similar to Cole and Ohanian's (2004) finding that the recovery failure was also an employment recovery failure; rather than a productivity failure, as TFP returned to trend by 1936, but hours worked remained 20 percent below trend until just prior to World War II. Both the depression of industry in the early 1930s and the continuation of the industrial depression in the mid and late 1930s was due to a non-productivity factor that significantly depressed labor.

Table 5 shows the real manufacturing wage, which is average hourly earnings (Hanes, 1996), divided by the consumer price index. These data suggest that low industrial employment was the result of a labor market distortion that kept the manufacturing wage well above its market clearing level. Real wages rise at the start of the Depression, and continue to rise as the Depression deepens. This increase in the real wage is the consequence of roughly constant nominal wages and deflation. In sharp contrast, real agricultural wages were below trend during this period. Table 6 compares industrial wages and hours to agricultural wages and hours for both the recovery and the contraction. These sectors were roughly equal size, accounting for over 50 percent of total hours worked in 1929. To make the comparison between the two periods more informative, the industrial wage is deflated by manufacturing TFP, as TFP rose rapidly during the recovery. The table shows relatively high hours and low wages in agriculture, and low hours and high wages in industry during both periods. This indicates that the industrial labor market indeed was functioning very differently throughout the 1930s. The labor market distortion is an industrial distortion, rather than an economy-wide distortion.

Perhaps the most striking evidence that industry wages were not only well above their market clearing level but that they did not adjust to market forces is from Simon (2001), who presents data on the supply price of labor

from "help offered" ads, in which individuals placed ads looking for work with a desired wage. Simon shows that the supply price of labor is as much as 40% below the wage paid, adjusting for selection and quality. In contrast, the supply price of labor and the wage were very similar just before the Depression, typically within a couple of percentage points of each other. Moreover, the 40 percent difference between the supply price and the wage during the contraction is comparable to the 40 percent decline in agricultural wages. Simon's evidence indicates that the gap between the wage and its market clearing level was not only large, but that it did not respond to what clearly should have been very strong competitive forces.

The persistence of low employment, low output, and high industrial wages throughout the 1930s suggests that a similar labor market distortion operated during both the contraction and the recovery. My work with Cole (1999, 2004) presented theory and evidence that the recovery distortion was due to Roosevelt's New Deal labor and industrial policies. I will next describe how Hoover's program, and his views about competition and unionization, were very similar to Roosevelt's.

3 Hoover as a New Dealer

Like Roosevelt, Hoover opposed unfettered competition, and he created policies that allowed industry to cooperate in order to stem what he perceived to be the negative impact of "cutthroat competition". And like Roosevelt, Hoover believed high wages were a key for prosperity. Hoover's New Deal policies began in the 1920s as Commerce Secretary. It is well documented that Hoover helped create industry trade associations for the purpose of firm cooperation, including firms sharing data on cost, output, and prices, and promoting standardization of products. The central goal of trade associations was to prevent "destructive competition", as Hoover, like Roosevelt argued that limiting competition would lead to superior economic outcomes. This limited competition view was very influential at this time, and was the result of the perceived success of World War I economic planning. (See Hawley (1966, 1974), Himmelberg (1976), and Rothbard (1975) for extensive discussions of Hoover's development of trade associations and his views about competition). There are many statements from Hoover on the benefits of associations:

"...In 1927 as Secretary of Commerce, I wrote the foreword to a bulletin on "Trade Association Activities" in which I said: 'the national interest requires a certain degree of cooperation between individuals in order that we may reduce and eliminate industrial waste, lay the foundation for constant decrease in production and distribution costs, and thereby obtain the fundamental in-

crease in wages and standards of living. Trade Associations, like many other good things, may be abused, but the investigation of the Department of Commerce shows that such abuses have become rare exceptions. Within the last few years trade associations have rapidly developed into legitimate and constructive fields of the utmost public interest and have marked a fundamental step in the gradual evolution of our whole economic life.' No facts have come to my attention which would cause me to change the opinions expressed at that time, rather every development of industry renders trade associations more essential to sound development of our economic system". (Hoover dinner speech presented at the convention of the American Trade Association Executives, source: <http://www.presidency.ucsb.edu/ws/?pid=22633>)

In his Memoirs (1952), Hoover stated:

...the great area of indirect economic wrong and unethical practices that spring up under the pressures of competition...the great field of economic waste through destructive competition, through strikes, , through failure of our different industries to synchronize...I then described the possibilities of using the multitude of associational activities ...to bring these ideas to reality, we enlisted the different trade associations in creation of codes of business practice and ethics that eliminate abuses." (Hoover, volume 2)

There is considerable evidence that the trade associations facilitated the collusion that characterized large industry in the 1920s. Kovacic and Shapiro (2000) discuss that trade associations were the central cooperative agency for industry at this time, that the Executive Branch discouraged aggressive prosecution by Department of Justice and the Federal Trade Commission, and that the Courts also were influenced by the limited competition view: "Supreme Court decisions in this era (1916-1936) affecting collusion and cooperation between firms reflected tolerant treatment...By the early 1930s, in the depths of the depression, even the court's stand against naked horizontal output restrictions wavered. In *Appalachian Coals Inc. vs. United States*, the Court refused to condemn an output restriction scheme embodied in a joint marketing agreement proposed by coal producers... the Court appeared to have lost faith in free market competition and welcomed experiments with sector-wide private ordering." Epstein,(1934) reports that industrial profits, particularly for large firms, were high during the 1920s, which is consistent with the fact that capital's share of income in manufacturing rose substantially during this period.

Regarding labor, Hoover strongly supported unions for increasing real wages and for reforming what Hoover termed "inhumane" working conditions. John L. Lewis of the United Mine Workers, one of the most militant union leaders, strongly backed Hoover, and Hoover considered Lewis for Secretary of Labor. Hoover emphasized in his Memoirs that he was delighted with the significant growth of *union* wages, which rose about 40 percent in

the 1920s, compared to only about a 6 percent increase for non-union wages (Bureau of the Census, 1976). Hoover presented a table of U.S. union wages in the U.S. in the 1920s, contrasted with real wages from the U.K., which had not advanced, and remarked:

"We could as a nation show one of the most astonishing transformations in economic history, the epitome of which lies in the following table, compiled from the department of labor statistics...These figures demonstrate one positive thing - the rapid increase of real (union) wages. A comparison with British indexes gives evidence that these results are peculiar to the United States.", pp 77-78.

According to Hoover, high real wages were necessary to keep demand, and in turn output, high:

"not so many years ago, the employer considered it was in his interest to use the opportunities of unemployment and immigration to lower wages... the lowest wages and longest hours were then conceived as the means to obtain highest profits. But we are a long way on the road to new conceptions. The very essence of great production is high wages...because it depends upon a widening range of consumption only to be obtained from the purchasing power of high real wages..." (p. 108, Hoover (1952), volume 2). Hoover also signed the Davis-Bacon Act in 1931, with the goal of raising wages by requiring that prevailing wages be paid on public works projects.

Hoover also supported unions by intervening in industrial-labor relations related to working conditions and hours. The most striking case of this was in the steel industry. Following unsuccessful attempts by the union to reduce the workweek, Hoover, as Harding's Secretary of Commerce, convinced Harding to pressure the steel industry to reduce the workday from 12 hours to 8 hours. "I instituted an investigation by the Department of Commerce into the 12 hour day. It was barbaric. I opened the battle by inducing President Harding to call a dinner conference of steel manufacturers at the White House on May 18, 1922. A number of (major) manufacturers, such as Charles Schwab and Judge Elbert H. Gary (Gary was Chairman of US Steel, the major firm to squash the union in 1919), resented my statement which asserted that it (12 hour day) was unsocial and uneconomic. I then startled the press with the information that the President was trying persuade the steel industry to adopt the 8 hour shift...at once a great public discussion ensued..." The industry strongly resisted the change but ultimately accepted it due to continued pressure from Hoover/Harding. "When I became Secretary of Commerce, the working hours of nearly 75 percent of industry were 54 or more per week. When I left the White House only 4.6 percent were working 60 hours or more."

Hoover's promotion of industrial cooperation to limit competition, and his support of high wages, was very similar to Roosevelt's views. I next

describe Hoover's 1929 program for raising real wages and re-distributing income from capital to labor.

4 Hoover's 1929 Wage Program

In November, 1929, Hoover met with the leaders of the major industrial firms in manufacturing, utilities, and transportation at the White House. The purpose of the meeting was to present Hoover's program for raising wages to avoid firm-labor conflict that he anticipated might arise during a recession. Hoover informed industry that they were to bear the cost of a recession by securing from them an agreement to maintain or raise nominal wage rates. In return, he would secure an agreement from labor to not strike and to not demand further wage increases in return for Hoover's wage program. This program is clearly consistent with Hoover's preferences for fostering high real wages. The meeting is described in Hoover's memoirs and by his Secretary of Commerce Thomas Lamont (1930). President Hoover asked industry to maintain or increase current wages, as this would help keep the industrial peace:

"...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".¹

Hoover adopted this program not only because he believed it would reduce conflict between capital and labor, but also because it advanced his goal of raising real wages. Hoover was particularly concerned that *non-union* real wages rose less than profits in the previous decade. Specifically, when industry broached the topic of reducing nominal wages in early 1931, with industrial output down over 30 percent, Hoover rejected the request, and gave no indication that wages should come down in the future: "Wages during Prosperity went no where near so high, comparatively, as commodity prices, business profits and dividends; therefore they should not come down with the general decline." (Time, April 13, 31). Similarly, The White House rejected wage cutting requests in the Fall of 1931, and The Department of Commerce

¹ Rothbard (1975) reports that industry requested additional "government-industry cooperation" in return for agreeing to Hoover's wage program, though I have been unable to find other discussions of this.

warned that wage cutting would result in labor unrest and "Hell to pay all over the country", *Time*, Oct 5, 1931). Hoover's program was ultimately aimed at systematically raising real wages - particularly non-union wages - to reverse more than a decade of what he perceived to be disproportionate growth of capital income at the expense of labor income.

4.1 Industry Followed Hoover's Wage Program

Following their November 1929 meeting with Hoover, major industrial firms either kept nominal wages fixed, or raised wages. This pattern of fixed/rising nominal wages during a period of deflation and economic downturn differed remarkably from previous episodes. To highlight this large difference, I compare wages under Hoover to those during the previous episode of significant deflation (1920-22), when the CPI declined by about 20 percent. Ozanne (1967) describes that International Harvester, facing no threat of unionization in the early 1920s, cut wages by 20 percent in April 1921 and an additional 12.5 percent in November 1921 for a total wage reduction of about 30 percent. Aggregate data also indicate significant wage cutting in the early 1920s. Nominal earnings of full time manufacturing workers fell about 19 percent between 1920 and 1922. (Bureau of the Census, 1976). These large nominal industrial wage cuts from 1921-22 differ considerably from Depression nominal wage changes.²

The evidence strongly indicates that Hoover was responsible for industrial wage patterns. Many large firms publicly advertised their compliance with Hoover during the first two years of the Depression, and Hoover indicated that he was pleased with the wage policies of the major manufacturers and large firms: "Wage agreement held up fairly well, and most of the non-union employers complied" (Hoover, Volume 3, p. 45).

Labor leaders attributed high wages to Hoover's program: "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, Volume 3, 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

²The fact that the aggregate decline is smaller than that of the firm level data probably reflects the fact that the aggregate data are annual averages, that the aggregate data are not adjusted for any compositional changes, and that the aggregate data also includes some union wages, which did not fall as much.

there were only seven firms per hundred firms had cut wages." (page 46).

University of Chicago economist Jacob Viner also attributed high wages to Hoover. "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", (Obrien, 1989). 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." Time Magazine noted "The United Press International interviewed business leaders who attended the 1929 White House conferences, discovered an agreement among them that Industry, by & large, had lived up to its wage pledge. Pierre Samuel Du Pont (I. E. du Pont de Nemours & Co.), Walter Sherman Gifford (American Telephone & Telegraph). Jesse Isidor Straus (R. H. Macy & Co.) declared their companies had not reduced their wage scales since 1929. Walter Clark Teagle said his Standard Oil of New Jersey had found it necessary to cut workers' weekly earnings by part-time employment but that the base pay rate had been maintained." ("Next: Wages?", 4/13/31, Time, pp 12-13)

Not surprisingly, the impact of high wages on profitability caused considerable concern among industrial leaders, who 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, in *Executive Opinion*, Kroos, 1970). Indiana's Republican Congressman William Robert Wood, chairman of the House Appropriations Committee, noted in 1931 that "Either wages should come down or commodity prices should go up. The wage level is far above the selling level." ("Next: Wages?", 4/13/31, Time, pp 12-13). Industrial wages clearly were much higher than their market clearing level, and the evidence strongly shows that Hoover's program was responsible for the nominal industrial wage floor.

5 The Incentive to Follow Hoover's Program

The benefit Hoover offered to firms for following his policy was implicit protection from unions. This section provides evidence that the benefit of protection from unions was potentially large. To do this, I first discuss the significant impact that unions had on wages at this time, I then discuss how firms *prior to Hoover* could effectively suppress unionization using a variety of methods, and I then discuss how labor policies and court decisions shifted at the end of the 1920s, which permanently reduced firms' ability to suppress unions. and which raised the probability and cost of unionization.

5.1 Fear of Unions: High Union Wage Premia and Hold-Up

It is widely agreed by labor historians that industry deeply feared unions at this time, reflecting union's ability to violently strike and extract high wages. Firms viewed the strike as a weapon that unions used to appropriate capital returns. Concern about unions and expropriation were sufficiently prominent that it was the primary theme of the 1926, volume "New Tactics in Social Conflict", Harry W. Laidler and Norman Thomas, Eds.), 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,...over profits (that) 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."

Firms feared unions because of a high and growing union wage premium. Table 7 shows union and non-union wages (Bureau of the Census, 1976). Nominal union wages rise about 40 percent over this period, while non-union wages rise about 6 percent.³ Microeconomic evidence is also consistent with a large union premium. For example, in May, 1922, the union rate for wood patternmakers in Chicago was about 40 percent more than the wage paid for the same occupation by International Harvester and Western Electric, both non-union shops (Ozanne, 1967).

The perceived threat of unionization raised wages of non-union works during this period. Ozanne noted that International Harvester gave out wage increases only "to buy off labor and prevent unionism", and did not raise wages when unions were not perceived to be a threat. Firms that feared unionization tended to pay higher wages. "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." (Ozanne, 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)).

³There 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.

5.2 Preventing Unionization in the Early 1920s

There clearly was a substantial incentive to keep unions out of the workplace, and firms were able to do this in the early and mid 1920s. Preventing unionization was fostered by Court decisions and government policies that limited the ability of unions to organize and that protected firm property rights during strikes. Ebel and Ritschl (2007) summarize Court decisions and how they significantly impeded union organization. There is considerable discussion of the limited ability of unions to organize in the 1920s among labor historians, which I summarize here (Bernstein (1960) is a standard reference). Firms prevented independent unions using company unions and modest corporate welfare programs that are widely perceived to have kept unions out of the workplace, and the use of violence when unions attempted to organize or unions struck. Gittelman (1992), Ozanne (1967), and Jacoby (1985) describe the use of company unions and welfare programs, and Bernstein (1960) describes firm violence during several union organization attempts and strikes during the early and mid-1920s. Tactics 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, and beating and shooting strikers. Firms were able to buy local police, and also hired private police forces that in some cases were deputized. Given the policies in place at the time, firm actions during strikes were rarely prosecuted, but union actions were often prosecuted.

Large firms coordinated with each other to suppress unions. This included the *Special Commerce Committee*, whose objective was "first and foremost...to exclude unions from their plants." (Gittelman (1992)). Ozanne (1967) describes the functions and activities of this Committee and also describes labor relations at International Harvester, one of the members of the committee. Ozanne noted that "the major objective for International Harvester was that of blocking outside unionism." (p. 156) The Committee coordinated corporate welfare programs and company unions to help suppress unionism, and there is agreement that these programs were successful.⁴

⁴The 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. 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. The Committee met for roughly two decades to discuss and collude on labor relations, wage policy, and national and legislative movements to regulate labor relations. There was one full-time employee, who would

Wages were a central topic of Special Conference Committee meetings. In fact, at the Committee's meeting of March 20, 1931, GM indicated that they were opposed to cutting wages, as was Bethlehem Steel. Goodyear had maintained wages from 1929, but was considering a wage cut. The major issue that was discussed was how to deal with union organizers following a possible wage cut.

5.3 Late 1920s: A Sea Change in Union Policies Begins

Legislation and Court decisions on labor unions shifted substantially at the end of the 1920s, and these changes significantly aided union organization and the impact of unions. These changes are described by Ebell and Ritschl (2007), and are briefly summarized here. Key legislation included the Railway Labor Act, which was strongly supported by Hoover, and which made collective bargaining at the company level mandatory. The act provided for state arbitration in labor disputes, and virtually eliminated the ability of firms to impose company unions, which had been a key factor in preventing independent unions during the 1920s. Even more important was that this legislation was upheld by District Court in 1928, the Court of Appeals in 1929, and the Supreme Court in 1930. These judicial reviews overturned many previous court rulings in a much broader context that upheld employer's rights against unions, and the Court decisions provided the foundation for the Norris-Laguardia Act of 1932, which prevented yellow dog contracts and which impeded the use of injunctions against labor, and for the Wagner (National Labor Relations) Act of 1935. In addition to legislation and Court decisions, and to Hoover's support of unions, the deaths of strikers by militia in the mid-1920s led governments to more broadly re-consider its policy during strikes.

There is broad agreement that union organization was ineffective during the 1920s, that this was an important component of low unionization rates at that time, and that ineffective organization was largely the result of government policies and Court decisions that favored firms. There is also broad agreement that labor policies began to change considerably in the late 1920s, that these changes reduced firms' ability to suppress unions and more broadly raised the threat and cost of unionization. This analysis thus indicates that there were benefits to following Hoover's program. To quantitatively assess those benefits, and in particular, assess whether those benefits outweighed

report on union activities at each meeting. Wage policies were very similar across companies. The first public knowledge of this committee arose during the 1937 hearings of Senator Robert LaFollette's Civil Liberties Committee, which was investigating abuses of civil and personal rights by industry.

the cost of paying Hoover's high wages, I now develop a model economy that includes a union with the ability to strike and expropriate capital returns from sunk investments.

6 A Union Model with Capital Holdup

Hoover's plan provided firms with protection from unions if industry maintained/raised their wages. To assess the value of union protection, I use an insider-outsider model tailored to the central feature of unions at that time, which was the ability to violently strike and potentially shut a firm down. This model builds on Cole and Ohanian (2004), but it differs in that firms own the capital stock, and that firms undertake investment before wage bargaining takes place. Thus, capital is sunk at the time that the insiders make their wage-employment offer. This provides labor the opportunity to "hold-up" capital and expropriate rents by threatening to strike. If a strike occurs, production is shut down for 1 period with probability ω . With probability $1 - \omega$, the firm is able to operate and hire labor at the spot market wage rate. The analysis presented here extends the one-final good structure with union hold-up developed earlier by Cole and Ohanian (2003).

The union is modelled exactly after the type of union that industrialists feared at this time. Laider and Thomas (1926), 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,...over profits (that) 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 in this model has this feature..

Time is discrete and denoted by $t = 0, 1, 2, \dots, \infty$. There is a representative household with many members, who supply labor and who consume a single consumption good (C). The second final good in the economy is investment (X). There are two broad intermediate sectors, manufacturing, which will be the cartelized sector, and non-manufacturing, which will be the competitive sector, Hereafter I will refer to the non-manufacturing good as agriculture. Each intermediate sector produces two intermediate goods, one for consumption, and one for investment. Each of these intermediate goods is a CES aggregate of output from an individual industry within that sector. The output of industry i in sector s , $s \in \{A, M\}$, for good j , $j \in \{C, X\}$ is given by:

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

Labor is mobile across industries and sectors. There are four capital stocks, one for the manufacturing-consumption intermediate good, one for the manufacturing-investment intermediate good, etc. The consumption and investment aggregate intermediate goods, $Y_{s,c}$, and, $Y_{s,x}$ are given by:

$$Y_{s,c} = \left(\int_0^1 y_{s,c}(i)^\theta di \right)^{1/\theta}. \quad (1)$$

$$Y_{s,x} = \left(\int_0^1 y_{s,x}(i)^\theta di \right)^{1/\theta}. \quad (2)$$

Production of the two final goods is:

$$C = [\alpha_c(Y_{m,c})^\phi + (1 - \alpha_c)Y_{a,c}^\phi]^{1/\phi}. \quad (3)$$

$$X = [\alpha_x(Y_{m,x})^\phi + (1 - \alpha_x)Y_{a,x}^\phi]^{1/\phi}. \quad (4)$$

This specification allows for different intensities of the use of intermediate goods in the production of final goods, as investment goods tend to intensively use industrial intermediate goods.

The evolution of the four capital stocks is given by:

$$K_{st+1,j}(i) = (1 - \delta)K_{st,j}(i) + X_{st,j}(i), \quad (5)$$

$$X_{st,j}(i) \geq 0 \quad (6)$$

6.1 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. Work is full time, or not at all. Searching 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 opening 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 χ . This job attrition parameter provides a simple way of generating job job loss in the model through factors that are not modeled, such as retirement, death, disability and injury, worker-firm mismatch, household re-location, firm/plant shutdown, etc. The attrition assumption has no implications for the number of insiders when their initial number is below their steady state level. 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 monopoly. The attrition assumption thus permits the insiders to achieve their optimal size when their initial number exceeds the optimum, and also allows the model to generate empirically plausible job tenure profiles.⁵

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

$$\sum_{t=0}^{\infty} Q_t [w_t h_{ft} + \bar{w}_t h_{mt} - c_t] + \Pi_0 = 0, \quad (7)$$

$$n_{mt} \leq \chi n_{mt-1} + v_{t-1} n_{ut-1}, \quad (8)$$

$$n_t = n_{at} + n_{mt} + n_{ut}, \quad (9)$$

where \bar{w}_t is the cartel wage. Income consists of labor income and date-zero profits (Π_0). Equation (8) 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 (χn_{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 solution for cartel job search, which occurs as long as $n_{mt} > \chi n_{mt-1}$, we obtain the following expression for the value of the multiplier on that constraint, which we denote as μ :

⁵Other elements could be used to allow insiders to achieve their optimal size, such as differentiating among workers according to skill, age, number of years of experience, etc. The approach used here is much simpler, and is consistent with the equal treatment of members that tended to characterize unions around this time.

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

Note that the value of the multiplier is the expected present value of the wage premium in the industrial sector.

6.2 Final Goods

Production of consumption goods and investment goods is competitive. Consumption is the numeraire. The problem for a representative consumption goods producer is given by:

$$\max \left[\sum_s \left(\int_0^1 y_{s,c}^d(i)^\theta di \right)^{\phi/\theta} \right]^{1/\phi} - \sum_s \left(\int_0^1 p_s(i) y_{s,c}^d(i) di \right) \quad (10)$$

where y_s^d denotes the final good producer's demand for the output from industry i in sector s . This problem yields the following efficiency condition for the demand for intermediate inputs:

$$Y_c^{1-\phi} Y_{s,c}^{\phi-\theta} (y_{s,c}^d(i))^{\theta-1} - p_s(i) = 0 \text{ for all } i \text{ and } s = \{a, m\}. \quad (11)$$

There is an analogous problem for the production of investment goods, with the relative price of investment goods denoted by p_x .

6.3 Intermediate Goods: The Competitive (Agriculture) Sector

The agricultural sector is competitive. There is a single technology that is used to produce intermediate goods for consumption and for investment goods in this sector. The output price is p_a . The maximization problem for a representative producer in industry i in the agricultural sector is given by:

$$\max_{n_{at}(i,j), k_{at+1}(i,j)} Q_t \left[\frac{p_{at}(i) (n_{at}(i,j))^\gamma k_{at}(i,j)^{1-\gamma}}{+(1-\delta)p_{xt}k_{at}(i,j) - w_t n_{at}(i,j) - p_{xt}k_{at+1}(i,j)} \right] + Q_{t+1} [r_{at+1}(i,j)k_{at+1}(i,j)], \quad (12)$$

where $r_{at+1}(i,j)$ denotes the return to capital earned in the industry in period $t+1$, where Q is the intertemporal price, and $j \in \{C, X\}$. Note that r_a is given by:

$$r_{at}(i,j) = p_{at}(i) (1-\gamma) z_t \left(\frac{n_{at}(i,j)}{k_{at}(i,j)} \right)^\gamma + (1-\delta)p_{xt}. \quad (13)$$

6.4 Intermediate Goods: The Cartel (Industrial) Sector

Manufacturing industries provide intermediate goods for production of consumption and investment final goods. I assume that initially there are no unions. If the firms in these industries follow the Hoover plan, then each industry behaves as a monopolistic competitor, is not subject to unionization, and follows the Hoover wage plan, which is described below. If the firm does not follow the Hoover plan, then with probability λ the industry is organized as a union 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 firm can hire labor from the spot labor market at the competitive wage \bar{w} and behave as a monopolistic competitor. Agreements are negotiated at the beginning of each period, but after investment.

6.4.1 The Negotiation Game

The bargaining model is a two-stage negotiation game, and is symmetric across industries. If firms do not follow Hoover, then with probability λ the workers organize, and are organized thereafter. If the workers organize, then with probability ω 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) . Firms 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 . The industry also colludes on investment.

The sub-game perfect Nash equilibrium of this game is constructed as the limit of the 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. Without loss of generality, we drop the subscript that differentiates between consumption and investment production.

6.4.2 Cartel Objective

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. To keep the notation simple,

I drop the industry (i) and sector (j) subscripts. The monopolist's profit function, conditional on capital stock k , is $\Pi(k)$, and the associated optimal employment function is $N(k)$, where

$$\Pi(k) = \max_n \left\{ Y^{1-\phi} Y_m^{\phi-\theta} (n^\gamma k^{1-\gamma})^\theta - wn + p_x(1-\delta)k \right\}, \quad (14)$$

$N(k) = n$, and Y_m is manufacturing output used in a sector and Y is total output from that sector. . hereafter as manufactured output used in the consumption sector.⁶ 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.

6.4.3 One-Period Industry Objective:

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 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

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

Next, determine the firm's payoff with collusion. There are two parts, a *static payoff*, which is the payoff from 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

⁶The functions for Π_t and N_t also depend upon Y , Y_m and r_t , but that is captured by the time dependence of the functions.

P_2 :

$$P_2 = \max_{n_s(i), k_s(i)} -\beta^{-1} p_x k'_s(i) + \left[\begin{array}{l} Y^{1-\phi} Y_s^{\phi-\theta} [n_s(i)]^\gamma k_s(i)^{1-\gamma} \\ + p_x(1-\delta)k_s(i) - w n_s(i) \end{array} \right]^\theta \quad (15)$$

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 in period t is the sum of date t monopoly profits and investment collusion: $\Pi(k_1) + \beta P_2(k')$. The total expected gross return to the firm from rejecting the union offer is:

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

The first term on the right hand side is the payoff from colluding and paying the spot wage, scaled by the probability that the strike does not shut down production. The second is the payoff from colluding on investment, and the third term is the payoff from shutdown, scaled by the probability of shutdown. This payoff 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: $\Pi(k_1, \bar{w}_1, \bar{n}_1) = P_1(k_1)$

Recursively, this is given by:

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

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

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

6.5 The Insiders' Objective

The insiders offer a wage/employment pair at each date that maximizes the present discounted value of rents per worker from the cartelized sector.⁷ 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:

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

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:

$$V(n, k) = \max_{(\bar{w}, \bar{n})} \left\{ \left(\min \left[1, \frac{\bar{n}}{n} \right] \right) [\bar{w} - w + \phi(Q'/Q)V(\chi\bar{n}, k')] \right\} \quad (16)$$

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

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 $-p_x k' + \beta P(k')$ is the return from colluding on investment. The right hand side is the firm's expected payoff if it rejects the insiders' offer. As in Cole and Ohanian (2004), it can be shown that there exists an optimal size for the insiders, n^* and an associated maximum wage, w^* , which maximizes insider wages. It can also be shown that if the initial number of insiders exceeds the optimal size, then the number of insiders decline monotonically at rate $1 - \chi$.

⁷We 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.

6.6 The Steady State of the Union Model

To demonstrate the impact of the insider-outsider distortion, I present the steady state of the union model compared to the same model, but without bargaining between the insiders and the firm. Parameter values were used such that in the steady state without the union, that households spend about 1/3 of their time endowment in the market, the return to capital is 4 percent, annual depreciation is 5 percent, and that capital's share of income is 1/3. The parameter θ 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 ϕ governs the substitution elasticity between goods across the cartelized and non-cartelized sectors. I use a substitution elasticity of 1/2, as in Cole and Ohanian (2004). This value is consistent with the facts that manufacturing's relative price and its expenditure share have declined over time. Given ϕ , I choose the parameters α_c and α_x such that without the union, the industrial sector's share of total employment is about 35 percent, which is conservative. The share of investment goods production is about 60 percent, reflecting the fact that investment goods use industrial intermediate goods intensively.⁸

I use data on strike outcomes from 1925-37 from DiNardo and Hallock (2001) to choose a value for ω , which is the probability that a strike shuts a firm down. DiNardo and Hallock present data on 36 strikes that occurred between 1925 and 1937, about 60 percent were effective and won by the workers, and about 60 percent of the strikes were violent and disrupted production. I therefore specify $\omega = 0.6$. I choose a value for the probability of remaining an insider (χ) to yield an expected job tenure of about 10 years. Job tenure data from this period is limited, but the model expected job tenure is high compared to the fact that about half of manufacturing jobs in the 1920s lasted 1 year or less (see Jacoby and Sharma (1992), and that mean completed duration of jobs at Ford Motor company plants during the 1919-1947 period were less than half a year (see Whatley and Sedo (1997))). Choosing a value to yield a lower job tenure rate would further reduce employment and output, as it would lead to a larger number of individuals queuing for union jobs.

Table 8 shows the steady state values of the union model variables relative to those without the union. Output and employment are significantly lower under unionization, falling 37 percent and 26 percent respectively, as

⁸Regarding the share of total employment, it is plausible to consider the sectors paying high wages to include not only manufacturing, but also mining and petroleum, construction, government, and transportation, which accounted for a total of 44 percent of employment in 1929. The industrial sector also had a much higher capital intensity at this time than the farm sector.

the manufacturing wage rises about 15 percent. The agricultural sector also shrinks, despite the fact that only the manufacturing labor market is subject to the policy. There are two reasons why the farm sector does not expand; one is that the price of investment goods rise, and the other is that the relative price of agriculture declines. These two forces reduce both the steady state farm capital stock and steady state farm hours.

6.7 The 1929-31 Economy Under Hoover's Plan: Depression

I now calculate the perfect foresight equilibrium path of the economy under the Hoover plan. To isolate the quantitative contribution of Hoover's wage program, and the associated impact of deflation on industrial wages, I abstract from other factors during the Depression, including bank failures (Bernanke, 1983), uncertainty (Romer, 1990), consumer debt (Olney (1999)), changes in the Solow Residual (Cole and Ohanian (1999), Chari, Kehoe, and McGrattan (2007)), tariffs and other open economy factors (Brunner and Meltzer, Eichengreen and Sachs (1985)), taxes (Cole and Ohanian (1999)), as well as other impacts of deflation/monetary factors outside of raising the real wage rate.

Under Hoover's program, firms pay the Hoover wage in return for protection from unionization. Thus, the economy is the same as above, but without the union. Industry pays the observed real manufacturing wage sequence from 1929:4-1931:4, which is taken parametrically by firms, and is the result of Hoover's wage program in conjunction with deflation.⁹ Computing the equilibrium path requires a terminal condition. I choose a terminal condition with the manufacturing wage permanently above its competitive level. The permanent impact of the policy is consistent with the fact that unionization policies changed permanently and is consistent with Hoover's goal of permanently raising real wages, particularly for non-union workers. I therefore choose the terminal condition as the steady state of the economy without the union, but with the industrial wage permanently equal to its trend adjusted value in 1931:4, which was about 7 percent above its 1929:3 value. I treat the 1929:3 value as the market-clearing wage prior to the policy. I am unaware of evidence that firms or policymakers expected wages to return to (trend-adjusted) 1929 levels. Note that choosing a value for the

⁹The analysis could certainly be extended into 1932, as real industrial wages were also high that year. I choose not to include 1932, as it becomes clear during 1932 that Roosevelt will defeat Hoover. Roosevelt expanded industrial and labor cartelization policies beginning in 1933, and including this factor would complicate the analysis.

terminal wage of 7 percent above trend is a very conservative choice relative to the actual value of the manufacturing wage that prevailed after 1931.

I calculate the equilibrium path of the Hoover economy to the terminal steady state with the initial capital stocks at their pre-Hoover steady state values, with the parameter values described above, with the actual industrial real wage sequence between 1929:4-1931:4, and with the wage remaining at 7 percent above trend after that. Figure 3 shows aggregate output in the model and in the data, and Figure 4 shows aggregate hours worked in the model and in the data, while Table 9 shows all the model quantity variables. The Hoover program reduces aggregate hours and output by about 15 percent by the end of 1931, reflecting a 25 percent decline in industrial employment, and a much more modest 7 percent decline in non-industrial employment.

Lower non-industrial employment largely reflects a real wage in that sector that declines about 10 percent. The model is thus broadly consistent with the depth of the depression, the asymmetry between the industrial depression and the non-industrial depression, and the asymmetry between industrial wages and non-industrial wages. Perhaps the most striking finding is that output and employment fall immediately and significantly in the model as they do in the data, even though the real manufacturing wage initially changes very little. For example by mid-1930, both actual and model industrial hours decline about 18 percent, with the real manufacturing wage only about two percent higher than it was in 1929:3. Note that a two percent wage premium by itself would reduce hours only about 6 percent, not 20 percent. The depression in the model is magnified by a drop in the demand for industrial goods, reflecting sharply lower investment. Specifically, the steady state capital stocks under the Hoover plan are lower than the initial capital stocks, and this leads to much lower investment along the transition to the Hoover steady state. Since investment goods intensively use industrial goods, the demand for industrial goods drops, and this increases the impact of Hoover's wage program and deflation on industrial employment.¹⁰

To shed further light on the permanent impact of the policy on the economy, I compare these findings to those of Cole and Ohanian (2000, Table 9), who studied the impact of the same real manufacturing wage sequence in a two-sector economy, but with the assumption that the wage distortion was transitory. The impact of the high real manufacturing wage in Cole

¹⁰In this model, labor is costlessly reallocated from investment goods production to consumption goods production, which is why consumption rises initially. Consumption would decline further if reallocation costs were included in the model, or if adjustment costs/time to build were included in the technology for producing investment goods, which would tend to prevent investment from falling to zero and limit the number of workers who transfer to the consumption goods sector.

and Ohanian was much smaller, with aggregate output falling about 4.5 percent in 1931. An important reason why the Depression is so much smaller in Cole and Ohanian is because the demand for industrial goods does not fall. Specifically, the relative price of industrial goods in Cole and Ohanian's (2000) experiment rises to attenuate the impact of the Hoover wage on industrial employment. In contrast, the relative price of industrial goods in the experiment presented here on average declines along the transition path to the Hoover steady state.¹¹ Thus, in Cole and Ohanian (2000), general equilibrium forces attenuated the impact of Hoover's program, while in this model, general equilibrium forces magnify its impact.

Firms pay higher wages for protection against unions in this economy, but clearly this protection is costly in terms of lower employment and output. I now assess the incentive for firms to follow the Hoover plan. To do this, I compare the expected present value of profits under the Hoover plan, beginning in 1929:4 and continuing through the terminal economy, to profits if firms don't follow Hoover, but instead operate in the economy with the risk of unionization. Computing the union model requires specifying a value for λ , which is the probability of unionization at each date. I choose a value for λ of 1 percent per quarter, which implies that about 30 percent of industrial workers would be unionized after 8 years¹². I find that the present value of profits under the Hoover plan are 20 percent higher than profits in the insider-outsider model when both profit streams are evaluated beginning in 1929:4. Thus, it is indeed plausible that firms would be willing to raise real wages about 7 percent per year in order to avoid the significantly higher wages that a union would ultimately extract.

7 Related Literature

This paper is consistent with the very old tradition in the literature that has characterized the Depression as a chronic excess supply of labor. Recent discussions of Hoover's wage policy also include the interesting analysis of Bordo, Erceg, and Evans (BCE, 1999), who study the Depression in a model with exogenous sticky economy-wide wages and deflation, and who find that

¹¹The relative price of industrial goods produced for the investment sector declines significantly, while the relative price of industrial goods for the consumption sector is roughly unchanged.

¹²To preserve the representative firm construct, I assume that each firm in each industry is unionized, but only a fraction of workers are paid the insider wage. For example, in the first period, λ percent of firms would be unionized. I assume that each firm is unionized, pays λ percent of its workers the union wage, and the other workers receive the competitive wage.

sticky wages combined with deflation reduced output considerably in a one-sector model. BCE, however, do not develop a theory of excess supply, they do not pose a theory for why firms would follow the Hoover plan, and they are silent on the difference in the depression between the industrial sector and the farm sector. Ebel and Ritschl (2006), who discuss Court decisions affecting unionization during this period, develop a bargaining model, and interpret the Depression as a shift from individual bargaining in the 1920s, to collective (union) bargaining in the 1930s. They also conclude that labor market policies are central for understanding the Depression.¹³

8 Summary and Conclusion

Many economists agree that the Great Depression was a period of a substantial and chronic excess supply of labor, but there is no canonical theory of this labor market failure. This paper developed a theory of labor market failure, based on President Hoover's program that offered industrial firms protection from unions in return for paying high wages. Firms deeply feared unions at this time, reflecting a rapidly growing union wage premium and a significant change in legislation that fostered unionization and enhanced the effectiveness of strikes. Given this state, it was rational for firms to follow Hoover's program of paying *moderately higher real wages* to avoid the *significantly higher wages* that would ultimately come from unionization. I conclude that Hoover's program, combined with deflation, prevented the industrial labor market from clearing and significantly depressed the economy.

My analysis also provides a theory for why low nominal spending - deficient aggregate demand - generated such a large depression in the 1930s, but not in the early 1920s, which was a period of comparable deflation, but when industrial firms cut nominal wages considerably. In the absence of Hoover's program, my analysis indicates that the Depression would have been much less severe. The 1930s would have been a substantially better economic decade had the government not adopted programs that artificially raised real wages in industrial labor markets and prevented those markets from clearing.

¹³My analysis squarely pins high industrial wages on Hoover's program and shifts in unionization policy. Some economists have argued that firms voluntarily paid high wages because it was good for business (O'Brien, 1987). My analysis does not support this view. Dighe (1998) presents other evidence against this voluntary high wage view.

Table 1
 Gross Private Domestic Investment - Structures
 (Barger and Klein, 1954)

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)
1929:1	95.9	98.2	91.7
1929:7	100.0	97.5	98.5
1929:9	97.7	89.1	97.6
1929:10	97.6	84.7	97.7
1929:12	89.5	55.3	87.0
1930:6	78.4	56.6	80.9
1930:12	65.5	47.1	72.2
1931:8	58.2	45.9	72.2

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
Average	96.2	103.7

Table 5
Real and Nominal Mfg Wages

Date	Real Mfg Wage	Nominal Mfg Wage
1929:1	99.0	98.5
1929:6	99.4	99.3
1929:10	100.0	100.0
1929:12	100.0	99.8
1930:6	102.1	100.3
1930:12	105.2	98.3
1931:6	109.2	95.6
1931:9	110.1	95.4
1931:12	109.6	92.9

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

Period	Mfg Hours	Mfg Wage	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 of the Union Model
 Relative to Pre-Hoover Steady State
 (Pre-Hoover Values = 100)

Y	I	N	W_m	N_m	W_a	N_a
63	61	74	117	56	58	91

Table 9
 Model Variables Under Hoover's Wage Program
 (Pre-Hoover Steady State Values = 100)

Date	Y	C	Total Hours	Mfg hours	Farm hours
1929:4	95.1	100.6	92.0	86.5	95.8
1930:1	93.7	99.0	91.0	84.7	95.3
1930:2	92.4	97.4	90.0	83.0	94.8
1930:3	91.1	95.9	89.0	81.3	94.4
1930:4	89.8	94.3	88.1	79.7	93.9
1931:1	88.5	92.9	87.1	78.1	93.4
1931:2	87.3	91.4	86.2	76.6	93.0
1931:3	86.0	89.9	85.3	75.0	92.5
1931:4	85.7	89.8	85.3	74.9	92.5

9 References

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Figure 1 - U.S. Industrial Production, January 1929 - July 1932
October, 1929 = 100

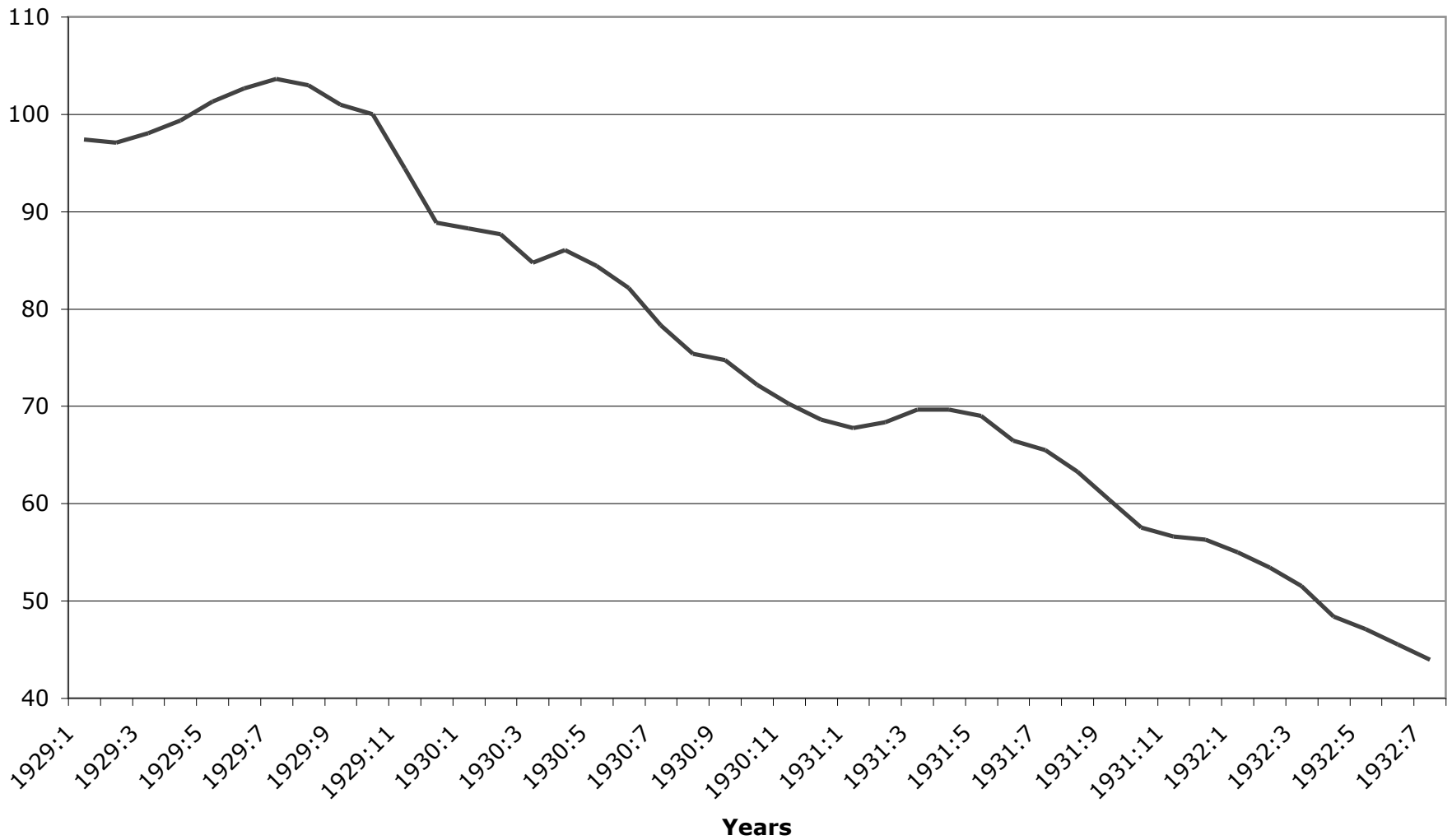


Figure 2 - U.S. Industrial Hours Worked, January 1929 - July 1932
October, 1929 = 100

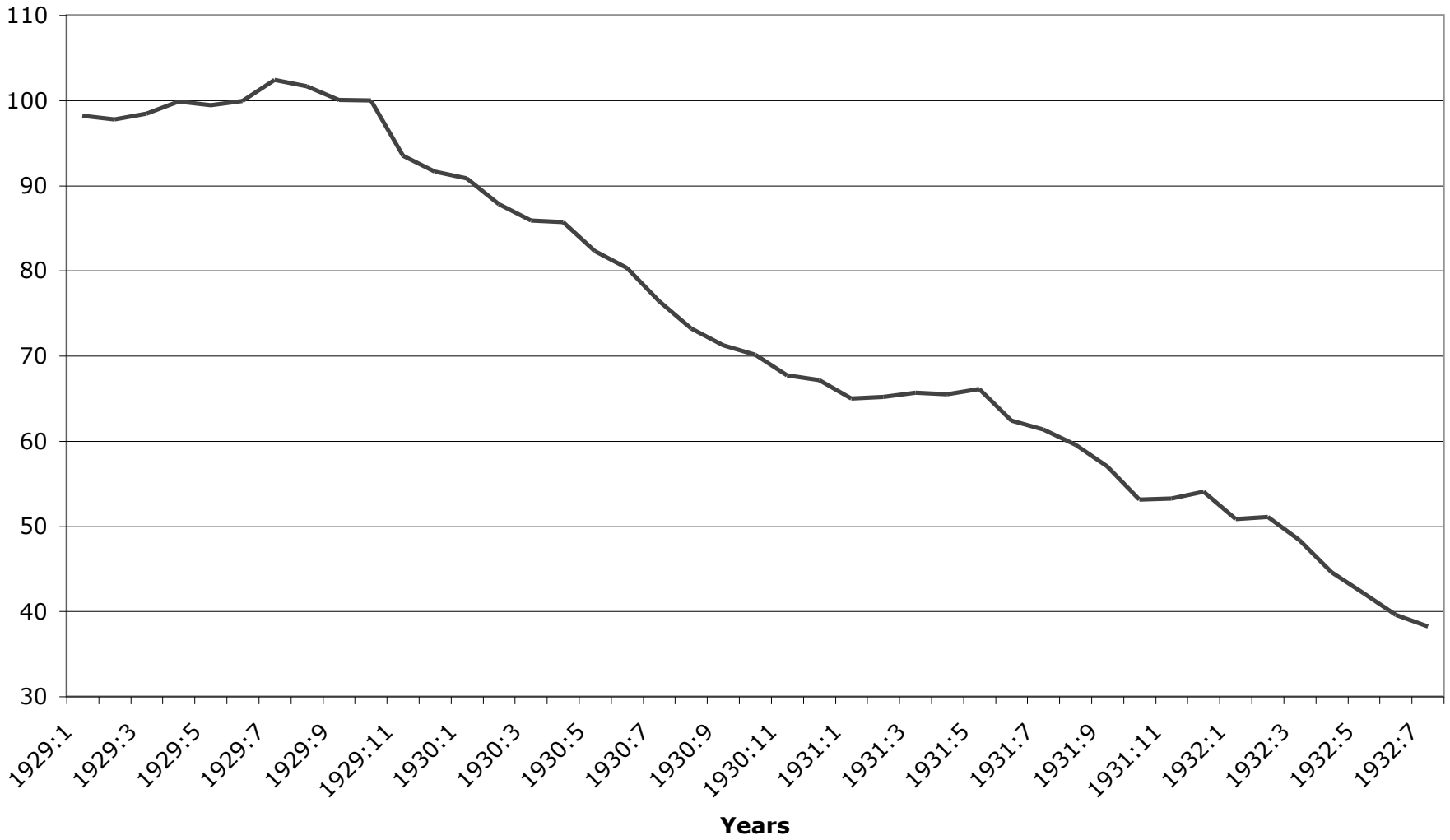


Figure 3 - Real GNP (-) and Model GNP (--) 1929:4 - 1931:4
(1929:3 = 100)

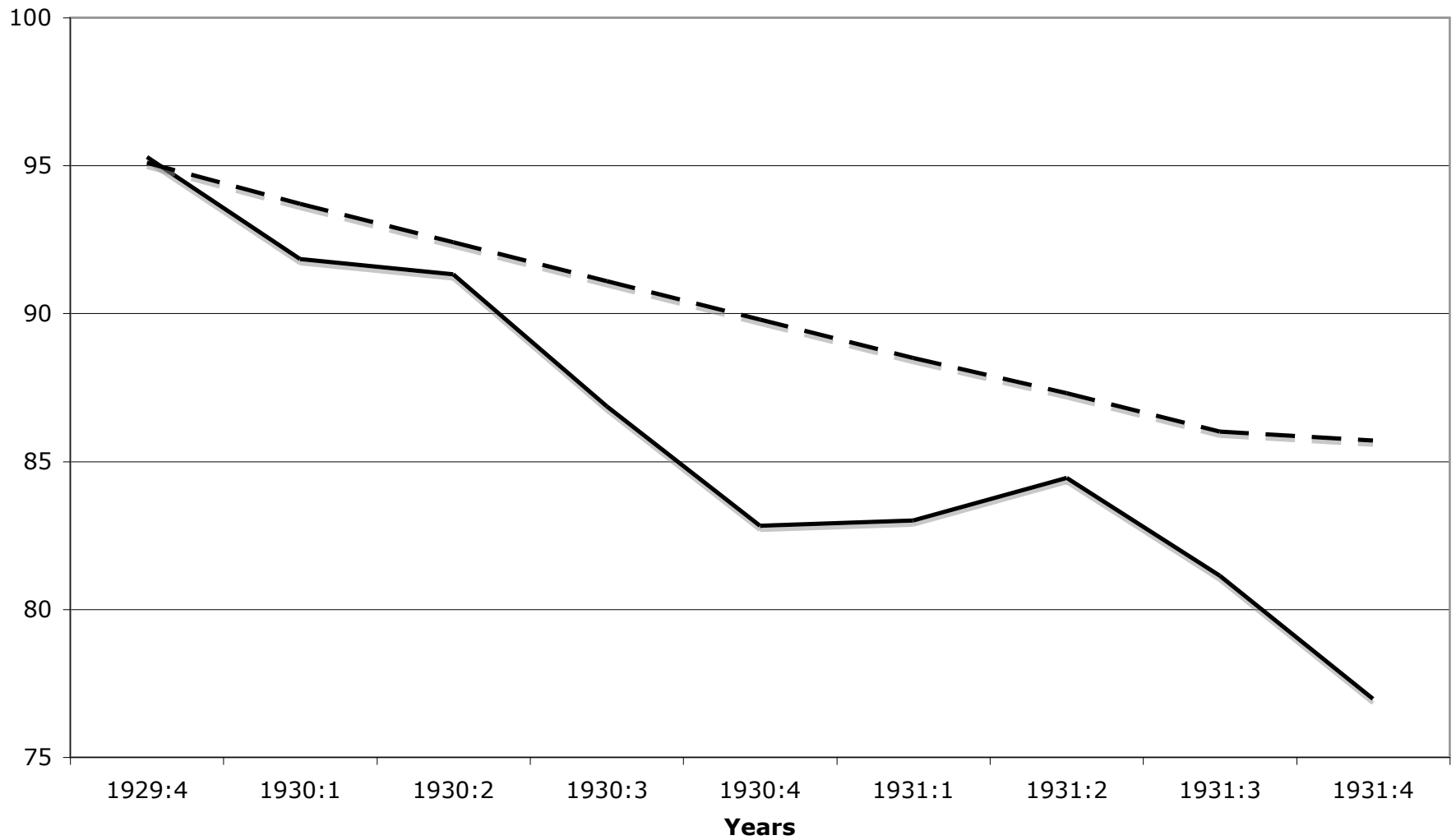


Figure 4 - Hours Worked (-) and Model Hours (--) 1929:4 - 1931:4
(1929:3 = 100)

