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WHAT - OR WHO - STARTED THE GREAT DEPRESSION?

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ABSTRACT

Herbert Hoover. I develop a theory of labor market failure for the Great Depression based on Hoover's industrial labor program that provided industry with protection from unions in return for keeping nominal wages fixed. I find that the theory accounts for much of the depth of the Depression and for the asymmetry of the depression across sectors. The theory also can reconcile why deflation and low levels of nominal spending apparently had such large real effects during the 1930s, but not during other periods of significant deflation.

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1. Introduction

Hours worked per adult in the United States were more than 20 percent below normal throughout the 1930s. Many economists agree that this large and persistent employment decline is the defining feature of the Great Depression, and characterize this as a chronic excess supply of labor reflecting a persistent and large labor market failure. Cole and Ohanian [1] develop a theory of labor market failure for the post-1933 depression, based on President Roosevelt's New Deal labor-industrial policies. These policies raised real wages substantially above market-clearing levels which in turn kept employment and output low. But there is no theory of labor market failure prior to the New Deal. This paper develops such a theory, and quantifies its contribution to the earlier stages of the Great Depression.

The theory is based on President Hoover's industrial labor program, in conjunction with the growing power of unions. 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. He also advised them to share work among employees. In return for maintaining or raising wages and for work-sharing, Hoover told industry that he would keep union demands

at bay. Following his conference with industry, Hoover secured organized labor's agreement to withdraw demands for higher wages and not to strike. 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, and by significantly spreading work among employees. There was very little new union organization or strikes during this period.

By late 1931, real manufacturing average hourly earnings had increased more than 10 percent as a consequence of the Hoover program and deflation. By September 1931, manufacturing hours worked had declined more than 40 percent, and the average workweek in manufacturing had declined by about 20 percent.

To evaluate the quantitative impact of Hoover's program, I calculate the equilibrium of a model economy with firms paying the observed real wage in the industrial sector and following the observed workweek. I find that Hoover's program substantially depressed the economy, reducing aggregate output and hours worked by about 20 percent. But 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 court decisions and unionization policy - including policies advanced by, and signed into law by Hoover - substantially

increased the likelihood of organization and raised union bargaining power. To assess this union protection hypothesis, I extend the model to include the possibility of union organization that is similar to Cole and Ohanian [1], but differs in that it is tailored to capture the central feature of unions at that time, which was the ability to 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.

This research complements a large body of work on the Depression, including Friedman and Schwartz [2], who tie the Great Depression to a decline in nominal spending and deflation. This long-standing view, however, requires a theory, but as Lucas (2007) notes, the development of such a theory remains a challenge, precisely because it requires rationalizing such a large and persistent monetary nonneutrality (see Parker [3]). This paper provides such a theory through Hoover's industrial labor program, which raised real wages in conjunction with deflation.

The outline of the paper is as follows. Section 2 presents data, with a focus on comparing the industrial sector, which was distorted by Hoover, to the agricultural sector, which was not impacted by Hoover's program. Section 3 summarizes Hoover's views on wages, unions, and industrial cartelization. Section 4 describes Hoover's labor program and how industry followed it. Section 5 describes the incentives for firms to follow Hoover. Section 6

presents the benchmark model, and the impact of Hoover's program on the Depression. Section 7 extends the model to include a union that can hold-up capital to quantify the benefits for firms to follow Hoover. Section 8 discusses the paper in relation to the broader literature, and discusses the contribution of the paper as developing a monetary theory of the Depression. Section 9 concludes.

2. The Depression under Hoover: Low Employment and High Wages

This section presents data that highlight the severity of the industrial contraction, the industrial labor market failure, in which low manufacturing employment coincided with high wages, and also present data that contrast the industrial sector's significant decline with the much milder decline in the agricultural sector, which experienced no labor market failure. I focus the analysis from late 1929 to late 1931, the period in which Hoover has the most influence on industry.

I begin by presenting data on industrial economic activity. Figure 1 show monthly manufacturing hours worked and manufacturing output (source: NBER macro history database). At this time, manufacturing accounted for about 28 percent of employment. These data show that the industrial depression begins abruptly and severely in late 1929. Specifically, industrial hours and output rise until Fall, 1929, but decline rapidly afterwards. Hours

and output fall 20 percent by June, 1930, and by roughly 40 percent by Fall, 1931. Figure 2 decomposes manufacturing hours into changes in employment and changes in the length of the workweek, as both decline significantly. Employment declines by about 30 percent over this interval and the workweek declines by about 20 percent.

Note that these data paint a very different picture from the standard view that the Great Depression was initially a "garden variety recession" (see Eichengreen and Bordo [4]). Instead these data show that the industrial Depression was immediately severe and deep. In contrast, agriculture, which accounted for about the same share of employment as manufacturing in 1929, does not experience a drop in hours or real output. In fact, hours worked in agriculture actually rise slightly between 1929 and 1931, increasing by about 1.5 percent. Real agricultural output rises by about 4 percent over this time period (Kendrick [5], page 363-365).

These data show a remarkable difference in economic performance across these two major sectors, and raise the question of why the Depression affected these two sectors so differently. Real wage data suggest that a key source for these differences lies in differences in the operation of their respective labor markets. The industrial depression coincides with a significant industrial labor market distortion, as real manufacturing wages rose during the Depression. Figure 3 shows the nominal manufacturing wage, and the

6

real manufacturing wage.[1] Real wages rise modestly at the start of the Depression, and continue to rise as the Depression deepens. The figure shows that for much of this period, higher real wages are the consequence of roughly constant nominal wages and deflation. The industrial labor market distortion is suggested by the fact that higher real wages coincide with substantial employment loss. In sharp contrast, real wages fall considerably in agriculture. The real agricultural wage, which is the daily farm wage rate relative to the CPI, declines by about 25 percent between 1929 and 1931. (United States Department of Agriculture, Statistical Bulletin Number 822, 1991)).[2]

To provide further evidence of a large industrial labor market distortion, I present data that indicates that households were significantly constrained in selling labor services in the industrial labor market, and I also summarize data that indicates the supply price of labor was well below the industrial wage. To show that households were constrained in selling labor services, I first note that in the absence of a labor market distortion, households should have equated the marginal rate of substitution between consumption and leisure to the real manufacturing wage. However, this implication is strongly at variance with the data. Using preferences that are logarithmic between

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[1]I use average hourly earnings (Hanes, 1996) for the nominal wage, and construct the real wage using the consumer price index.

[2]Agricultural hours and wages are available only at the annual frequency.

consumption and leisure, and using data on consumption, hours worked, and the manufacturing real wage, I find that the manufacturing wage is about 30 percent higher than the marginal rate of substitution in 1931, which is consistent with the view that the manufacturing wage was well above its market-clearing level, and that households were rationed in selling their labor services in industrial labor markets.

Data on the supply price of labor also indicate a large labor market distortion that prevented this market clearing. Simon [6] presents data on the supply price of labor from "help offered" ads, in which individuals placed ads in newspapers looking for work with a desired wage, and with a summary of their work characteristics. 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 in help offered ads, and the actual wage, were very similar just before the Depression, typically within a couple of percentage points of each other. Simon's evidence indicates that the gap between the actual wage and the market clearing wage was not only large, but that it did not respond to what clearly should have been very strong competitive forces that should have reduced the wage and increased employment. These data are also consistent with a substantial labor market distortion which kept the industrial wage far above its market-clearing level.

This analysis suggests that the key to understanding the Depression is

understanding and quantifying this labor market distortion. The next section proposes a theory for this distortion based on Herbert Hoover's industrial labor market program which, in conjunction with deflation, fostered higher real wages in the industrial sector, and which prevented those wages from declining, even in the face of strong countervailing economic forces.

3. Hoover as a New Dealer

While Herbert Hoover is often portrayed as a market-oriented President, some of his labor and industrial policies were thematically similar to Roosevelt's New Deal policies. Like Roosevelt, Hoover created policies that allowed industry to cooperate in order to stem what he perceived to be the depressing effects of "cutthroat competition". And like Roosevelt, Hoover believed high wages were the key to prosperity. Hoover's 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 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.

The view that limiting competition was essential for economic prosperity was influential at this time, and was the result of the perceived success

of World War I economic planning in which government, rather than markets, allocated production, and de facto limited competition by assigning particular goods to be produced to particular producers (See Hawley [7], [8], Himmelberg [9], and Rothbard [10] 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 cooperative trade associations and limiting competition:

"...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 increase 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 din-

ner speech presented at the convention of the American Trade Association Executives, source: htp://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 waster 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 [11])

There is considerable evidence that the trade associations facilitated the collusion that characterized large industry in the 1920s. Kovacic and Shapiro [12] 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 market-

ing 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 [13] 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.

Hoover was also a strong supporter of unions and high wages. 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). In his Memoirs, 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 [11]).

Hoover was central in advancing unionization. He promoted and signed landmark unionization legislation, including the Davis-Bacon Act in 1931 and the Norris-Laguardia Act in 1932, both of which raised wages and facilitated unionization. The Davis-Bacon Act requires that prevailing (union) wages be paid on public works projects, and the Norris-Lauguardia Act prohibited courts from issuing injunctions against union strikes, picketing, or boycotts and also prohibited "yellow dog" contracts, which allowed firms to require that workers sign a contract indicating that they will be fired if they join a union. After the National Labor Relations Act, the Norris-Laguardia Act is considered by many as the second most significant unionization legislation in the United States.

Hoover also supported unions by intervening in industrial-labor relations related to working conditions and the length of the workweek. 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 manufactures at the White House on May 18, 1922. The manufacturers, such as Charles Schwab and Judge Elbert H. Gary (Gary was Chairman of US Steel, which had defeated the union during a series of violent strikes 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 and 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 strong support of high wages and unions was similar to Roosevelt's New Deal. I next describe Hoover's 1929 program for raising real wages and redistributing income from capital to labor.

4. Hoover's Labor Program

In November, 1929, Hoover met with the leaders of the major industrial firms in manufacturing, utilities, and transportation at the White House. Hoover presented his program for raising wages and work-sharing to avoid firm-labor conflict that he anticipated would arise. 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, and to engage in work-sharing. In return, he secured an agreement from labor to not strike and to not demand further wage increases. This program is clearly consistent with Hoover's preferences for fostering high real wages, supporting unions, and reducing the workweek. 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...that the available work should be spread by shortening the work week...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 [11], pp 43-44). Lamont noted "One of the first things which they (business leaders)

15

did was to agree in principle to maintain the level of wages to perpetuate industrial peace".[3]

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 much less than profits in the previous decade. Specifically, when industry broached the topic of reducing nominal wages in early 1931, with industrial output dropping by more than 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 warned that wage cutting would result in labor unrest and "Hell to pay all over the country", Time, October 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 the disproportionate growth of capital income relative to

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[3] Rothbard [10] reports that industry requested additional "government-industry co-operation" in return for agreeing to Hoover's wage program, though I have been unable to find other discussions of this.

labor income.

4.1. Industry and Labor Followed Hoover's Program

Following their November 1929 meeting with Hoover, major industrial firms either kept nominal wages fixed, or raised wages, and spread work considerably. The pattern of fixed/rising nominal wages during a period of deflation and economic downturn differs remarkably from previous episodes. To highlight this 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 [14] 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 stand in sharp contrast to the relative fixity of nominal wages under Hoover.[4].

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[4]The 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.

Firms also followed Hoover's request for work-sharing, as the average workweek in manufacturing had declined by about 20 percent by September, 1931, compared with about a 30 percent decline in employment. In contrast, the workweek changed very little during fluctuations prior to Hoover, with about 80 percent of the cyclical change in hours worked being accounted for by changes in employment. For example, manufacturing employment declined about 25 percent during the 1921-22 recession, but the workweek declined only about 3 percent.

There is considerable evidence that indicates that Hoover was responsible for nominal wage fixity. 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 [15], 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 [15], 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 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", (O'Brien [16]). 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). Most of the major manufacturing firms that publicly advertised and verified their compliance with Hoover were not unionized at the time,

including Bethlehem Steel, Dupont, Ford, GM, Goodyear, and U.S. Steel. This evidence suggests Hoover's independent influence on wage setting among large-scale industry.

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 [17]). 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 shows that Hoover's program was responsible for the nominal industrial wage floor, and for the substantially shorter workweek.

In return for industry following Hoover's program, labor largely kept their pledge to Hoover to not strike, as man-days lost to work stoppages was at its all time low in 1930 (U.S. Bureau of Census, [18]). Moreover, there was little labor organization during this period. Freeman reports that union membership as a fraction of non-agricultural employment fell between 1929 and 1931.

Major producers followed this program until late 1931. At this time, Hoover informed industry that he would not support the "Swope program", which explicitly provided for cartels, and which was a de facto blueprint for the National Industrial Recovery Act. Following this, major manufacturers, including U.S. Steel and G.M instituted their first nominal wage cuts.

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 prevent unionization, and I then discuss how labor policies and court decisions changed substantially, which permanently reduced firms' ability to prevent organization. and which raised the probability and cost of unionization.

5.1. Fear of Unions: High Union Wage Premia

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, Editors), 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."

One reason firms feared unions is because of a high and growing union wage premium. Table 1 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.[5] 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 [14]).

The perceived threat of unionization raised wages of non-union works

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[5]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.

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 [14], page 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 [19]).

5.2. Preventing unionization in the Early 1920s

There was a substantial incentive to keep unions out of the workplace, and firms were largely successful in preventing unionization in the early and mid 1920s. Union membership declined from about 17.4 percent in 1921 to about 10.5 percent by 1929 (Freeman [20]). Preventing unionization was fostered by Court decisions and government policies that limited the ability of unions to organize and that favored firms during strikes. Ebel and Ritschl [21] 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 [19] is a standard reference). Prevention methods included 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 when workers called a strike. Gittelman [22], Ozanne [14], and Jacoby [23] describe the use of company unions and welfare programs, and Bernstein [19] describes firm violence during several union organization attempts and strikes during the early and mid-1920s. These 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 sometimes able to bribe local police, and also hired private police forces that in some cases were deputized. Firm actions during strikes were rarely prosecuted, but union actions were often prosecuted.

Large firms coordinated to prevent unionization. This included the *Special Commerce Committee,* whose objective was "first and foremost...to exclude unions from their plants." (Gitelman [22]). Ozanne [14] describes the functions and activities of this Committee and using archival data also describes labor relations at International Harvester, which is considered to be a representative member of the committee. Ozanne noted that "the major objective for International Harvester was that of blocking outside unionism." (page 156) The Committee coordinated corporate welfare programs and company unions to help suppress unionism, and there is agreement that these

programs were successful.[6] 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 discussed at that meeting was how to deal with union organizers following a wage cut.

5.3. A Sea Change in Labor Policies: Facilitating Unionization

Legislation and Court decisions on labor unions shifted substantially at the end of the 1920s, and these changes significantly aided union organization

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[6]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. Bethlehem Steel, Dupont, GE, GM, Goodyear, International Harvester, Irving Bank and Trust, Exxon, US Rubber, Westinghouse formed the Special Conference Committee, and AT&T and US Steel joined afterwards. The Committee had no telephone listing, no letterhead, no bank account, no dues. The Committee met regularly 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 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.

and the impact of unions. These changes are described by Ebel and Ritschl [21], 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 in that industry. 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 that had upheld employer's rights against unions.

There is considerable agreement that the Railway Act and subsequent Court decisions were the genesis of legislation that facilitated unionization and substantially increased labor bargaining power, including the Norris-Laguardia Act of 1932, which prevented yellow dog contracts and which reduced the use of injunctions against labor, and the Wagner (National Labor Relations Act) of 1935, which in its original form not only provided for collective bargaining, but also placed very few limitations on labor actions during strikes. In addition to legislation and Court decisions, and to Hoover's support of unions, the deaths of strikers by militia in the mid-1920s not surprisingly led governments to significantly reconsider its policy during

strikes.

There is agreement that new 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 agreement that labor policies changed considerably in the late 1920s, that these changes significantly reduced firms' ability to prevent unionization and more broadly raised the threat and cost of unionization. This analysis thus indicates that there were benefits to following Hoover's program that provided protection from unions in return for paying moderately higher wages. The next section develops an economic model to quantify the impact of Hoover's program on the economy, and to assess the relative benefits of following Hoover's program.

6. The Hoover Economy

Hoover's plan provided firms with protection from unions if industry maintained/raised their nominal wages and spread work by reducing the average length of the workweek. To quantify the contribution of this policy to the Depression, I construct a general equilibrium model tailored to capture the main features of the Hoover program. Since the Hoover program did not affect all sectors, I construct a two sector model in which one sector is sus-

ceptible to unionization and thus is affected by the Hoover program, and the other sector is not susceptible to unionization and thus is not impacted by the Hoover program. I will refer to these two sectors as manufacturing, and agriculture, respectively, with the agricultural sector including agriculture and other sectors in which potential unionization was less likely.

Time is discrete and denoted by $t = 0, 1, 2, ...\infty$. There is a representative household with many members, who supply labor and who consume a single consumption good (C). Population grows at the constant rate n. 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 $s, s \in \{a, m\}$, is denoted by $y_s(i)$, and is given by:

$$y_s(i) = h(i)e_s(i)^\gamma k_s(i)^{1-\gamma},$$

in which the length of the workweek is given by h, employment is given by e, and capital is given by k. I use a technology with a variable workweek since Hoover's program impacted the workweek in manufacturing. This specification has been used by Kydland and Prescott [24], Braun and McGrattan [**?**], Hayashi and Prescott [25], Osuna and Rios-Rull [26] , and McGrattan and Ohanian [27], among others.[7]

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[7]Capital input in this model is variable, and is equal to the capital stock scaled by the length of the workweek, or hours per worker. In the model, utilization falls in manufac-

The aggregate intermediate goods, Y_a and, Y_m are given by:

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

Production of the final good, and the allocation between consumption and investment is:

$$Y = \left[\alpha_m Y_m^\phi + \alpha_s Y_a^\phi \right]^{1/\phi} \tag{2}$$

$$Y = C + X \tag{3}$$

Labor is mobile across sectors, but capital is specific to each sector. The

turing, which is consistent with actual manufacturing utilization during the Depression. It is worth pointing out two issues about tieing the decline in utilization to hours per worker. One is that some of the decline in utilization was due to plant closings, rather than a shorter workweek across all plants. Another is that some worksharing was such that workers were employed for fewer days, but the plant could have had the same workweek length. I am unaware of data that can provide any type of detail on these distinctions, however, so I will treat the model as a parsimonious tool for capturing low capital input during the Depression, as it will allow the model to be consistent with actual manufacturing output per hour. This treatment is also reasonable because there is evidence that worksharing that reduces the number of days an employee works, even keeping the length of the workweek fixed, also reduces output per hour (see Lanoie, Raymond, and Shearer [28]).

evolution of the capital stocks for manufacturing and agriculture is given by:

$$K_{st+1}(i) = (1 - \delta)K_{st}(i) + X_{st}(i), \tag{4}$$

$$X_{st}(i) \geq 0 \tag{5}$$

6.1. Household Problem

Each household member has one unit of time, and either works in the agricultural sector, in the manufacturing sector, or engages in non-market activities. Given a variable workweek in production, the household in the benchmark model chooses the length of the workweek and the number who work. The household's problem is given by:

$$\max \sum_{t=0}^{\infty} \beta^t \{\ln(c_t) + e_{at}\mu \ln(1 - h_{at}) + e_{mt}\mu \ln(1 - h_{mt}) - v(e_{at} + e_{mt})\}(1+n)^t$$

subject to

$$\sum_{t=0}^{\infty} Q_t \left[w_{at}e_{at} + w_{mt}e_{mt} - c_t\right] + \Pi_0 = 0, \tag{6}$$

where Q_t is the date t price of goods, e_a is the number of household members who work in the agricultural sector, e_m is the number who work in the manufacturing sector, h_a is the workweek length in agriculture, h_m is the workweek length in manufacturing, and Π_0 are date-zero profits. Note that the opportunity cost of working includes not only hours worked for each household member who works, but also includes a cost of sending household

30

members to work, which is governed by the function $v(e_a + e_m)$. To specify this function, I assume that the cost of entering the workforce differs across individuals in the family. Rank-ordering household members by their position in the distribution of these costs, and specifying that these costs rise linearly, I obtain:

$$-v(e_{at} + e_{mt}) = -\int_{i=0}^{e_t} (\xi_0 + 2\xi_1 x)dx = -(\xi_0 e_t + \xi_1 e_t^2)$$

This specification yields a strictly convex cost function for employment, and thus implies a well-defined problem for the household in choosing both the number of workers and the length of the workweek.

6.2. Final Goods Production

Production of final goods, which is the numeraire, is competitive. The problem for a representative final producer is given by:

$$\max \left[\sum_s \alpha_s \left(\int_0^1 y_s^d(i)^\theta di \right)^{\phi/\theta} \right]^{1/\phi} - \sum_s \left(\int_0^1 p_s(i)y_s^d(i)di \right) \qquad (7)$$

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:

$$\alpha_s Y^{1-\phi} Y_s^{\phi-\theta}(y_s^d(i))^{\theta-1} - p_s(i) = 0 \text{ for all } i \text{ and } s = \{a, m\}. \qquad (8)$$

6.3. Intermediate Goods: The Competitive 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:

$$\max_{e_{at}(i),k_{at+1}(i)} Q_t \left[\begin{array}{c} p_{at}(i)h_{at}(i)(e_{at}(i))^\gamma k_{at}(i)^{1-\gamma} \\ +(1-\delta)k_{at}(i)) - w_{at}e_{at}(i) - k_{at+1}(i) \end{array} \right] + Q_{t+1}\left[r_{at+1}(i)k_{at+1}(i) \right],$$

(9)

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

$$r_{at}(i) = p_{at}(i)(1-\gamma)h_{at}(i)\left(\frac{e_{at}(i)}{k_{at}(i)}\right)^\gamma + (1-\delta).$$

(10)

6.4. Intermediate Goods: The Cartel Sector

Manufacturing industries also provide intermediate goods for production of consumption and investment final goods. The manufacturing sector is monopolistically competitive. The maximization problem for a representative producer in industry i in the manufacturing sector is given by:

$$\max_{e_{mt}(i),k_{mt+1}(i)} Q_t \left[\begin{array}{c} p_{mt}(i)h_{mt}(e_{mt}(i))^\gamma k_{mt}(i)^{1-\gamma} \\ +(1-\delta)k_{mt}(i)) - w_{mt}e_{mt}(i) - k_{mt+1}(i) \end{array} \right] + Q_{t+1}\left[r_{mt+1}(i)k_{mt+1}(i) \right],$$

(11)

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

$$r_{mt}(i) = p_{mt}(i)(1-\gamma)h_{mt}\left(\frac{e_{mt}(i)}{k_{mt}(i)}\right)^{\gamma} + (1-\delta) \tag{12}$$

6.5. Parameterization

Several of the model parameters have values that are standard in the business cycle literature. This includes the growth rate of technological progress, which is two percent, the population growth rate, which is one percent, the household discount factor (β), which is chosen so that the steady state return to capital is six percent, the exponent on capital in the production function, which is 1/3, and the depreciation rate, which is five percent annually.

I choose values for the utility function parameters μ, ξ_0 and ξ_1 to target a steady state employment rate of 0.7, a steady state workweek length of 0.5, and that about 80 percent of the deviations in hours worked off of the steady state growth path are due to changes in employment and about 20 percent are due to changes in the workweek length. This latter specification is consistent with the relative contributions of changes in employment versus hours per worker to cyclical fluctuations in total hours worked prior to Hoover's program.[8]

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[8]The standard deviation of the log of manufacturing employment changes net of a linear trend is about four times as large as the standard devation of the log of manufacturing

In terms of the technology parameters, θ governs the elasticity of substitution within a sector, and is set at 0.9, which implies about a 10 percent mark-up in a standard monopolistic competition version of the model. 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 [1]. This value is consistent with the facts that manufacturing's relative price and its expenditure share have declined over time. I specify the sectors of the economy under the Hoover program as manufacturing, mining, construction, transportation, and utilities, which accounted for about 40 percent of employment in 1929, and this specifies the value for the share parameter α.

6.6. The Hoover Depression

This section presents the perfect foresight equilibrium path of the Hoover economy. To do this, note that the Hoover intervention is a unanticipated and permanent change in the model, with the economy transiting afterwards to the Hoover steady state.

I construct the Hoover economy using the model above, and by introducing two additional features. First, I specify that the manufacturing sector pays the observed real manufacturing wage sequence from 1929:4-1931:4. The

workweek changes net of a linear trend. The source of the data is Kendrick [5], page 465.

34

manufacturing wage is exogenous in the model, which I interpret as the product of Hoover's fixed nominal wage program in conjunction with deflation. The second feature is that the workweek in manufacturing is exogenously fixed at its actual sequence between 1929:4 - 1931:4. Hoover's worksharing mandate is almost certainly the reason why the workweek declined so much during the Depression.[9] As discussed above, before Hoover's intervention, the workweek length varied little over the cycle, as changes in employment, rather than changes in hours per worker, accounted for most of the cyclical change in manufacturing hours. For example, following the World War I demobilization, manufacturing hours declined considerably (falling about 25 percent between June, 1920 and December, 1921), but almost all of this was due to lower employment, as hours per worker only fell about 3.5 percent during this period. This cyclical stability of hours changed remarkably after Hoover's intervention, with the workweek declining about 2/3 as much as employment declined between late 1929 and late 1931.[10].

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[9]Hoover intended his worksharing program to be a form of insurance against job loss. However,recall that there was very little worksharing prior to Hoover's program. Presumably, worksharing was always possible, and the fact that firms and workers did not choose this option suggests that the benefit exceeded its cost.

[10]The analysis could certainly be extended into 1932 and afterwards, as real industrial wages remain above trend. I choose not to include later years, as it becomes clear during 1932 that Roosevelt will defeat Hoover. While Roosevelt expanded industrial and labor

Computing the equilibrium path requires a terminal condition. I choose the terminal condition to be the steady state of the Hoover economy, with the manufacturing wage permanently above its competitive level. The permanent impact of the policy is consistent with the fact that labor policies changed permanently under Hoover, 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 with the industrial wage permanently equal to its trend adjusted value in 1931:4, which was about seven percent above its 1929:3 value.[11] I treat the 1929:3 value as the market-clearing wage prior to the policy. I also specify the workweek length in manufacturing to be permanently set to its 1931:4 level for the terminal economy.

I first calculate the steady state of the Hoover economy. Table 2 shows these steady state values relative to the pre-Hoover steady state. Hoover's program generates a substantial steady state drop in economic activity, re-

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cartelization policies beginning in 1933, as analyzed in Cole and Ohanian [1], including this factor would complicate the analysis.

[11]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 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.

ducing steady state output (Y), consumption (C), and investment (I) by about 28 percent, and steady state total hours worked (H) by about 20 percent. The decline in hours reflects a 38 percent drop in steady state industrial hours worked (H_m) and an eight percent drop in steady state agricultural hours worked (H_a). The decline in agricultural hours reflects a 30 percent decline in the agricultural wage, which in turn reflects a 20 percent decline in the relative price of agricultural output. Thus, while workers can always choose to work in the agricultural sector, the incentive to do so is reduced substantially by the Hoover policy. This large change in the incentive to work in the non-distorted sector operates through general equilibrium effects created by the Hoover program.

To calculate the equilibrium transition path of the economy to the Hoover steady state, I set the initial capital stocks at their pre-Hoover steady state values. Figures 4 - 8 show the transition path of real output, consumption, investment, and hours worked in the model, compared to the actual values of those variables between 1929:4 and 1931:4.[12] The Hoover program depresses the economy substantially, reducing aggregate hours by about 20 percent by the end of 1931, and reducing real GDP by about 18 percent. The model also generates a depression that is considerably worse in the manufacturing sec-

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[12] With the exception of manufacturing hours, the actual data are linearly interpolated to the quarterly frequence.

tor, as manufacturing hours decline 33 percent by 1931:4, while agricultural hours fall by about 11 percent. Consumption is 12 percent lower in 1931:4, while investment is 55 percent lower at this date. Note that investment rises temporarily when the policy is adopted, which is due to two simplifying features in the model. One is the perfect foresight assumption, and the other is that there are no investment adjustment costs. While both of these features create a very transient incentive to accumulate additional capital, investment in the model is below trend in late 1930, and falls quickly thereafter. Including either time-to-build in the production of capital goods, or convex adjustment costs would substantially dampen the transitory investment increase. The workweek restriction is important as it allows the model to be consistent with the fact that actual manufacturing output per hour does not rise substantially. In particular, manufacturing output per hour is on average slightly higher during this period, and in the model is about 2 percent higher.

To shed further light on the permanent impact of the policy on the economy, I compare these findings to those of Cole and Ohanian [29], Table 9, who studied the impact of the same real manufacturing wage sequence in a similar economy, but assuming that the wage distortion was transitory, rather than permanent, and with no workweek restriction. Amaral and MacGee [30] also use a two-sector model with inflexible manufacturing wages and flexible

agricultural wages to analyze the Depression as the result of a transitory monetary shock. The impact of the high real manufacturing wage in both of these analyses is much smaller than here, with real output falling only about 4 percent by 1931. This reflects the fact that steady state hours and capital are not depressed in these other analyses.[13] This suggests that quantifying a depression of this magnitude in this class of models requires a permanent, not a transitory, distortion.

7. Introducing a Union in the Model

This analysis assumes that firms followed Hoover's program because the alternative of not following Hoover, but having to deal with the possibility of union organization, was less profitable. To assess this hypothesis, I extend the model economy to include the possibility of union organization, which I model in an insider-outsider framework. The union model is tailored to capture a key feature of unions in the 1920s and 1930s, which is the ability to strike and hold-up capital. It thus differs from Cole and Ohanian [1], in which the insiders make an offer before capital is in place. In this model, the insider's offer is made after capital is installed, thus creating the hold-up.

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[13]Bordo et al [31] generate a much larger depression from high wages, though their analysis is in an economy in which all wages in all sectors are high, and the real wage sequence they use is higher than the one used here.

A summary of the union model is as follows. Firms first choose investment to augment their existing capital stock. If the firm does not follow the Hoover plan, then with probability λ the industry is organized as a union by the current workers, whom I call *insiders*. With probability $1 - \lambda$, organization does not occur, and the firms can hire labor from the spot labor market at the competitive wage w, and behave as a monopolistic competitor.

If organized, the insiders make a take it or leave it offer consisting of a wage-employment pair, $(\bar{w}, \bar{e})$. If the offer is rejected, the insiders strike. The strike shuts down the firm (industry) for one period with probability ω, and the firm suffers a capital loss of depreciated capital. With probability $1 - \omega$, the firm breaks the strike, and operates, paying the spot market wage w. Agreements are negotiated each period after investment takes place. In equilibrium, the union's offer is such that the firm weakly prefers to accept.

7.0.1. 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 with a strike 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: $(\bar{w}_t, \bar{e}_t)$. Firms either accept or reject the workers' proposal. If the firms accept, they hire $\bar{e}_t$ units of labor at the wage $\bar{w}_t$. The industry also colludes on investment.[14]

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 accept any wage and employment offer $(\bar{w}, \bar{e}_t)$ that yields a reservation level of profits.

7.0.2. Cartel Problem

I 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) subscript for the time being. The monopolist's profit function, conditional on capital stock k, is $\Pi(k)$, and the associated optimal employment function is $e(k)$:

$$\Pi(k) = \max_e \left\{ Y^{1-\phi} Y_m^{\phi-\theta} \left(h e^\gamma k^{1-\gamma} \right)^\theta - we + (1-\delta)k \right\}, \qquad (13)$$

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[14]Firms and workers bargain over the number of employees and the wage, but not hours per worker. This makes the contract much simpler, and is also consistent with the adoption of the 40 hour workweek through the Fair Labor Standards Act in 1939.

where $e(k) = e$, and Y_m is manufacturing output used in final goods production.[15]

I now use this profit function to construct the industry's reservation profit function, which is the outside option to the industry of rejecting the union's offer. To do this, note that there are two payoffs to industry collusion, 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 the industry colluding on investment. The static payoff is $\Pi(w, k_1)$. The returns that the firms in the industry earn from colluding on investment is P_2 :

$$P_2 = \max_{e_s(i), k_s(i)} -\beta^{-1} k'_s(i) + \left[\begin{array}{c} Y^{1-\phi} Y_s^{\phi-\theta} \left[he_s(i)^\gamma k_s(i)^{1-\gamma} \right]^\theta \\ +(1-\delta) k_s(i)) - w e_s(i) \end{array} \right] \tag{14}$$

subject to

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

Thus, the total payoff is the sum of date t monopoly profits and investment collusion, $\Pi(k_1) + \beta P_2(k')$, where k_1 is the current level of the capital stock. This implies that the total expected gross return to the firm from rejecting the union offer is:

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

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[15]The 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.

The first term on the right hand side is the profit from paying the spot market wage, scaled by the probability that a strike does not shut down production. The second term is the payoff from colluding on investment, and the third term is the payoff from shutdown, scaled by the probability of shutdown. $P_1(k_1)$ thus defines the reservation profits that the firm must earn from any union offer. In equilibrium the workers will offer a wage-employment pair that yields a return that is equal to this reservation level: $\Pi(k_1, \bar{w}_1, \bar{e}_1) = P_1(k_1)$

Recursively, this is given by:

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

where k' denotes the level of the capital stock that the firms in the industry will choose. This will be the capital stock along the equilibrium path since the workers will always offer $(\bar{w}, \bar{e})$ such that the firms earn their reservation profit level, and thus weakly prefer accepting the offer (see Cole and Ohanian [32]).

7.1. 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, subject to the reservation profit constraint.[16] This value depends on the

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[16]I 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.

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 e, 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:

$$e_t = \chi e_{t-1}$$

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

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.

$$V(e,k) \;=\; \max_{(\bar{w},\bar{e})} \left\{ \left(\min\left[1, \frac{\bar{e}}{e}\right] \right) [\bar{w} - w + \chi(Q'/Q)V(\chi\bar{e}, k')] \right\} \quad (15)$$

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

The left hand side of the constraint is the firm's payoff if it accepts the workers offer, where $\Pi(k, \bar{w}, \bar{e})$ denotes the profits that it earns during the period, and $-k' + \beta P(k')$ 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, e^* and an associated maximum wage, w^*, which maximizes insider wages subject to the reservation profit constraint. It can also be shown that if the initial number of insiders exceeds the optimal size, then the number of insiders declines monotonically at rate $1 - \chi$ on the transition path to the steady state.Cole and Ohanian [32] present details of this model.

7.2. 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 relative to the model without the union. Parameter values are the same as chosen above, and there are two additional parameters, the probability that a strike is successful (ω), and a union mem-

ber's survival probability (χ)[17] I choose ω such that the union wage is 25 percent above trend, which is a conservative choice relative to estimates of union wages relative to trend at that time. The implied value of ω is about 0.8. I am unaware of any specific estimates of the likelihood that a strike would disrupt production. Dinardo and Hallock [33] analyzed major strikes between 1925 and 1937 and classified whether the strike was "won" by workers, "won" by firms, or whether the result of the strike was a compromise between the union and firm. They estimated that 50 percent or more of strikes were either won by workers or there was a compromise. While the implied value of ω in the model is higher than the union's "win/compromise" rate estimated by Dinardo and Hallock, note that strikes that weren't necessarily considered to be won by labor will still impede production and lead to losses for firms.

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 [34], and that mean completed duration of jobs at Ford Motor company plants during the 1919-1947 period were less than half a year

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[17]I keep the same workweek length in manufacturing in the union analysis as in the Hoover analysis.

(see Whatley and Sedo [35]). Note, however, that this parameter does not affect the steady state.

Table 3 shows the steady state values of the union model variables relative to those in the pre-Hoover steady state. Unionization generates a larger depression than the Hoover program, with output, consumption and investment declining by nearly 40 percent. and aggregate hours declining by nearly 30 percent, representing a 54 percent decline in manufacturing hours, and an 11 percent decline in agriculture hours.

With the hold-up version of the model in place, 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.

Profits in the model with the threat of unionization depends on the probability of unionization, λ. I therefore solve for the value for λ such that firms are indifferent between following Hoover or deviating and risking unionization.

This involves a tradeoff in that expected profits in the Hoover economy are lower initially, but higher later compared to the economy with the risk of unionization. I find that firms choose to follow Hoover's program provided that λ, the probability of the firm's workers organizing, is 10 percent per

year or higher. Thus, it is reasonable 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.

8. A Monetary Theory for the Depression

This section discusses the findings within the broader context of the Great Depression literature. The traditional explanation is that monetary contraction, which created deflation and low nominal spending, is the cause of the Great Depression. This conclusion has been reached by a number of economists, including, Friedman and Schwartz [2], Lucas and Rapping [36], Hamilton [37], Eichengreen [38], Bernanke [39], Bordo, Erceg, and Evans [31], among many others. But any monetary explanation of the Depression requires a theory of a very large and very protracted monetary nonneutrality. Such a theory has been elusive because the Depression is so much larger than any other downturn, and because explaining the persistence of such a large nonneutrality requires in turn a theory for why the normal economic forces that ultimately undo monetary nonneutrality were grossly absent in this episode. That is, if the Depression is largely the result of monetary forces, then the size and the duration of the monetary nonneutrality were remarkably well outside estimates from any other period.

This paper provides such a theory for a large and protracted monetary

nonneutrality. The nonneutrality is quantitatively large in the Hoover economy because Hoover's wage maintenance and work-sharing program reduces steady state hours and capital stocks. The nonneutrality persists in this model because it is a transition from a non-distorted steady state to the Hoover distorted steady state.

There was little nominal wage adjustment in the first two years of the Depression, as industry publicly maintained nominal wage levels following the Hoover meeting, and indicated that their adherence to wage maintenance was indeed due to Hoover. Industry followed Hoover, despite Hoover's rejection of several industry requests to Hoover to cut wages. And in addition to the evidence presented here, Rose [40] compiles complementary evidence from U.S. Chamber of Commerce archives that supports the thesis that Hoover's program was a key factor in accounting for industry's maintenance of nominal wages. This analysis thus provides a theoretical interpretation for Hamilton's [37] view that deflation is the central initiating force for the Great Depression.

While Hoover's nominal wage maintenance program has been previously noted in the literature, including work by O'Brien [16], Vedder and Gallway [41], Bordo, Erceg, and Evans [31], and Cole and Ohanian [29], I am unaware of other research that has provided a detailed accounting of how the program affected industry, offer a theory for why firms followed Hoover, and conduct a quantitative analysis of the Hoover plan within a growth model. The most

closely related work is by Ebel and Ritschl [21] who present an analysis that is thematically similar, with a focus on policy changes that fostered organization and bargaining power a the end of the 1920s. They discuss in detail the Court decisions affecting unionization during this period, develop a wage bargaining model, and interpret the Depression as a shift from individual bargaining to collective (union) bargaining.

I am also unaware of other theories of nominal wage maintenance that are consistent with the evidence presented here about Hoover and industry's maintenance of nominal wages. O'Brien [16] is perhaps the best known analysis of nominal wage rigidity during the Depression. He argues that industry maintained nominal wage levels, despite their impact on profits, simply because firms viewed this action as being in their self interest for boundedly rational reasons. But O'Brien's view is inconsistent with these data, which indicate that firms did not prefer to maintain high nominal wages, but rather did this only because of Hoover's program. Moreover, as Rose [40] notes, O'Brien's' theory is subject to a large free-rider problem, as any individual firm would have a big incentive to cut wages.

9. Conclusion

The defining characteristic of the Great Depression is a substantial and chronic excess supply of labor, with employment well below normal, and real

wages in key industrial sectors well above normal. A successful theory of the Depression must explain not only why the labor market failed to clear, but why monetary forces apparently had such large and protracted effects. This paper proposes such a theory, 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 growing union wage premium and a sea change in economic policy, including policies advanced and supported by Hoover, that significantly fostered unionization and enhanced their bargaining power. Consequently, there was an incentive for firms to follow Hoover's program of paying moderately higher real wages to avoid even higher wages and lower profits that would come from unionization.

I conclude that the Depression is the consequence of government programs and policies, including those of Hoover, that increased labor's ability to raise wages above their competitive levels. The Depression would have been much less severe in the absence of Hoover's program. Similarly, given Hoover's program, the Depression would have been much less severe if monetary policy had responded to keep the price level from falling, which raised real wages. This analysis also provides a theory for why low nominal spending - what some economists refer to as deficient aggregate demand - generated such a large depression in the 1930s, but not in the early 1920s, which was a period of comparable deflation and monetary contraction, but when firms cut nominal

wages considerably.[18]

Presidents Hoover and Roosevelt shared similar goals of fostering industrial collusion and increasing real wages and raising labor's bargaining power. Hoover accomplished these goals during a period of deflation by inducing industry to maintain nominal wages, and by promoting and signing legislation that facilitated union organization and that increased wages above competitive levels, including the Davis-Bacon Act and the Norris-Lagaurdia Act. Roosevelt accomplished these goals with the NIRA and the Wagner Act, both of which raised wages well above competitive levels while increasing industrial collusion.

The 1930s would have been a better economic decade had government policy promoted competition in product and labor markets, rather than adopting policies that extended monopoly in product markets and that set wages above competitive levels.

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[18]Kendrick's data shows that real output fell only around 3 percent in the early 1920s, but real consumption and investment actually increased. Thus, the 1921-22 recession largely reflects a decline in government purchases, which partially reflects the postwar demobilization.

Table 1

Real Non-Union Wages

(Nominal Wages Divided by CPI)

(1919 = 100)

Date	Union	Non-Union
1920	108	108
1921	125	101
1922	128	102
1923	131	111
1924	139	113
1925	138	108
1926	140	106

Table 2

Steady State of the Hoover Economy

Relative to Pre-Hoover Steady State

(Pre-Hoover Variables = 100)

Y	C	I	H	W_m	H_m	W_a	H_a
72	72	71	80	107	61	68	92

Table 3

Steady State of the Union Model

Relative to Pre-Hoover Steady State

(Pre-Hoover Variables = 100)

Y	C	I	H	W_m	H_m	W_a	H_a
62	62	61	73	125	48	56	89

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Figure 1 - Industrial Output and Hours
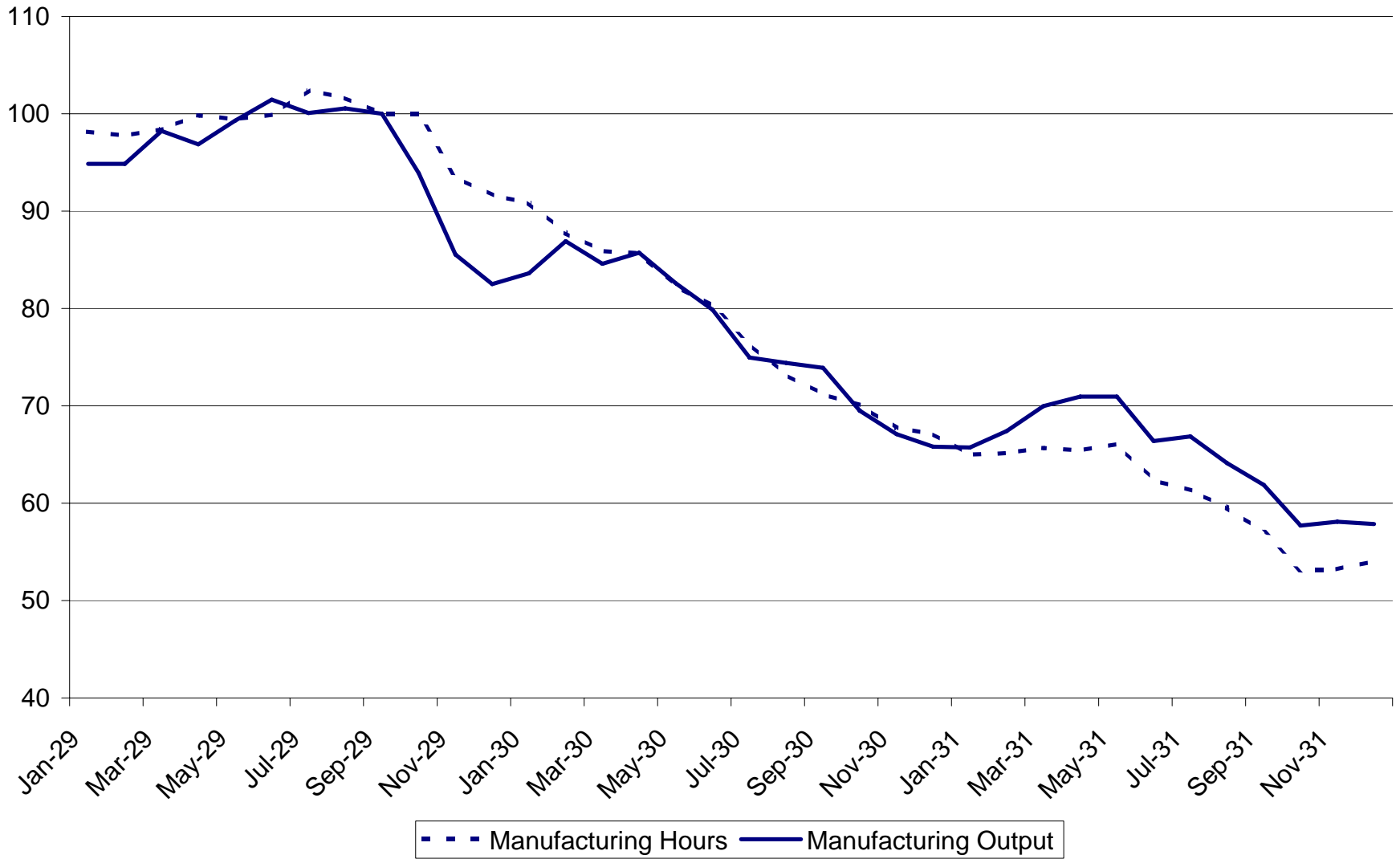## (Sept 1929 = 100)

Legend: - - - Manufacturing Hours — Manufacturing Output

Figure 2 - Manufacturing Employment and Hours per Worker
(Sept 1929 = 100)

- - - - Manufacturing Employment ——— Average Manufacturing Hours
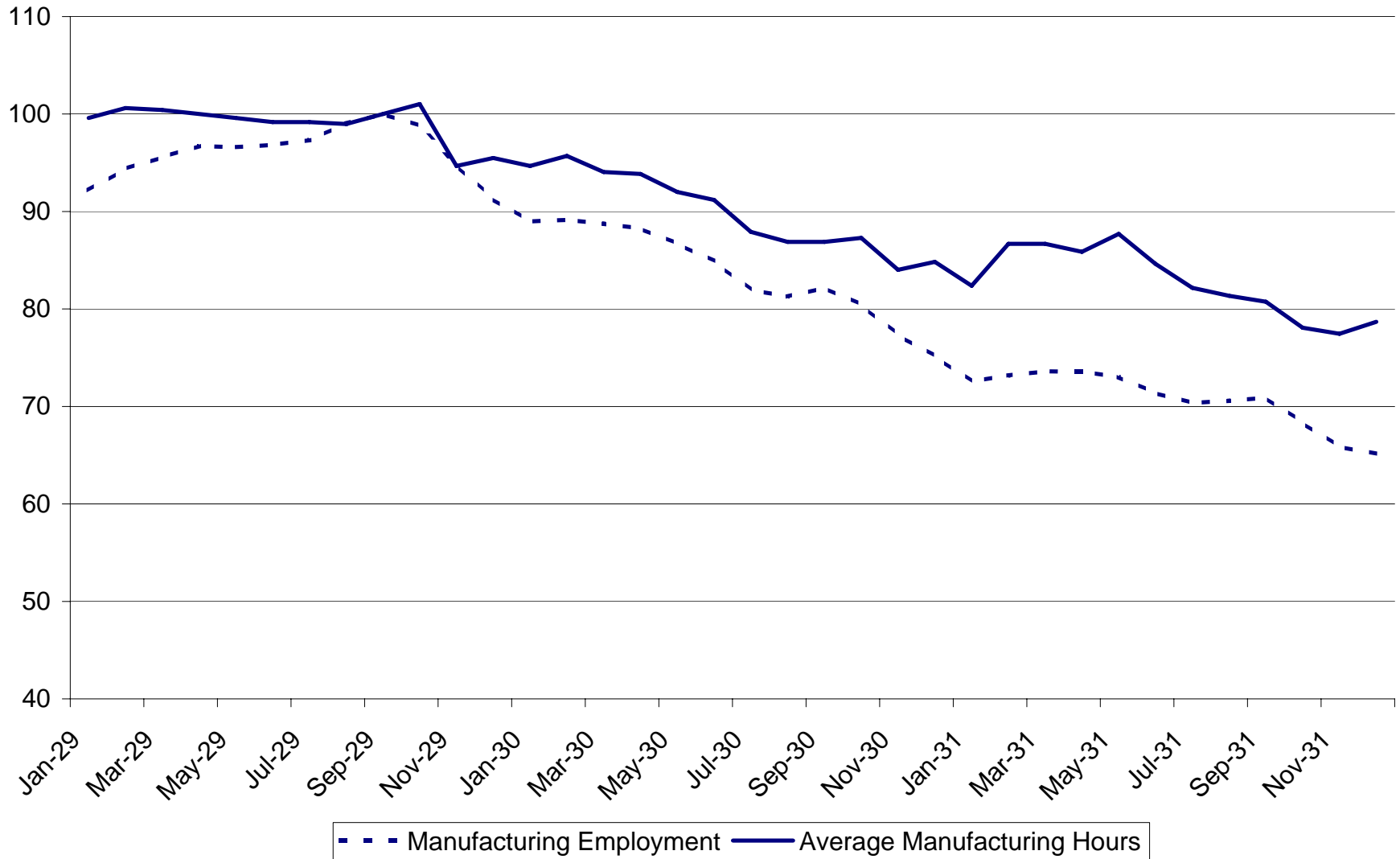
Figure 3 - Manufacturing Wages
(Sept 1929 = 100)
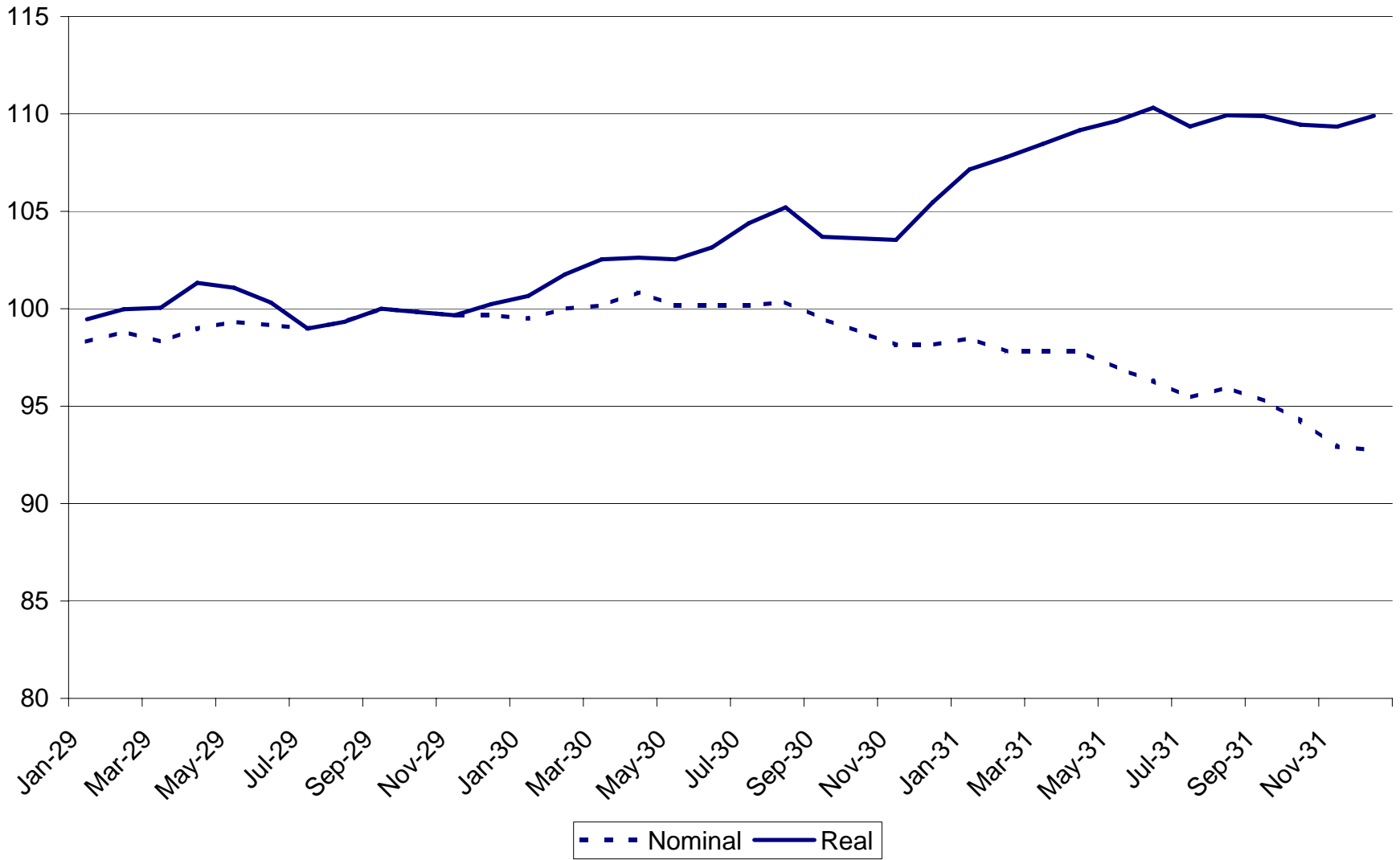
Figure 4 - Real GNP - Data and Model
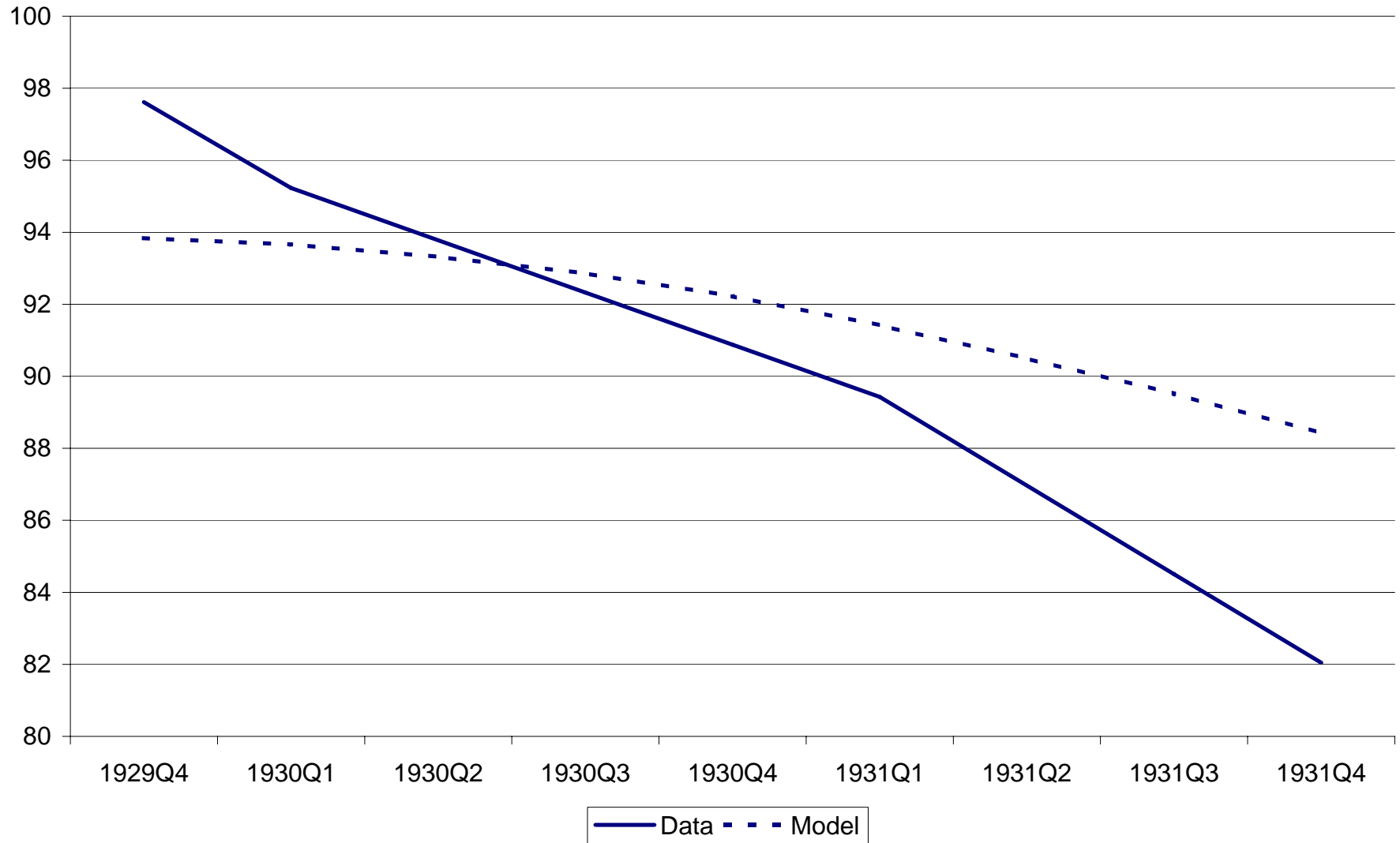**(1929Q3 = 100)**
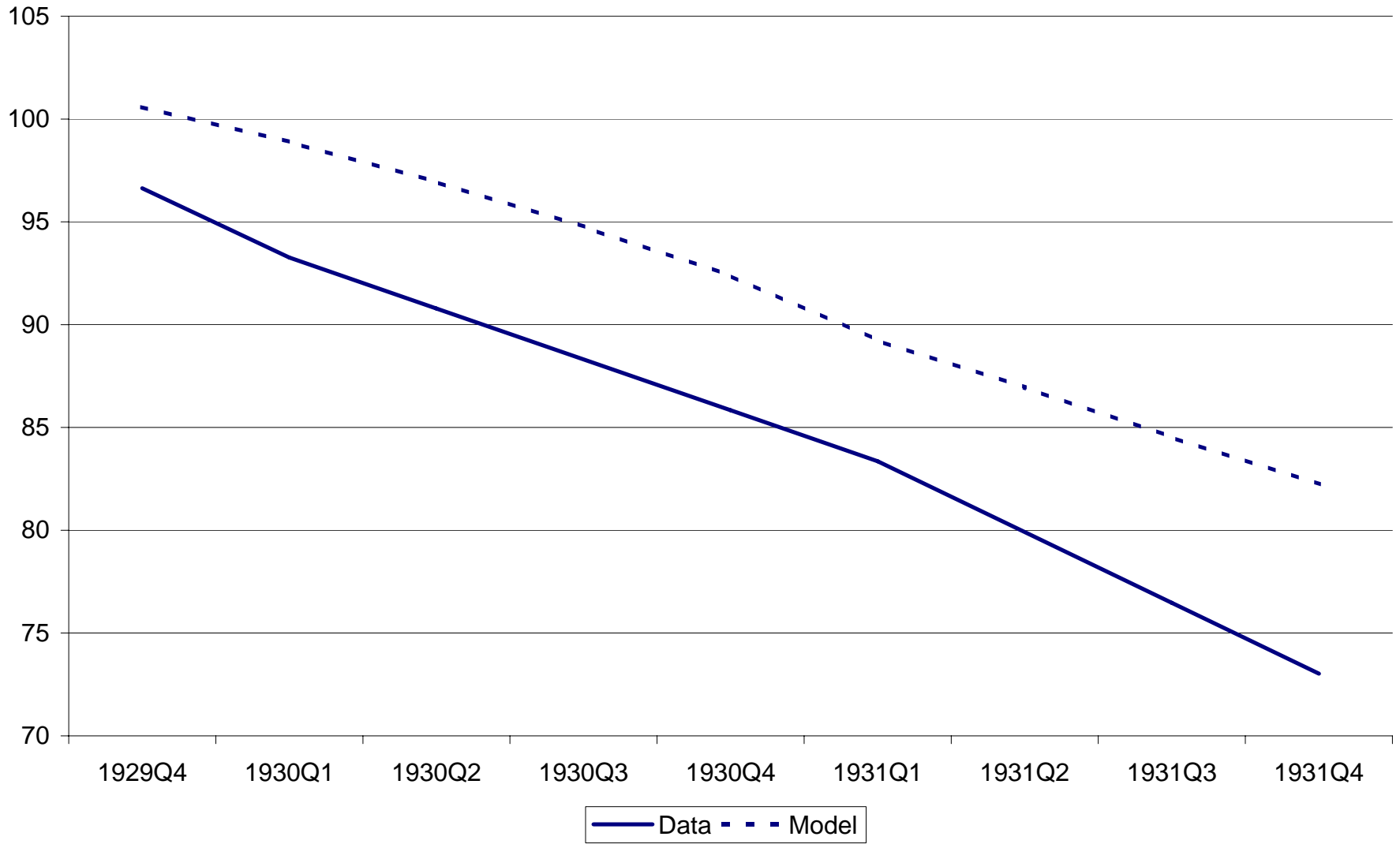
Figure 5 - Real Consumption - Data and Model
(1929Q3 = 100)

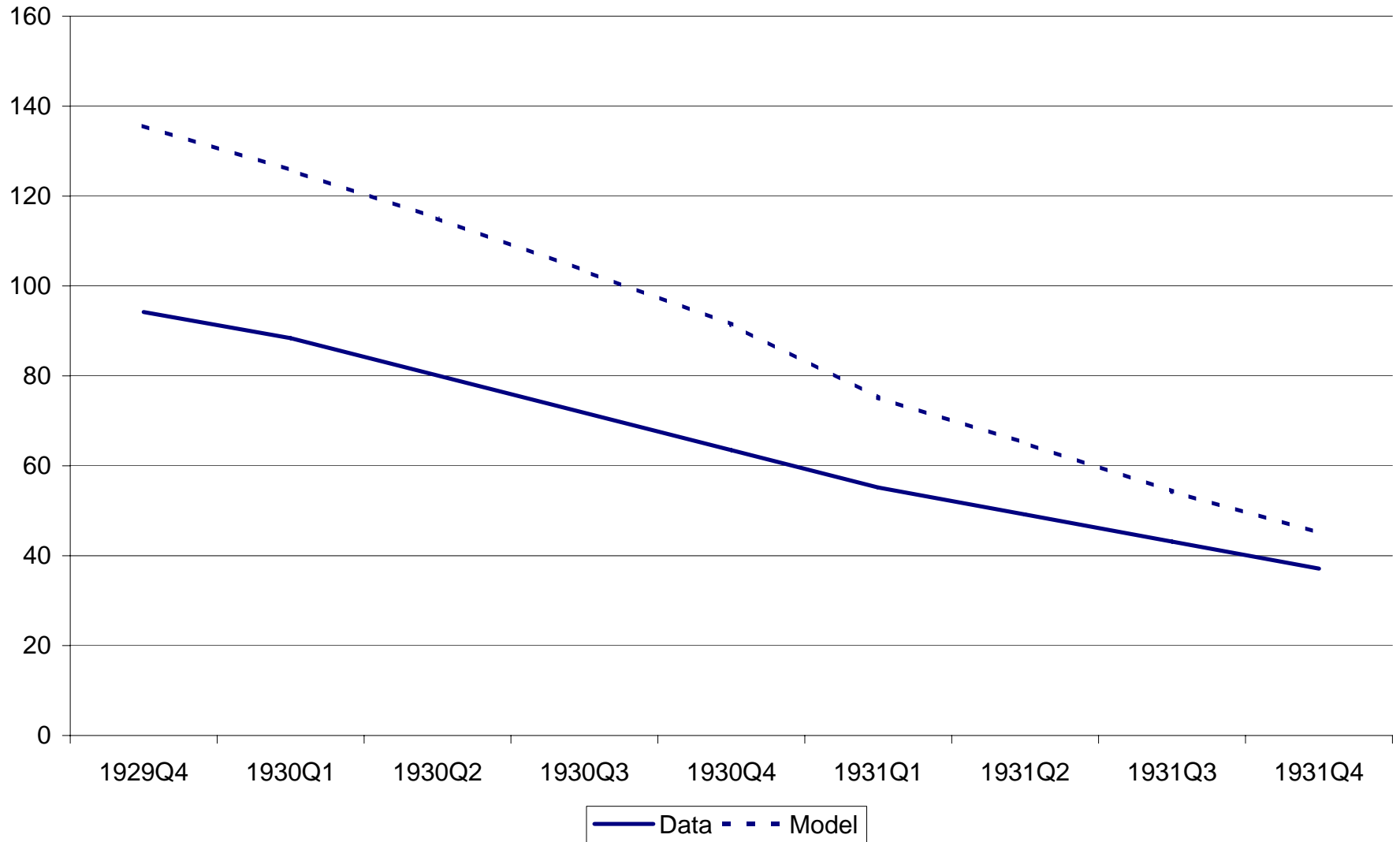**Figure 6 - Real Investment - Data and Model**
(1929Q3 = 100)

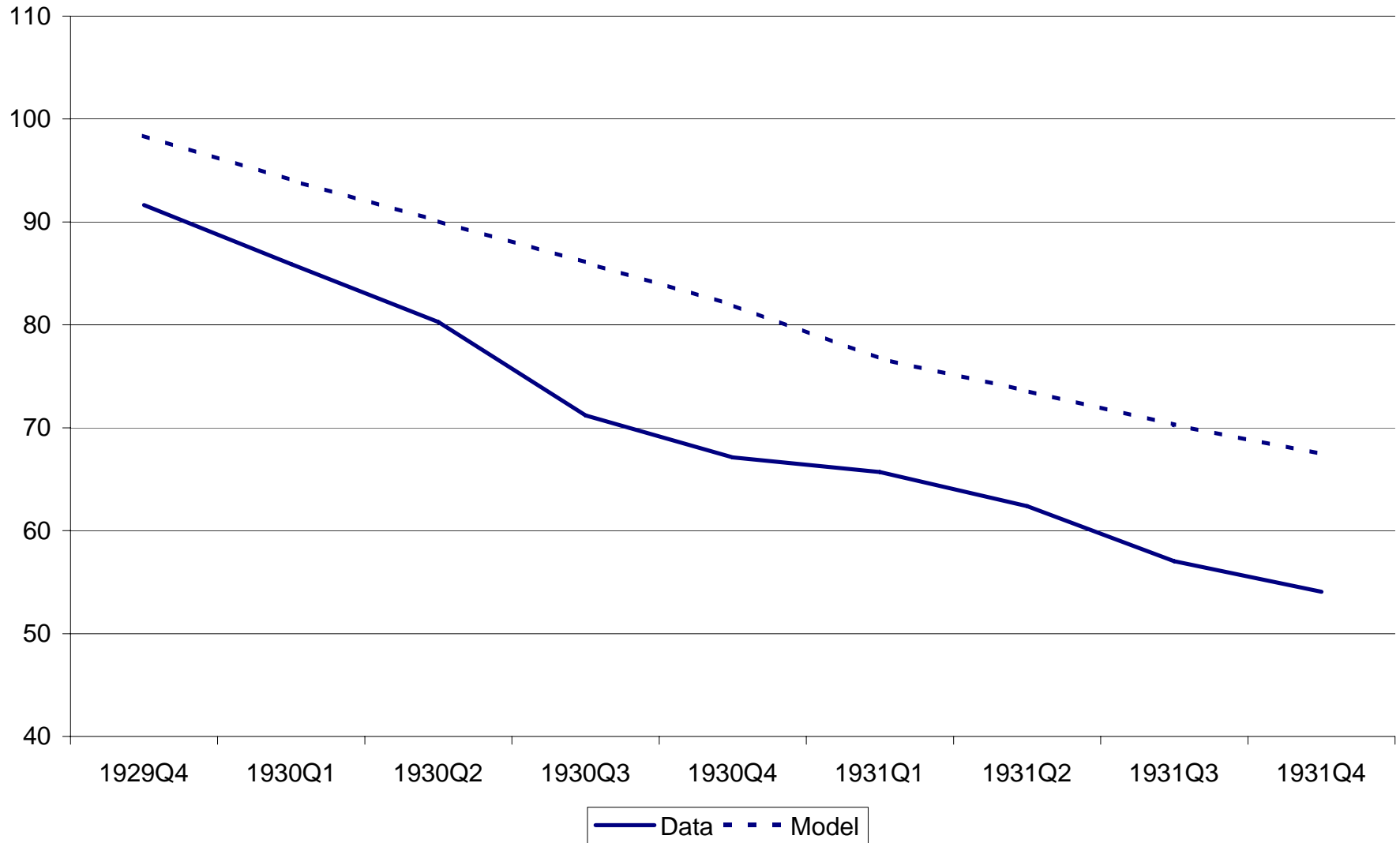**Figure 7 - Manufacturing Hours - Data and Model**
(1929Q3 = 100)

Figure 8 - Agriculture Hours - Data and Model
(1929Q3 = 100)