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Minimum Wage Legislation and Farm Financial Structure

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Minimum wage legislation which results in higher average wage rates for farm laborers would affect the asset structure and income flows of farm operators. A simulation model of financial structure of the farm sector is used to show that higher wage rates would result in increased nonreal estate assets and debt relative to real estate assets and debt. Proprietors' equities would decline. Simulation results indicated that reductions in net farm income due to higher wage rates would be partially offset by higher nonfarm income of farm operators and their families.

Keywords: Agricultural labor, Income sources, Minimum wages, Simulation, Balance sheet.

Proposed minimum wage laws for hired farm laborers have generated much public debate. Numerous bills which would affect coverage and wage rates for hired farm labor have been introduced in Congress. For a comprehensive summary of legislation recently enacted or considered, see (*16*). The common feature of all these bills is that average wages rates would be increased. Several studies (*3*, *4*, *6*) have been directed toward determining how such legislation might affect the welfare position of hired labor, the total amount of labor used in farming, and the composition of the labor force. The purpose of this research is to estimate the effect of such legislation on the financial structure of the farm sector.

Short- and Long-Run Considerations

Short-run economic consequences of minimum wage legislation for hired farm labor can be depicted as in figures 1 through 3. Figure 1 represents the factor market for hired farm labor. The hired farm labor market is in equilibrium where the demand for labor (D_L) intersects the supply of labor (S_L) resulting in quantity (Q_o) and a wage rate of (P_o). Enactment of minimum wage legislation imposes an artificially determined wage rate, such as (P_1). Demand for hired farm labor is reduced to Q_1, and $0Q_o$ - $0Q_1$ hired farm laborers would be displaced. If the demand for hired labor is inelastic, the total wage income of the remaining hired laborers will increase.

Figure 2 represents the profit maximizing combination of capital and labor inputs for the farm firm. Given the budget constraint line B/P_k - B/P_o, the firm would produce Q_o output using L_o labor and K_o capital. If the wage rate increased from P_o to P_1 (as shown in figure 1), the firm's budget constraint line becomes B/P_k - B/P_1 and output declines to Q_1.

Figure 3 represents the product market for aggregate farm output. If the firm's response to the increased wage rate is to reduce output, then the aggregate supply curve would shift to the left (S_o to S_1). If the demand for aggregate output is inelastic, total gross income would increase as a result of the reduction in aggregate supply. To summarize, short-run static equilibrium analysis as depicted in figures 1 to 3 suggests that given an inelastic demand for both hired labor and aggregate output, higher wage rates for hired farm labor would reduce the quantity of hired labor employed and increase aggregate gross farm income.

The short-run static analysis suggested by figures 1 to 3 overlooks several key factors. First, the reduction in output suggested by figure 2 is predicated on the assumption that total expenditures remain unchanged. Yet in a longer run context it is possible to increase total expenditures through increased levels of borrowing, which in turn can lead to a higher level of capital stocks. Second, the substitution of family labor for hired farm labor is ignored in figure 2. Third, Coffey (*2*, p. 1065) suggests that one of the dynamic impacts of higher wage rates may be to increase worker productivity. All three factors imply a greater level of output than suggested by short-run analysis. Therefore, in a dynamic context it is not necessarily true that increased wage rates will decrease total output.

There are also numerous secondary impacts which are not specifically accounted for by short-run analysis. Capital-labor substitution can affect interest expenses (if purchases are financed with borrowed funds), taxes on farm property, and the income level of operators. A reduction in income can lead to an alteration of capital

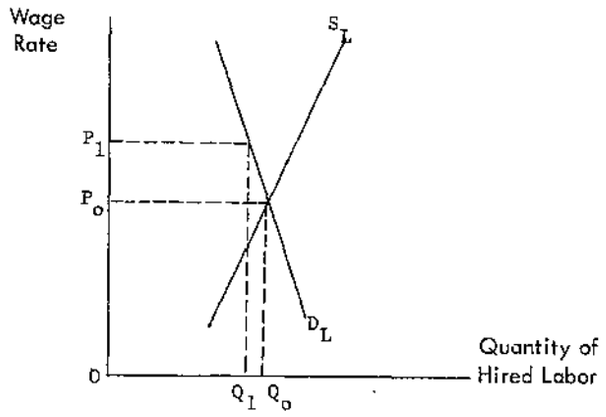

Figure 1

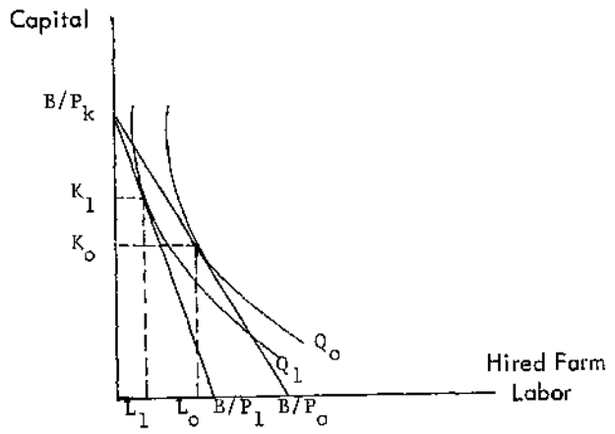

Figure 2

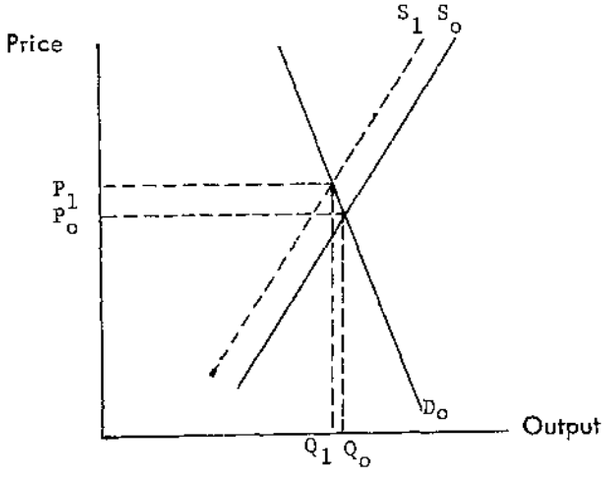

Figure 3

appreciation of real estate assets which in turn may affect real estate debt. Estimation of these longer range dynamic impacts could provide a better framework for analysis of proposed legislation.

Recently Lins (*7*, *8*) developed a simulation model of financial structure in the farm sector. The model can be used to generate a simulated farm income statement, balance sheet, and sources and uses of funds statement for the number of years specified by the user. The model is composed of an interrelated system of equations, several of which contain the wage rate for hired farm labor, the quantity of operator and family farm labor used, and the quantity of hired labor as explanatory variables.[1] It provides a useful vehicle for analyzing long-run dynamic impacts of minimum wage legislation on financial structure of the farm sector.

Method of Analysis

The wage rate employed in the Lins simulation model is the average cash wage rate for hired farm labor not including room and board. Hence one needs an estimate of the impact of minimum wage legislation on the *average* wage rate, not just the wage rate for directly affected workers. Morgan (*9*, p. 584) suggests that the short-run effect of increasing the lowest wage rates by legislation is to narrow the wage differential; but the wage differential that existed before increasing the lowest wage rates is often restored within 1 or 2 years. Therefore, rather than attempting to analyze any specific proposed minimum wage rates, the analysis here focuses on an assumed percentage increase in the *average* cash wage rates resulting from minimum wage legislation.

Counterfactual simulation was used to test the impact of higher wage rates for hired farm labor on farm financial structure. For this procedure the model was run first for 1960 through 1970, using reported values for all exogenous variables. Then it was assumed that the *average* wage rate for hired farm labor was 10 percent per year higher because of minimum wage legislation.[2] The modified model was rerun for 1960-70. A comparison of these two simulation runs provides the basis for determining how financial structure of the farm sector would

[1] These equations include the demand for farm machinery and equipment, the demand equations for nonreal estate debt, and the per capita nonfarm income of farm operators. Details of the model are too extensive to report here. See (*8*) for a complete description of the model.

[2] The assumed 10-percent increase in wage rates is in addition to any increases caused by the Federal Fair Labor Standards Act, which extended coverage to an estimated 384,000 hired farmworkers in 1966.

have been altered by minimum wage legislation which caused average farm wage rates to rise by 10 percent.[3]

Elasticity Assumptions

Using data for 1929-61, Tyrchniewicz and Schuh (*12*) estimated the short- and long-run price elasticities of demand for hired farm labor to be -0.26 and -0.49 respectively. Later work by Hammonds, Yadav, and Vathana (*5*, p. 6) indicates that the elasticity is increasing over time, and for 1941-69 they estimate the short- and long-run elasticities to be -0.85 and -1.05 respectively. For simulation purposes a price elasticity of demand of -0.90 is arbitrarily assumed here.[4]

Tyrchniewicz and Schuh also estimated the substitution elasticity of hired labor for operator and family labor. They found that a 1 percent decrease in hired farm labor would increase operator labor by 0.2 percent. To the author's knowledge this is the only reported estimate of the elasticity of substitution. Therefore an elasticity of substitution of hired labor for operator labor of -0.20 is used here.

Given the above assumptions, table 1 indicates the extent that increasing the hired farm labor wage rates by 10 percent would increase total usage of operator and family labor, and decrease hired labor and total hours of labor used in agriculture. Note the partial substitution of operator and family labor for hired labor. The general direction of these changes is supported by the work of Gardner (*4*) and Lianos (*6*).

The total hours of labor used in farming are shown to decline by over 1 percent per year in response to a 10 percent per year increase in hired labor wage rates. However, another response to increased wage rates is to increase machinery inputs. Thus the effect on total output depends upon the relative changes in labor and machinery inputs and the elasticity of substitution between the two. Tweeten and Quance (*10*, p. 350) have found an elasticity of aggregate farm production for machinery of 0.10 and an elasticity of aggregate farm production for labor of 0.25. This implies that a 1 percent decline in labor could be offset by a 2.5 percent increase in machinery inputs. The level of machinery inputs is determined by the equations within the model, while the level of labor inputs is shown in table 1. Combining this information with the elasticity of substitution implied by the work of Tweeten and Quance, one can estimate within the simulation model the impact on aggregate output due to the assumed increase in wage rates.

Given a change (positive or negative) in the level of aggregate output, prices received for farm products are likely to be altered. To determine the extent of this change one needs an estimate of the price elasticity of demand for aggregate farm output. Tyner and Tweeten (*11*) have estimated this elasticity at -0.30. That value is used here.

Simulation Results

A comparison of balance sheets simulated under reported wage rates and the assumed wage rates is presented in table 2. The simulated balance sheets are presented as of January 1, 1971, an 11-year period after assumed wage rates were in effect. Virtually all farm sector balance sheet items are affected.

As one would expect, the largest impacts are on stocks of machinery and motor vehicles and nonreal estate debt. The value of machinery and motor vehicle stocks was estimated to be $2.06 billion, or 5.60 percent higher under the assumed wage rates. The greater value of machinery and motor vehicles reflects the substitution of capital for labor. Nonreal estate debt was estimated to be $2.0 billion, or 6.01 percent higher under assumed wage rates. The large increase in debt was needed not only to finance larger stocks of machinery, but also to meet higher operating expenses resulting from higher labor costs.

The value of farm real estate assets was estimated to be $2.86 billion, or 1.32 percent lower under assumed wage rates. This reflects a lower level of capital appreciation in response to lower levels of net farm income. Real estate debt was estimated to be $0.46 billion, or 1.55 percent lower under assumed wage rates. This reflects a lower level of borrowing because of lower real estate prices. In addition there is some substitution of nonreal estate debt for real estate debt.

Changes in financial assets were very minimal. However, household equipment and furnishings were estimated to decline by 2.67 percent. Again, this is in response to the lower level of net farm income obtained by farm operators. Crop and livestock inventories also declined slightly. This is due primarily to changes in the prices at which inventories are valued.

One of the key variables in assessing the impact of the assumed wage rates is the effect on proprietors' equities. Proprietors' equities were $3.03 billion, or 1.18 percent lower under the assumed wage rates. Thus the *farm* wealth of farm proprietors is estimated to be slightly more than 1 percent lower due to 10 percent higher wage rates for hired farm labor.

[3] Because the simulation model is constructed from linear regression estimates, linear approximations to other percentage changes in wage rates can be easily derived from the results presented here.

[4] A later section examines this assumption in more detail.

Table 1. Reported and assumed wage rates and hours of labor used in agriculture, 1960-70

Year	Cash wage rate not including room and board		Man-hours of hired farm labor		Man-hours of operator and family farm labor		Total hours of labor used in farming	
	Reported[a]	Assumed	Estimated[b]	Assumed[c]	Estimated[d]	Assumed[e]	Reported[f]	Assumed
	Dollars per hour		*Million hours*		*Million hours*		*Million hours*	
1960	0.970	1.067	2,682	2,441	7,113	7,241	9,795	9,682
1961	0.990	1.089	2,680	2,439	6,720	6,841	9,400	9,280
1962	1.010	1.111	2,615	2,380	6,364	6,479	8,979	8,859
1963	1.050	1.155	2,533	2,305	6,131	6,242	8,664	8,547
1964	1.080	1.188	2,409	2,192	5,785	5,889	8,194	8,081
1965	1.140	1.254	2,239	2,037	5,536	5,636	7,775	7,673
1966	1.230	1.353	2,098	1,909	5,283	5,378	7,381	7,287
1967	1.330	1.463	1,932	1,758	5,337	5,433	7,269	7,191
1968	1.440	1.584	1,903	1,732	5,102	5,194	7,005	6,926
1969	1.550	1.705	1,919	1,746	4,776	4,862	6,695	6,608
1970	1.640	1.804	2,022	1,840	4,500	4,581	6,522	6,421

[a]Source: *Farm Cost Situation (14)*.
[b]Estimated by dividing total cash wages to hired farm labor reported in (*15*) by the reported cash wage rate.
[c]Based on an estimated price elasticity of demand for hired farm labor of -0.90.
[d]Total hours of labor used in agriculture minus the estimated man hours of hired farm labor.
[e]Based upon an estimated elasticity of substitution of -0.20.
[f]Source: *Agricultural Statistics (13)*.

Balance sheet items indicate only a part of the impact on financial structure due to the assumed wage rates. Flow items should also be considered in evaluating impacts on financial structure. The simulation model estimates a farm income statement and sources-and-uses-of-funds statement in addition to the balance sheet. The most meaningful method of assessing flow items represented in these accounts is to sum them over the 11-year period simulated rather than presenting them for any one specific year. A comparison of selected flow items simulated under reported wage rates and assumed wage rates is presented in table 3.

As shown in table 3, total gross farm income summed over the 11-year period decreased by $1,804 million, or 0.34 percent, as a result of a 10 percent higher wage rate. Because an inelastic demand for farm output was assumed, this indicates that aggregate farm output increased slightly. This is accounted for by the fact that higher levels of machinery inputs more than offset the decline in labor inputs. While gross farm income was only 0.34 percent lower, net farm income was estimated to decline by $5,909 million, or 3.69 percent, under assumed wage rates. As one would expect, capital expenditures on nonreal estate assets and depreciation of farm machinery rose in response to the higher level of machinery stocks employed in the production process.

Nonfarm income of the farm population was estimated to increase $2,787 million, or 2.54 percent, under the assumed wage rates. This suggests that to offset the decline in net farm income, farm operators or their families obtained more nonfarm income. Thus more hours of operator and family labor were devoted to nonfarm occupations. Given that farm operator and family *farm* labor also increased (see table 1), the imposition of minimum wage rates for hired farm labor could substantially increase the total hours of labor performed by farm operators and their families.

Another important flow item is the level of proprietor withdrawals. This flow represents the expenditures of farm operators for consumption items, income taxes, nonfarm investments, and *other nonfarm* uses. Proprietor withdrawals declined by $2,508 million, indicating that farm proprietors partially offset the decline in net farm income due to higher wage rates by lowering the level of their own consumption, nonfarm investments, etc. Reductions in proprietor withdrawals offset roughly 42.4 percent of the decline in net farm income. Thus the assumed wage rates would have had much more serious consequences for farm operators than is implied when viewed solely from a balance sheet context.

Sensitivity to Elasticity of Demand for Hired Labor

The estimates in tables 2 and 3 are based on a given set of elasticity assumptions. Of particular interest is the

Table 2. Simulated balance sheets for the farm sector as of January 1, 1971, under reported and assumed wage rates

Item	Simulated under reported wage rates	Simulated under assumed wage rates	Difference
	Billion dollars	*Billion dollars*	*Percent*
Physical assets:			
Real estate	217.37	214.51	-1.32
Nonreal estate	78.21	79.63	1.82
Crops and livestock	30.60	30.25	-1.14
Machinery and motor vehicles	36.78	38.84	5.60
Household equipment and furnishings	10.83	10.54	-2.67
Financial assets:	23.84	23.80	-0.17
Demand deposits and currency	6.58	6.57	-0.02
Time and savings deposits	6.06	6.08	0.33
Other reported	11.20	11.20	0.00
Total assets	319.42	317.94	-0.46
Liabilities:			
Real estate debt	29.71	29.25	-1.55
Nonreal estate debt	33.26	35.26	6.01
Proprietors' equities	256.45	253.42	-1.18
Total liabilities	319.42	317.94	-0.46

Table 3. Selected flow items simulated under reported and assumed wage rates

Flow items summed over 11 years, 1960-70	Simulated under reported wage rates	Simulated under assumed wage rates	Difference
	Million dollars	*Million dollars*	*Percent*
Gross farm income	515,883	514,079	-0.34
Total net farm income	160,222	154,313	-3.69
Total nonfarm income of farm population	109,665	112,452	2.54
Taxes on farm property	22,889	22,906	0.07
Depreciation of farm machinery	41,280	43,090	4.38
Capital expenditures on nonreal estate assets	55,858	59,740	6.95
Current operating expenses	261,403	264,223	1.08
Proprietor withdrawals	269,449	266,941	-0.93

assumed elasticity of demand for hired labor. This estimate has received much attention in the literature because it is of vital importance in determining the consequences to hired laborers due to alteration of wage rates. Some rather wide divergences in published estimates of this elasticity coefficient exist. Tyrchniecwiez and Schuh have estimated the elasticity of demand for labor at -0.29 (-0.49 in the long run), while Bauer (*1*) estimated the coefficient at -1.482.

To test the sensitivity of results in tables 2 and 3 to the assumed elasticity of demand for hired labor, the model was rerun using alternative levels of elasticities of demand for hired labor. All other elasticity assumptions were unchanged. Results are presented in table 4.

As shown in table 4, gross and net farm incomes, as well as proprietors' equities, increase as the demand for hired labor becomes more elastic. Because of the higher income levels, capital appreciation on farm real estate also increases as demand becomes more elastic. Thus, in the aggregate, farm operators appear to be better off the more elastic is the demand for hired labor. Besides income, most other flow items are only affected slightly by changes in the assumed elasticity of demand. Proprietor withdrawals remained virtually constant over the range of elasticity estimates tested.[5]

Other Considerations

The aggregate nature of the simulation model used for this analysis precludes a geographical determination of the impacts of minimum wage legislation on financial structure of the farm sector. Yet regional differences are likely to be important. For example, Ferguson (*3*, p. 20) points out that: ". . . total inclusion of all farm workers under the Fair Labor Standards Act would substantially affect the costs on farms in the South more than any other area." This results from the low average wage rate for hired farm labor in the South compared with proposed minimum wage rates.

Differences by type of farm are also likely to be important. Ferguson (*3*, p. 10) states that:

> "Four types of farms dominate U.S. agriculture—cash grain, tobacco, dairy, and other livestock (dairy and poultry excluded). These four types represent 77 percent of the farms that used hired labor in 1970, but employed only 16 percent of the hired farm workers covered under the Fair Labor Standards Act (FLSA) during the May 16-22, 1971 survey week. At the other end of the scale, vegetable, fruit and nut, and miscellaneous farms represented only 10 percent of the farms *hiring* labor, but employed 63 percent of hired farmworkers covered under FLSA during the May 1971 survey week."

Thus, if all hired farmworkers were to be covered, cash grain, dairy, tobacco, and other livestock farms would probably feel the greatest impact. Also, since farms which used over 500 man-days of hired farm labor in any quarter of the preceding year were covered starting in 1967, inclusion of *all* hired farm workers now would probably be most seriously felt by operators using smaller amounts of hired labor.

In conclusion, many different facets of financial structure would be affected by minimum wage legislation which raises average wage rates for hired farmworkers. Nonreal estate assets and debts would be likely to increase relative to real estate assets and debt. Proprietors' equities would probably not be largely affected. Proprietors' net farm income would be likely to decline. This decline would be partially offset by higher nonfarm income and reductions in farm proprietor withdrawals. Differences in impacts would probably depend on geographic region and type of farm.

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[5] The sensitivity of the model estimates to the other elasticity assumptions could be evaluated in a similar manner. However, the relevant range of elasticities to be tested should come from other studies.

Table 4. Simulated balance sheet as of January 1, 1971, with three assumed elasticities of demand for hired farm labor

Item	Elasticity of demand for hired farm labor		
	-0.40	[a]-0.90	-1.40
	Billion dollars	*Billion dollars*	*Billion dollars*
Assets:			
Real estate	211.56	214.51	217.40
Nonreal estate	79.72	79.63	80.19
Crops and livestock	30.50	30.25	30.61
Machinery and motor vehicles	38.74	38.84	38.96
Household equipment and furnishings	10.48	10.54	10.61
Financial assets	23.72	23.80	23.88
Demand deposits and currency	6.55	6.57	6.59
Time and savings deposits	5.98	6.08	6.09
Other reported	11.20	11.20	11.20
Total assets	315.00	317.94	321.46
Liabilities:			
Real estate debt	29.19	29.25	29.32
Nonreal estate debt	35.35	35.26	35.18
Proprietors equities	250.47	253.42	256.96
Total liabilities	315.00	317.94	321.46
Flow items 1960-70:			
Gross farm income	512.44	514.08	516.25
Net farm income	152.79	154.31	156.11
Nonfarm income of the farm population	114.77	112.45	111.70
Taxes on farm property	22.67	22.91	23.17
Depreciation of farm machinery	42.99	43.09	43.18
Capital expenditures on nonreal estate assets	59.54	59.74	59.94
Current operating expenses	264.47	264.22	264.19
Proprietor withdrawals	266.84	266.94	266.45

[a]From tables 2 and 3.

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