THE BURDEN OF SLAVERY

Robert E. Hall
14.161T
Mr. Temin
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Recent papers by Conrad and Meyer (2) and Sutch (6) have closed the question of the profitability of slavery in the antebellum South. One is therefore tempted to conclude that economic science has nothing to say about the economic efficiency of slavery. The purpose of this paper is to show that while slavery is efficient as a method for allocating labor, slaves as a form of wealth impose a burden upon society which is analogous to the burden imposed by the national debt. Essentially I argue that slavery raises the interest rate and absorbs capital which would otherwise take the form of machines or the liabilities of foreigners.

This argument has a long history in the literature of the economics of slavery*, but it has never been examined in an explicit quantitative theoretical framework. In fact, the argument has undergone curiously little development since it was first articulated by U.B. Phillips around the turn of the century. Moe's recent paper (4) contains little more than Phillips' original statement: "...the southern planter as a rule, invested all his profits in a fictitious form of wealth and never accumulated a surplus for any other sort

* I am indebted to Richard Sutch for suggesting a bibliography on the absorption hypothesis.
of investment." (Phillips, op. cit., p. 260) Conrad and Moyer examine the capital absorption hypothesis briefly (2), but dismiss it with the following words: "...it is difficult to see how the capitalization of an income stream can be said to count as a loss of wealth." (p. 81). I hope to show that there is a sense in which capitalization of an income stream does result in a decline in wealth.

1. The theory of wealth

In this section I present a theory of wealth developed according to principles proposed by Irving Fisher (2) and elaborated by Modigliani and his collaborators (see 1 for complete bibliography). For the purposes of my slavery argument, it is necessary to examine only the stationary state, in which all the variables are unchanging with time. This results in an enormous simplification of the theory. The following assumptions are also made to make the argument easier to understand: there is only one good, produced by two factors, machines and labor; machines decay exponentially; there is perfect competition in all markets; all individuals are alike.

Individuals formulate a lifetime consumption plan which depends on their wealth and the interest rate. Formally, they seek to maximize the utility functional

\[ U(c) \]
subject to the constraint
\[ \int_0^T e^{-rt} c(t) dt = \int_0^T e^{-rt} y(t) dt, \]
where \( y(t) \) is wage income—property income is implicit in the discounting function \( e^{-rt} \). This determines the consumption plan \( c^*(t) \) and from it one can derive the individual's demand for assets at age \( t \):
\[ a(r,y,t) = \int_0^t e^{rs}(y(s) - c^*(s)) ds \]
Now in the stationary state, the age composition of the population is unchanging with time, so the aggregate demand for assets is a function of the interest rate and the aggregate wages only, \( A(r,Y) \). The existence of such a function, and its independence of all the other variables in the economy are the crucially important points of this section.

To complete the formal model, I assume a constant returns to scale aggregate production function \( P(K,L) \). Then the marginal conditions of profit maximization imply Walrasian demands for labor and machines \( \frac{\alpha(r,w)X}{w} \) and \( \frac{(1 - \alpha(r,w))X}{r+\delta} \), where \( \alpha \) is labor's share at interest \( r \) and wage \( w \), \( X \) is output, and \( \delta \) is the rate of depreciation of machines (\( r + \delta \) is the gross rent on machines). Finally, the fundamental equilibrium condition of this economy requires that the demand for assets equal the value of the capital stock plus liabilities of foreigners, \( E \). Thus the model has the following equations of the stationary state:
(1) \[ A(r,Y) = K + E \]
(2) \[ X = F(K,L_0) \]
(3) \[ L_0 = \frac{\alpha(r,w)X}{w} \]
(4) \[ K = \frac{(1-\alpha(r,w))X}{r + \delta} \]
(5) \[ Y = wL_0 \]

These equations may be summarized in the following diagram.

The \( K(r) \) curve is constructed by solving (2), (3), and (4) for \( K \) given various values of \( r \); the \( A(K) \) curve is constructed from (5) and the function \( A(r,Y) \). It is a condition of stability that the \( A \) curve cut the 45° line from above—this condition is very likely to be fulfilled because the shape of \( A \) is largely determined by the shape of the production function.
2. The model with slavery

To analyze the institution of slavery, I assume that a proportion \( \beta \) of the labor force \( L_0 \) is owned by the remaining free population. Slaves have a price \( p \); their aggregate value \( S = p\beta L_0 \) forms part of the assets of the public. The model is then

(I) \[ A(r,Y) = K + E + p\beta L_0 \]

(II) \[ X = F(K,L_0) \]

(III) \[ L_0 = \frac{\alpha(r,w)X}{w} \]

(IV) \[ K = \frac{(1-\alpha(r,w))X}{r+\delta} \]

(V) \[ Y = (1-\beta)wL_0 \]

(VI) \[ w = p(r+\delta_s) + m \]

where \( m \) is the non-capital cost of maintaining a slave and \( \delta_s \) is the rate of depreciation on slaves. Equation (VI) expresses Sutch's point that the price of slaves will adjust until the gross rent on slaves, \( p(r+\delta_s) + m \), equals the wage rate \( \ell \). The diagram is then
In the free labor economy, assets include $E_f$, liabilities of foreigners, while in the slave economy, slaves valued at $S$ are included, along with $E_s$ liabilities of foreigners. It is clear that $E_s < E_f$. In the free labor economy, consumption is $F(K_o, L_o) - \delta K_o + r_o E_f$, while in the slave economy consumption is $F(K_o, L_o) - \delta K_o + r_o E_s$. The burden of slavery is $r_o (E_f - E_s)$ in the open economy so far analyzed.

For the United States as a whole in the 1860's it is probably reasonable to assume that the economy was closed—that is, $E^{US} = 0$. Each region, North and South, has an excess demand for assets, $E^N(r)$ and $E^S(r)$, with

$$E^{US}(r) = E^N(r) + E^S(r).$$

By examining the slave and free diagrams, these functions can be derived:
Since $E_s^S(r) < E_f^S(r)$, the slavery interest rate $r_s$ is greater than the free labor interest rate $r_f$.

In the South, the burden of slavery has two parts: the decrease in interest receipts from the North, or increase in payments to the North, equal to $r_f E_f^S(r_f) - r_s E_s^S(r_s)$, and the decrease in output resulting from the smaller capital stock caused by the higher interest rate. The first effect is not necessarily a burden (it may be negative), but since the South was much smaller that the North, it almost certainly was a positive burden. The second effect has a definitely positive sign. For the country as a whole, the interregional borrowing effects cancel, and the burden is just the capital stock effect, known to be positive for both economies.

If the technology and demands for assets of North and South are alike, the burden for the whole country can be seen in a single diagram.
This is a specialization of the earlier diagram for the case \( E = 0 \). This shows that the capital stock effect, \( K_s < K_f \), exists for two reasons: (1) \( A_s < A_f \); i.e., the slave economy demands fewer assets for a given level of output because slavery converts non-property income into property income, and (2) \( K + S > K \); i.e., for a given level of assets, fewer machines are held because they are displaced by slaves.

2. The Modigliani-Cobb-Douglas case

The model for the closed economy can be further specialized for empirical purposes by assuming that the production function is Cobb-Douglas and that the asset demand function has a form proposed by Modigliani:

\[
A(r,Y) = A_0 Y
\]

where \( A_0 \) is a constant—Modigliani usually takes \( A_0 \) to be 5.

The MCD model has the following form:

(i) \[ A_0 Y = K + p\beta L_o \]
(ii) \[ X = \gamma L_o^\alpha K^{1-\alpha} \]
(iii) \[ L_o = \frac{\alpha X}{w} \]
(iv) \[ K = \frac{(1-\alpha)X}{r+\delta} \]
(v) \[ Y = (1-\beta)wL_o \]
(vi) \[ w = p(r+\delta) + m \]
4. Application to slavery in the United States

The appendix presents estimates of the relevant variables for each decade from 1860 to 1950. For 1860 I have estimated the following values (all in 1860 dollars):

\[ K = 15.5 \quad p\beta L_0 = 4.8 \quad X = 4.2 \quad \beta = .14 \]

I have assumed \( \alpha = .70 \) and \( \delta = .09 \).

From this, it is possible to derive estimates of the parameters of the model for the closed economy:

\[ \gamma L_0^\alpha = \frac{X}{K^{1-\alpha}} = \frac{4.2}{(15.5)^{1-\alpha}} = 1.8 \]

\[ A_0 = \frac{K + p\beta L_0}{\alpha(1-\beta)X} = \frac{15.5 + 4.8}{(.7)(.8)(4.2)} = 8. \]

Finally, the model can be solved with these values for the case of no slavery:

\[ A_0 \alpha \gamma L_0^\alpha K^{1-\alpha} = K \]

\[ K = (A_0 \alpha \gamma L_0^\alpha)^{1/\alpha} \]

\[ = (8)(.7)(1.8)^{1/1.7} \]

\[ = 27 \]

\[ X = (1.8)(27)^{1/3} \]

\[ = 4.9 \]

That is, slavery reduced GNP in 1860 by 0.7 billion dollars or 17%. Of this, the South bore proportionately more, although it is not possible to make an exact calculation without regional data which are not available.
5. Conclusion

The limitations of this argument are painfully clear. It is suitable as formulated only for an entirely stationary economy, although it would be easy to reinterpret the equations in terms of steady-state exponential growth. Its greatest weakness is its inability to deal with transition cases—for the present purposes it has nothing to say about the immediate results of emancipation. Finally, it is subject to all the criticisms directed at one-sector neoclassical economic models—it is an unsettled question as to how much reality is captured by models of this sort.
References


(2) A. Conrad and J. Heyer, The Economics of Slavery, 1964

(3) I. Fisher, The Theory of Interest, 1930

(4) J. Moes, "The absorption of capital by slavery"


Enserman, Exploring in Entrepreneur History, 1968
Table I  Private National Wealth, 1860 prices


col. 2: Government liabilities in the hands of the public.
*HS*, series Y368 (gross debt of federal government) plus series Y545 (debt of state and local government) less US securities held by the FRS and state and local governments (*Banking and Monetary Statistics*, p. 512 and *Federal Reserve Bulletin*, December 1951, p. 1560) plus equity in government corporations (Goldsmith, *et al.*, *Study of Saving*) plus postal savings (*HS*, series X240-244), all deflated.


col. 6: Producers' durables. Investment date were obtained from Gallman's unpublished study for the years 1839 to 1904. For earlier years, Gallman's data were used to extrapolate backwards using the relation, estimated by regression:

\[ I_t = e^{-0.758t} \cdot 4.244 \]

where \( t \) is in years and \( t = 0 \) in 1830. For years after 1904, I used 5-year averages of investment data obtained from the OBE Capital Goods Study (unpublished) divided by 3 to change from 1904 to 1860 prices. From these investment data, capital stock estimates were calculated by the relation
\[ K_t = I_{t-1} + \delta K_{t-1} \]

where \( \delta \) is the rate of depreciation.

col. 7: Structures. Exactly the same method was used as for durables, with

\[ I_t = e^{0.0499t} - 2.377 \]

col. 8: Value of livestock. HS, series K195-212, deflated

col. 9: Value of crops. HS, series F197-221, interpolated to decades, deflated, extrapolated backwards by graphing.

col. 10: Nonfarm inventories. same as crops

col. 11: Land. same as crops

col. 12: Value of slaves. Sutch's average price of slaves in 1860 ($1221) times the slave population in 1860 (3,900,000)
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Table II  Gross National Product

For 1859 to 1900, the data are from Gallman, suitable averaged to a uniform decade base. For 1910 to 1950, the data are from Kuznets, multiplied by .515 to convert to 1860 prices.
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