THE BURDEN OF SLAVERY

Robert E. Hall
14.161T
Mr. Temin
January 11, 1966

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. Moes' 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 Meyer 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 (3) 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

$$\int_0^T e^{-rt}c(t)dt = \int_0^T e^{-rt}y(t)dt \quad ,$$

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 $F(K,L)$. 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 α is labor's share at interest r and wage w, X is output, and δ 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) $A(r,Y) = K + E$

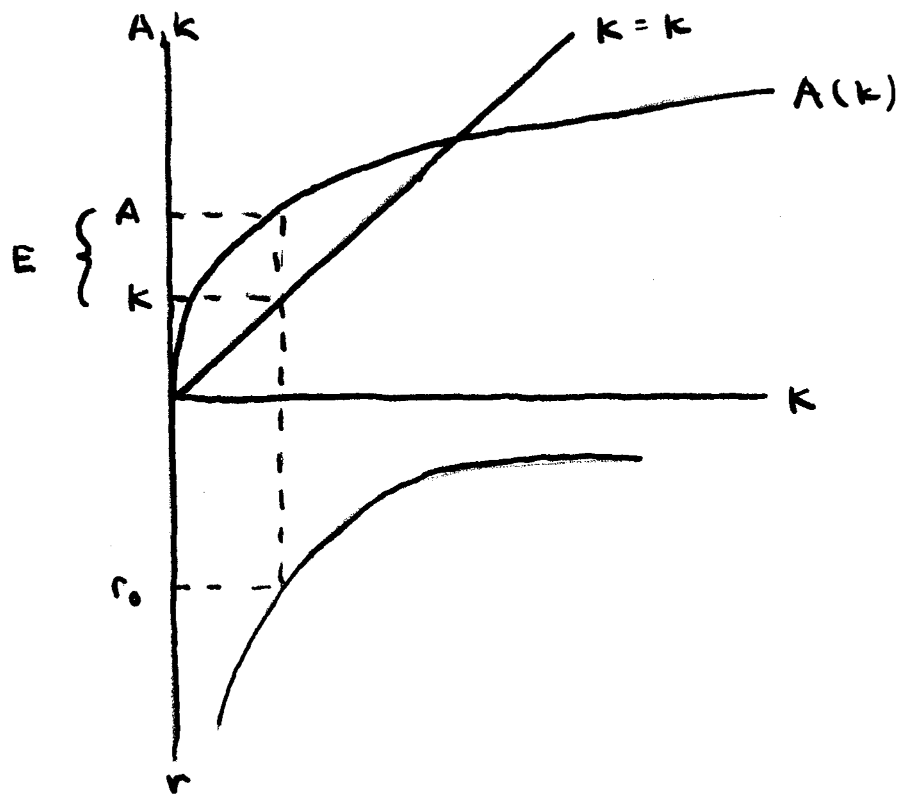
(2) $X = F(K,L_o)$

(3) $L_o = \frac{\alpha(r,w)X}{w}$

(4) $K = \frac{(1-\alpha(r,w))X}{r + \delta}$

(5) $Y = wL_o$

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^o 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 β of the labor force L_o is owned by the remaining free population. Slaves have a price p; their aggregate value $S = p\beta L_o$ forms part of the assets of the public. The model is then

(I) $$A(r,Y) = K + E + p\beta L_o$$

(II) $$X = F(K,L_o)$$

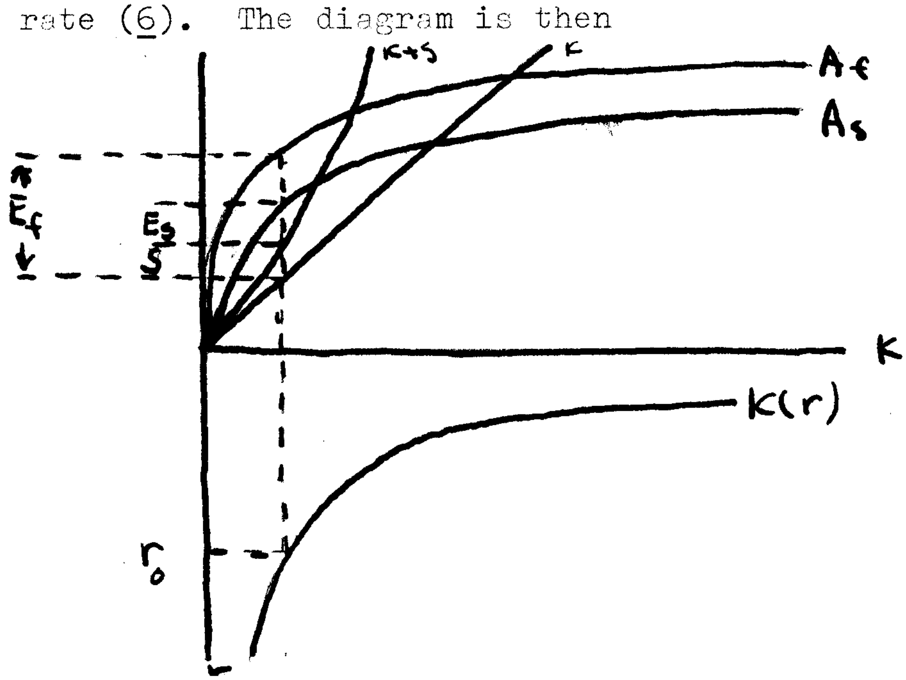
(III) $$L_o = \frac{\alpha(r,w)X}{w}$$

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

(V) $$Y = (1-\beta)wL_o$$

(VI) $$w = p(r+\delta_s) + m \quad ,$$

where m is the non-capital cost of maintaining a slave and δ_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 (6). The diagram is then

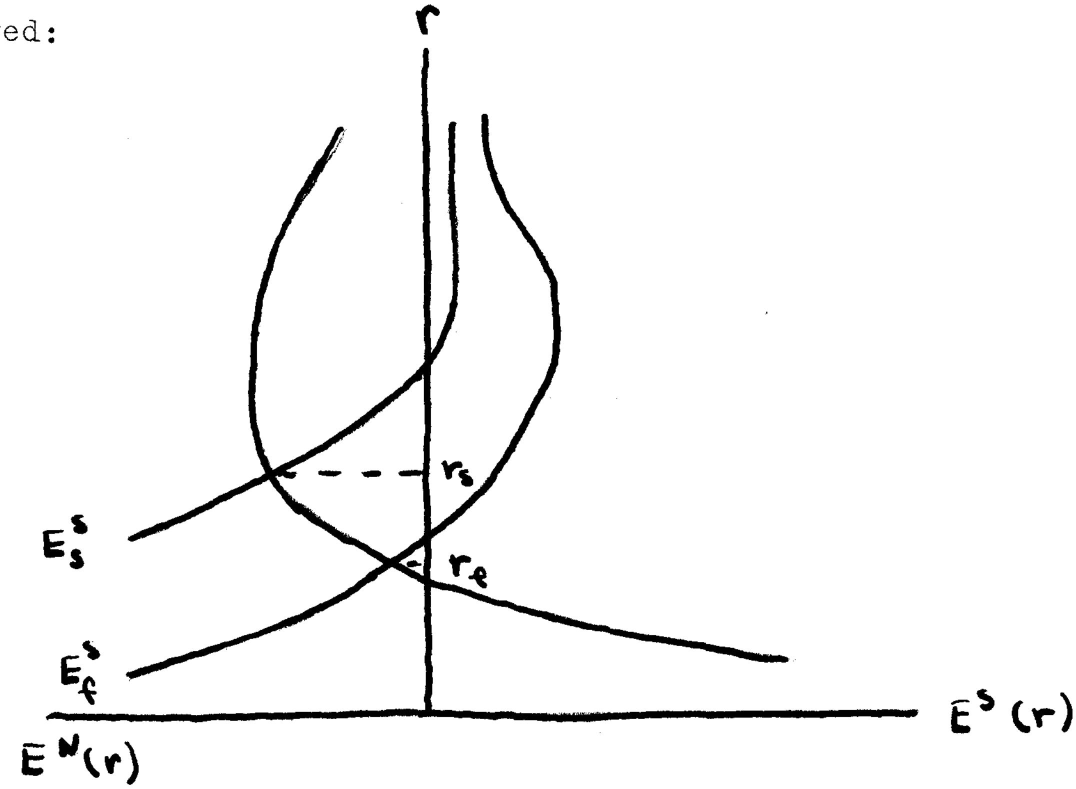


In the free labor economy, assets include E_f liabilities of foreigners, while in the slave economy, slaves valued at S are included, along with E_s liabilities of foreigners. It is clear that $E_s < E_f$. In the free labor economy, consumption is $F(K_o,L_o) - \delta K_o + r_o E_f$, while in the slave 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

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

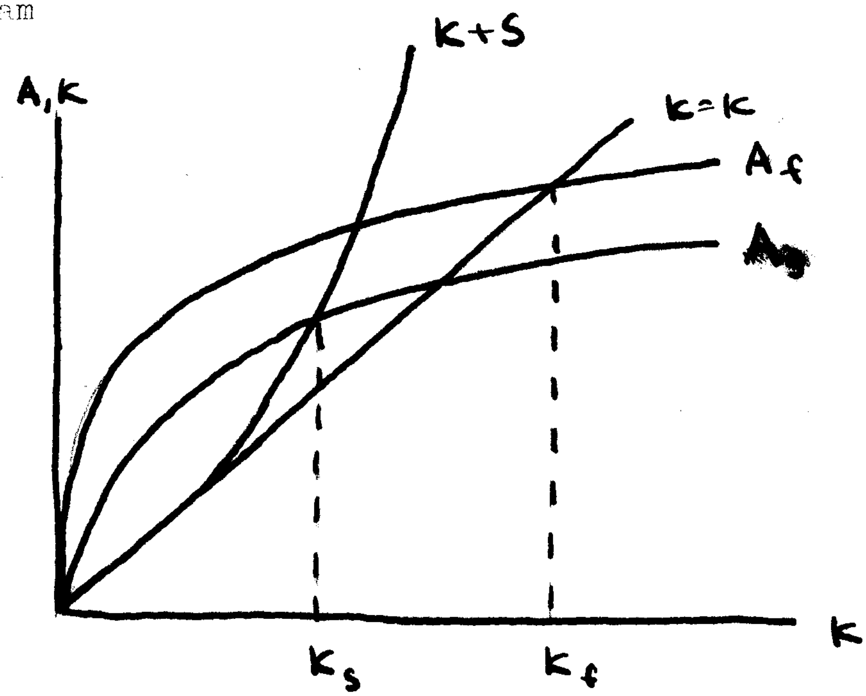
By examining the slave and free diagrams, these functions can be derived:



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.

3. 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:

$$A(r,Y) = A_o Y \quad ,$$

where A_o is a constant--Modigliani usually takes A_o to be 5. The MCD model has the following form:

(i) $$A_o Y = K + p\beta L_o$$

(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) $$w = p(r+\delta_s) + m$$

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)

$K = 15.5 \qquad p\beta L_o = 4.8 \qquad X = 4.2 \qquad \beta = .14$

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:

$$\gamma L_o^{\alpha} = \frac{X}{K^{1-\alpha}} = \frac{4.2}{(15.5)^{.3}} = 1.8$$

$$A_o = \frac{K + p\beta L_o}{\alpha(1-\beta)X} = \frac{15.5 + 4.8}{(.7)(.86)(4.2)} = 8.$$

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

$$A_o \alpha \gamma L_o^{\alpha} K^{1-\alpha} = K$$

$$\begin{aligned} K &= (A_o \alpha \gamma L_o^{\alpha})^{1/\alpha} \\ &= ((8.)(.7)(1.8))^{1/.7} \\ &= 27 \\ X &= (1.8)(27)^{.3} \\ &= 4.9 \end{aligned}$$

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

(1) A. Ando and F. Modigliani, "The life-cycle hypothesis of saving" American Economic Review 53: 55-84, March 1963

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

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

(4) J. Moes, "The absorption of capital by slavery" American Journal of Economics and Sociology 20:535-541, October 1961

(5) U. Phillips, "The economic cost of slaveholding in the cotton belt" Political Science Quarterly 20:257-275, 1905

(6) R. Sutch, "The profitability of ante-bellum slavery--revisited" Southern Economic Journal 21:365-377, April 1965

Engerman Explorations in Entrepreneurial History, 1966

Statistical Appendix

Table I Private National Wealth, 1860 prices

col. 1: Currency. <u>Historical Statistics</u> (<u>HS</u>), series X284, deflated.

col. 2: Government liablities in the hands of the public. <u>HS</u>, 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 (<u>Banking and Monetary Statistics</u>, p.512 and <u>Federal Reserve Bulletin</u> , December 1951, p.1560) plus equity in government corporations (Goldsmith, <u>et al.</u>, <u>Study of Saving</u>) plus postal savings (<u>HS</u>, series X240-244), all deflated.

col. 3: Deposits in the Federal Reserve. <u>HS</u>, series X245-254, deflated.

col. 4: Social security. Goldberger <u>et al.</u> , <u>SSUS</u>, v. III, p. 42, deflated

col. 5: Net foreign debt. <u>HS</u>, series F197-221 and V193-206, 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:

$$I_t = e^{.0758t - 4.244}$$

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 1954 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 δ is the rate of depreciation.

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

$$I_t = e^{.0499t - 2.377}$$

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)

Table 1

	1	2	3	4	5	6	7	8	9	10	11
1860	.439	.065				.766	4.593	.350	.300	9.000	4.827
70	.623	2.047				1.595	7.687	.596	.450	14.000	
80	.745	1.901			-.455	3.490	13.377	.700	.620	23.000	
90	1.438	1.169			-1.670	7.623	19.906	1.060	.950	33.000	
1900	1.885	3.337			-2.670	13.436	32.204	1.570	1.390	42.000	
10	2.812	4.965			-3.480	23.770	43.212	1.420	2.250	45.000	
20	2.067	14.605	.755	.127	1.570	19.939	51.978	1.570	2.050	48.000	
30	2.538	18.240	1.321	.802	4.600	28.317	58.842	2.030	1.550	52.000	
40	4.377	40.393	8.824	2.795	-.621	26.467	59.220	1.725	1.400	44.000	
50	9.319	79.196	5.944	13.152	1.590	35.387	55.272	3.290	2.040	43.000	

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

Table II

GNP

Year	current prices	1960 prices	Deflator
1859	4.24	4.18	1.01
70	6.82	5.75	1.19
80	10.4	9.44	1.10
90	12.8	13.3	.96
1900	19.3	19.1	1.01
10	31.6	28.3	1.12
20	88.9	37.7	2.36
30	91.6	49.0	1.87
40	100.6	62.3	1.61
50	284.6	96.4	2.95