Comparative Advantage and Local Manufacturing in the South and Midwest in 1860

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The investigation of manufacturing activity in the ante bellum South and Midwest has long been a topic of interest to economic historians. The interest has centered on the effects (if any) the slave/plantation system had on the amount of southern manufacturing. Some authors have hypothesized that the existence of slavery reduced southern manufacturing in some manner [9, 11]. Other authors have suggested that the plantation system was responsible [1]. Still others have flatly asserted that neither slavery nor the plantation system had an effect on the level of manufacturing in the South; in other words, the South did not have much manufacturing because it did not have a comparative advantage there [2, 8, 10]. Implicit in these viewpoints is a suggestion of what would have happened to the South in the absense of the Civil War. The group that sees a definite effect from the slave or plantation system believes that the South would never have achieved much economic development as long as the detriment existed. The comparative-advantage group sees the opposite. Since the South was following its comparative advantage, growth would have proceeded as rapidly as possible; probably not much manufacturing would ever have existed, but this outcome was actually beneficial to the South in terms of income.

This paper attempts to make a contribution to the manufacturing debate by viewing the problem in locational terms. In a tautological sense, the South must have been following its comparative advantage; otherwise, Southerners would have been producing other products. The more interesting question, however, is did the existence of slavery or the plantation system change the South's comparative advantage away from what it otherwise would have been? That is the question that will be investigated and partly tested here. This paper will

concentrate on explaining the regional differences in local manufacturing, that is, it will examine one part of the larger question. Before presenting the partial model to be used and the results obtained from testing it, however, the different factors that can lead to a comparative advantage will be investigated.

COMPARATIVE ADVANTAGE

To understand how slavery or the plantation system might have affected the comparative advantages of the regions, it is necessary to look at a number of different factors that can lead to a comparative advantage.[1] First, comparative advantage can arise because of different production functions, that is, the classical comparative-cost doctrine. Comparative advantage can also occur due to differences in the endowment of resources and in resource prices, that is, the Heckscher-Ohlin approach. The resource endowment can be divided into mobile resources such as capital and labor and immobile resources such as most natural resources. An explanation blaming the failure of mobile resources for the lack of Southern manufacturing would tend to center on factors or institutions keeping these resources out of the region. An explanation blaming the lack of natural resources would focus on the lack of opportunities for manufacturing firms needing to locate close to their resources. Thus, it is important to divide resource endowment into the two parts. Finally, comparative advantage can arise due to differences in the levels of the local demand, the major subject of this paper. Areas with relatively more local demand will suport more of certain types of manufacturing than other areas. A region's comparative advantage in a product can therefore arise in a number of different ways.

Much previous research on ante bellum manufacturing can be placed in this comparative-advantage framework. For example, Douglas North [11] suggests that the Midwest had more manufacturing than the South because the Midwest possessed a better resource base. Eugene Genovese [9] argues that the existence of slavery so skewed the southern income distribution that the demand for manufactured goods was very small. On the other hand, Albert Niemi [10, pp. 69-84] found that midwestern and southern manufacturing was primarily resource-oriented in 1860 but that a significant part was in industries that serviced local demand. Robert W. Fogel and Stanley L. Engerman [8, pp. 253-57] argue that natural resource endowments kept southern manufacturing relatively low, though the slave system may have

had some (minor) effect. These explanations all center on the availability of natural resources and the state of local demand.

One further piece of research is of interest because it shows explicitly how slavery could have changed the South's comparative advantage. This article is by Heywood Fleisig [7]. He postulates that the existence of slavery meant that a market for farm labor existed in the South; entrepreneurs could then get wealthy by using this slave labor in agriculture, thereby holding down the amount of manufacturing. In the North, on the other hand, virtually no market for farm labor existed; entrepreneurs here could only get wealthy by going into nonagricultural activities, that is, manufacturing. Slavery, by allowing the South to possess more of a certain mobile resource, farm labor, gave the region a greater comparative advantage in agriculture. Fleisig's explanation is thus different from those surveyed in the above paragraph as to the factor that gave the South its comparative advantage in agriculture.

In this paper, one factor that can cause comparative advantage will be investigated in detail. The paper will attempt to explain the regional differences in the amounts of local manufacturing. A supply-and-demand model will be used to show theoretically why the extent of this type of manufacturing depended on the level of local demand and what factors determined the level of demand. The model will be estimated in order to show why certain regions possessed more local manufacturing than others. Finally, the effects of slavery on local manufacturing will be discussed.

A MODEL OF LOCAL MANUFACTURING

The problem of explaining regional differences in the amount of local manufacturing can be approached in a simple supply-and-demand framework. First consider the supply side. It is usually said that the amount of local manufacturing depends upon the level of local demand, a statement that is tantamount to assuming that the supply curve for local manufacturing is perfectly elastic. This supposition follows by definition because the resources used to produce these goods are assumed to be plentiful. Thus, an increase in demand for the resource should not raise their price. The supply curve for the output produced will then be perfectly elastic because output can be expanded without an increase in costs. Then, within one region, the amount of output will be determined solely by the level of demand. Among regions, differences in the amounts of local manufacturing will be due to differences in the location

of the demand curves. The resulting situation is then shown in Chart 1.

Four factors could cause there to be regional differences in the level of demand for local manufacturing: the own price, population, other prices, and incomes.[2] As a temporary simplifying assumption, the own price will be assumed to have been the same in each region, that is, the costs of production and thus the regional supply curves were identical. Regional population differences will be accounted for by working in per capita terms; thus, we will try to explain regional differences in the amount of local manufacturing per capita.[3] Prices of other goods probably did not have much effect on the demand curve for local manufacturing because it is probable that there were neither good substitutes nor good complements for local manufacturing products as a group. All this supposition allows a conclusion to be drawn that the primary factor causing the demand for local manufacturing to differ among regions was that per capita incomes differed among regions. Thus, our basic hypothesis is that the location of the regional demand curves in Chart 1 depended on the levels of regional per capita incomes.

The situation shown in Chart 1 is presented in an alternative way in Chart 2. This figure, being in income-quantity space, provides the clearest view of what the situation is. Given our assumptions, the income-quantity combinations for the different regions should appear along the same Engel curve. Our model can now be tested by simply estimating the following regression:

$$VA = \alpha + B\ (PCINC)\ ,$$

where VA = regional value added per capita in local manufacturing and, PCINC = regional per capita income. The expected results, those that would tend to confirm our model, would be a positive and significant value for B and a high R^2.

In order to run the above regression, information on three variables is needed: the proper regions to be used, the amount of local manufacturing in each region, and the per capita income of each region. Since <u>local</u> manufacturing is our concern, the large regions of the Midwest and the South cannot be used. Similarly, states cannot properly be used. All these regions would be examples of homogeneous regions, regions that are formed on the basis of similar characteristics.[4] The proper type of regions to use in investigating local manufacturing are functionally integrated regions; these are regions which grow around a node. Since, by definition, local industries located

where they did because of the pressure of local demand, some method of delimiting areas of local demand is needed. The concept of a functionally integrated region, defined by a node and the node's hinterland, provides such a method. The functionlly integrated subregions of the Midwest and South in 1860 have been constructed elsewhere.[5] Eighty-two subregions were found. Only a sample of 15 of these subregions will be used in this paper because of the time-consuming nature of calculating the per capita income estimates.[6]

The amount of local manufacturing in each nodal subregion can be easily calculated from the 1860 census data [15] once the industries that comprised the local manufacturing group are determined. Two groups of these industries have also been determined elsewhere [4]. These groups of industries are used in this paper; one provides a lower bound and the other an upper bound for the amount of local manufacturing in each subregion.[7] The measure used for the amount of local manufacturing was the sum of the values added in the different industries.

Finally, the per capita income in each subregion has to be calculated. Let it be said at the outset that the accuracy of any income estimates for any area smaller than groups of states for 1860 is very doubtful. The available data are just not specific enough to allow us to have much confidence in our estimates of incomes in the subregions used.[8] Nevertheless, some recent research allows the use of much more of the available ante bellum data in constructing the subregional income figures.[9] The basic procedure is one of allocating national and state value added estimates in agriculture, manufacturing, mining, construction, and various service industries to the various subregions. The numerous assumptions necessary to do the allocation are what lower the confidence in the accuracy of the resulting estimates. However, the construction of subregional income estimates do allow a test to be made of the model of local manufacturing developed earlier. These estimates will therefore serve to illustrate the usefulness of the model presented in explaining differences in the amounts of manufacturing in the ante bellum South and Midwest.

RESULTS

The data used to run the regressions are given in the Appendix. The following results were obtained from the data:

$$VG1 = 0.16326 + \underset{(1.58)}{0.03956}\ PCINC \qquad R^2 = 0.16$$

$$VG2 = -1.6045 + \underset{(1.80)}{0.07397}\ PCINC \qquad R^2 = 0.20\ ,$$

where VG1 and VG2 are the value added estimates of the two different groups of local manufacturing (t-statistics are given in parentheses).[10] The basic results are somewhat mixed. The coefficients of PCINC are positive and of reasonable size, that is, they predict that an increase of $1 in PCINC will result in $0.04 to $0.07 additional spending on local manufacturing goods. However, the coefficients are insignificant in both cases and, furthermore, the R^2 is quite low in both cases. The results as a whole provide only a minimum of support for the model presented in the last section.

The basic reason that the results are so mixed becomes clear when the scatter diagram for the data is examined. The scatter is reproduced in Chart 3. As can be seen, 11 of the 15 points appear to lie near the same Engel curve while 4 of the points are outliers of varying degrees, though all show "too much" manufacturing for the region's income. The impression that the four outlying points caused the mixed nature of the results is apparent when the following regressions results are examined. These regressions were run without the four outlying points.

$$VG1 = -2.4968 + \underset{(3.14)}{0.05511}\ PCINC \qquad R^2 = .52$$

$$VG2 = -3.6863 + \underset{(3.98)}{0.07810}\ PCINC \qquad R^2 = .64$$

The results here are very good. The sizes of the income coefficients are reasonable, the coefficients are significant, and the R^2 in each equation is fairly good. However, four of our observations can not arbitrarily be thrown out of the sample. The remaining problem therefore is one of determining why these observations do not fit our basic model very well.

It is extremely interesting that these particular regions are the outlying ones. These four regions, Richmond, Savannah, Detroit, and Louisville, have a number of things in common. They are, in a sense, the four most economically developed regions in the sample. Thus, some variable that would measure "economic development" would likely improve the results. A number of potential variables were tried. The variable that gave the best results was one that measured the percent of the

regional population that lived in the nodal city, that is, the urbanization of the region (URBAN in the regressions below). When this variable was included in the regressions, the following results were obtained:

$$VG1 = -1.1363 + \underset{(2.46)}{0.03589}\ PCINC + \underset{(5.13)}{0.2202}\ URBAN \qquad R^2 = .74$$

$$VG2 = -3.9585 + \underset{(3.84)}{0.06732}\ PCINC + \underset{(7.74)}{0.39890}\ URBAN \qquad R^2 = .87$$

It should be emphasized that these regressions included all 15 observations. The PCINC coefficients are reasonable, positive, and significant as are the URBAN coefficients. Furthermore, each R^2 is quite large. These results provide a good deal of evidence that our model is basically correct.

A further check on the quality of the results can be done by computing the income elasticities implied by the regressions for the two groups of local manufacturing. The elasticities were computed at the mean values of income and of manufacturing value added. The income elasticity for the first group is 0.87 while it is 1.13 for the second group. These estimated values are very satisfactory. A priori, local manufactured goods are probably neither a luxury nor a necessity; thus, an income elasticity of about 1.0 is to be expected. That the values implied by the regressions are so close to 1.0 increases the confidence in the regression results.

It remains to explain how the ad hoc inclusion of the URBAN variable can be supported on a theoretical basis. It is likely that the URBAN variable is acting as a proxy for price differences among the regions.[11] The more urbanized regions probably had more and cheaper transportation and perhaps cheaper access to resources, thus reducing the costs and prices of local manufactured goods. With lower prices, consumers would buy more, given the same level of income, than otherwise. This situation is shown graphically in Chart 4. Thus, the final regressions estimated above are probably demand curves where prices as well as incomes varied among the regions.

One final test of interest was done using the sample of data. Dummy variables were used to test whether there was something associated with a region being in the South that lowered southern local manufacturing beyond that implied by southern incomes and urbanization. Two separate dummy variables were tried, one for all southern regions and a second for just the southern cotton regions. Each dummy variable was included separately in the regressions where per capita income was the

only other explanatory variable and in the regressions including both income and percent urbanized. In all[12] of the regressions, the dummy variables proved insignificant. Thus, differences in the amounts of local manufacturing were due to differences in the level of demand, with no additional effect found from the location of the region.

CONCLUSIONS

Our results provide very good evidence that the amounts of local manufacturing differed among regions due to differences in the levels of local demand. In turn, local demand differed primarily because of different per capita incomes and prices (probably). These results are in line with what the theory of comparative advantage would lead us to believe: the amounts of local manufacturing should depend on local demand. Furthermore, no independent effect on the level of local manufacturing was evident due to whether the region was located in the South or not. Thus, at least for local manufacturing, simple economic reasons accounted for the regional differences.

It is, however, interesting to speculate as to the role that slavery played in influencing the size of the different demand factors, that is, the "simple economic reasons." In the first place, slavery almost certainly increased the overall level of southern per capita incomes before the Civil War. The very essense of slavery meant that slaveowners could force slaves to work more hours than they freely would.[13] Thus, slavery increased the amount of output the given labor supply produced and, therefore, led to higher per capita incomes. In turn, these higher incomes led to a larger demand and a larger production of local manufactured goods. In this way the institution of slavery actually increased the amount of southern local manufacturing. Secondly, a number of people have speculated that slavery reduced the level of southern urbanization. If this actually happened, then slavery also would have decreased the amount of southern local manufacturing. The net effect of slavery on local manufacturing in the South is therefore impossible to determine, though the possibility that it increased local manufacturing can not be discarded.

NOTES

*The author wishes to thank Joe Frost for research assistance.

1. This discussion partially follows that in Niemi [10, pp. 69-84]. It should be emphasized that the factors that can lead to comparative advantage are not necessarily mutually exclusive.

2. Tastes could also be a factor leading to differences in demand and because of the speculation on southern conspicuous consumption, a few words need to be said. We need to assume that the utility function was the same between the North and the South, not that tastes at current incomes and prices did not differ. The assumption of equivalent utility functions simply means that Northerners would have also engaged in conspicuous consumption had they been faced with southern conditions, a seemingly reasonable argument.

3. When working with a demand function in per capita terms, there is an additional term that takes into consideration differences in consumers' incomes and tastes. The term is small compared to the others and is usually neglected. See [13].

4. See [14] for a discussion of both homogenous and functionally integrated regions.

5. See [5, pp. 67-78]. The term "subregion" is used in this paper in order to help distinguish between the large regions of the South and Midwest and the small regions used here for testing purposes.

6. The nodal cities for the 15 regions are: Richmond, Charlotte, Savannah, Columbus (Georgia), Vicksburg, Dallas, Chattanooga, Columbus (Ohio), Detroit, Lafayette (Indiana), Louisville, Paducah, Columbia (Missouri), Peoria, and Dubuque. For a complete list of the nodal cities see [5, Table 2, pp. 71-3].

7. The two groups are composed of the following industries: Group 1 - Flour and Meal; Sawed Lumber; Carriages; Tin, Copper, and Sheet-Iron Ware; Saddlery and Harness; Bread and Crackers; Cooperage; Printing and Publishing; Brick. Group 2 - All Group 1 Industries plus: Sash, Doors, and Blinds; Furniture; Cabinet, School, and other; Leather; Pottery and Stone Ware; Marble and Stone Work; Hardware; Agricultural Implements-Miscellaneous; Machinery; Steam-engines.

8. Easterlin [6, pp. 533-34] makes this point very explicitly even for the large region per capita income figures he was using.

9. See [3]. It should also be noted that results virtually identical to those in this paper were obtained in my dissertation [5], and only very crude per capita income estimates were used there. Thus, the results seem pretty robust for reasonable changes in the levels of regional per capita incomes.

10. Regressions were also tried where the Engel curve was

assumed to be nonlinear. As the results showed little change, the nonlinear regressions are not reported here.

11. No price data on local manufacturing presently exist that would allow the direct incorporation of a price variable into the regression equation.

12. The sign of the coefficients of the dummy variable was consistently negative, however (DUMMY = 1 if the region was Southern or, for the other dummy, if the region was a major cotton producer). Each dummy variable was highly correlated with per capita income. Thus, multicollinearity could be the cause of the insignificance of the coefficients; however, in most cases, the t-statistics obtained were substantially below 1.0.

13. This argument has, of course, been advanced by Ransom and Sutch [12] as an explanation of why southern relative incomes declined so drastically after 1860.

REFERENCES

1. Robert Baldwin, "Patterns of Development in Newly Settled Regions," Manchester School of Economic and Social Studies, Vol. 24 (May 1956), pp. 161-79.

2. Fred Bateman and Thomas Weiss, "Comparative Regional Development in Antebellum Manufacturing," Journal of Economic History, Vol. 35 (March 1975), pp. 182-215.

3. Raymond L. Cohn, "Antebellum Regional Incomes: Another Look," Explorations in Economic History, Vol. 18 (October 1981).

4. _____, "Local Manufacturing in the Antebellum South and Midwest," Business History Review, Vol. 54 (Spring 1980), pp. 80-91.

5. _____, "A Locational Analysis of Manufacturing Activity in the Antebellum South and Midwest," Ph.D. dissertation, University of Oregon, 1977.

6. Richard A. Easterlin, "Regional Income Trends, 1840-1950," in Seymour Harris, ed., American Economic History (New York: McGraw-Hill, 1961).

7. Heywood Fleisig, "Slavery, the Supply of Agricultural Labor, and the Industrialization of the South," Journal of Economic History, Vol. 36 (September 1976), pp. 572-97.

8. Robert W. Fogel and Stanley L. Engerman, Time on the Cross (Boston: Little, Brown 1974).

9. Eugene D. Genovese, "The Significance of the Slave Plantation for Southern Economic Development," Journal of Southern History, Vol. 28 (November 1962), pp. 422-37.

10. Albert W. Niemi, Jr., State and Regional Patterns in

American Manufacturing: 1860-1900 (Westport, CT: Greenwood Press, 1974).

11. Douglass C. North, "Location Theory and Regional Economic Growth," Journal of Political Economy, Vol. 62 (June 1955), pp. 243-58.

12. Roger L. Ransom and Richard Sutch, One Kind of Freedom (Cambridge: Cambridge University Press, 1977).

13. Henri Theil, Principles of Econometrics (New York: Wiley, 1971), pp. 580-88.

14. Morris B. Ullman and Robert C. Klove, "The Geographic Area in Regional Economic Research," in National Bureau of Economic Research, Studies in Income and Wealth, Vol. 21: Regional Income (Princeton, NJ: Princeton University Press, 1957), pp. 87-109.

15. United States, Bureau of the Census, Eighth Census of the United States: Manufactures (Washington, D.C.: US Government Printing Office, 1860).

Chart 1. Market for local manufacturing in two regions. The different subscripts refer to the different regions.

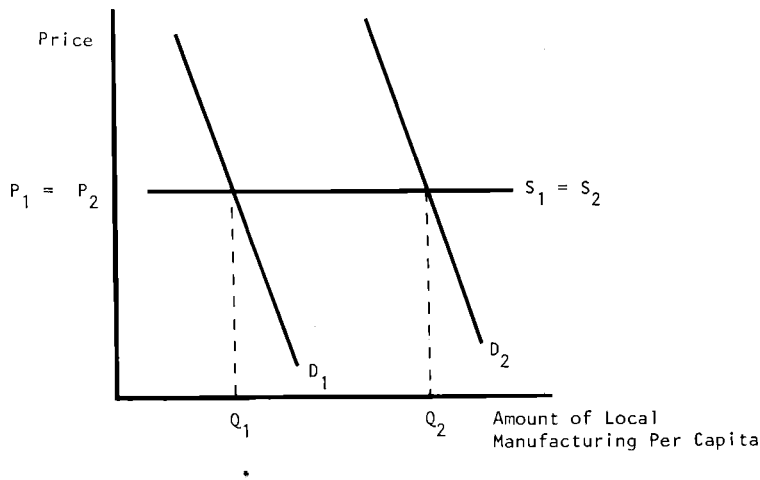


Chart 2. Engel curve for local manufacturing with income-quantity combinations for two regions indicated.

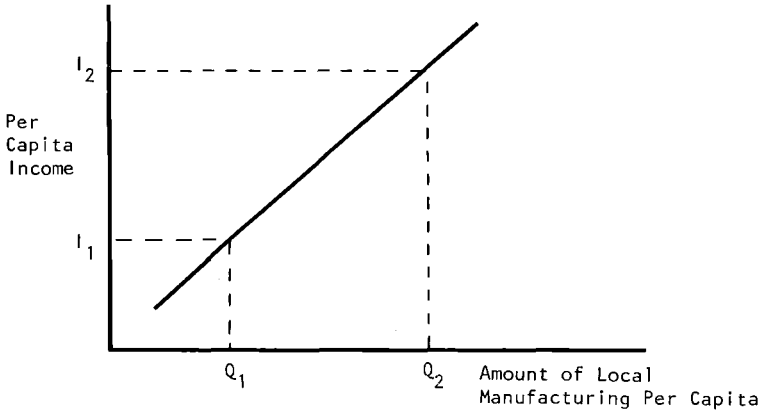


Chart 3. A scatter diagram of the data showing the outlying points.

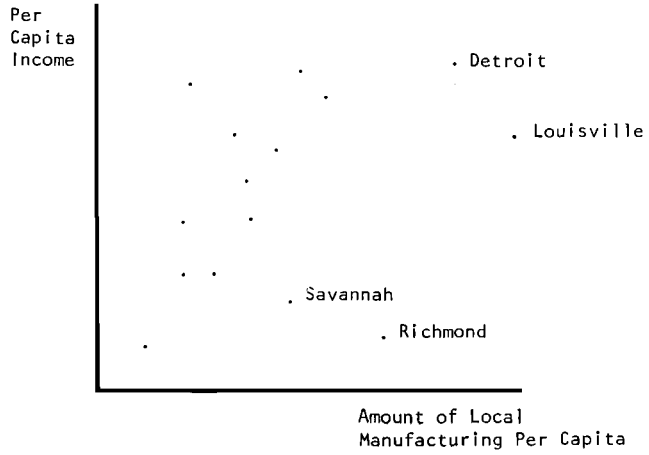
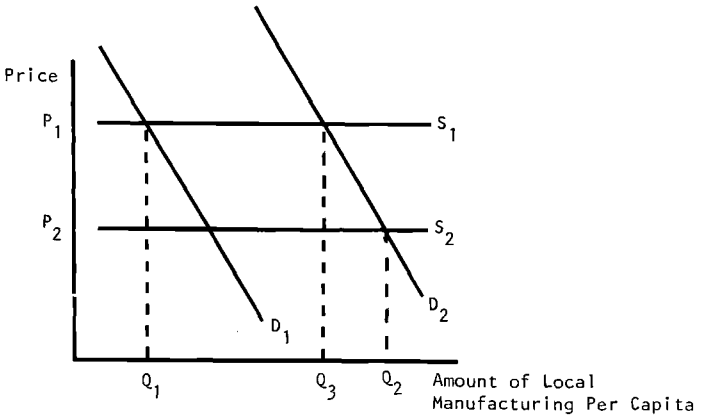


Chart 4. Market for local manufacturing where price differences exist. Q_1, Q_2 are the actual levels of local manufacturing per capita in the two regions. Q_3 is the amount that would exist in region 2 if there were no price differences.



APPENDIX

Region	VG1	VG2	PCINC	URBAN
Richmond	$ 6.82	$ 9.90	$ 80.31	18.7%
Charlotte	1.33	1.87	69.23	0.9
Savannah	6.15	7.20	91.24	17.7
Columbus, GA	2.25	3.31	93.98	4.6
Vicksburg	2.06	3.23	106.08	2.2
Dallas	5.44	6.04	114.06	4.4
Chattanooga	1.94	3.64	94.52	2.3
Columbus, OH	4.23	7.94	131.63	5.2
Detroit	8.08	12.51	136.09	13.2
Lafayette	4.60	6.59	120.49	4.6
Louisville	7.06	13.94	125.89	23.8
Paducah	5.09	5.72	106.47	3.0
Columbia, MO	3.16	3.63	127.58	3.8
Peoria	5.02	7.04	135.92	5.8
Dubuque	4.72	5.85	121.73	5.9