CAPITAL VALUE AND RELATIVE WAGE EFFECTS OF IMMIGRATION INTO THE UNITED STATES, 1870-1930

by

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Joseph Schachter

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CHAPTER I

SUMMARY AND CONCLUSION

In few other countries has immigration played such a large role in augmenting population growth as in the United States. It has been estimated that net immigration into the United States from 1820-1930 totalled 27.3 million persons.[1] Since adult immigrants constitute a source of labor whose cost in terms of rearing, educating, and training was borne by the countries of emigration, the coming of these millions of immigrants to the United States represented an enormous inflow of human capital that dwarfed the inflows of the more orthodox type. Furthermore, if one considers the magnitude and duration of this movement, it is difficult to exaggerate its importance as a factor in the economic growth of the United States.[2]

The national income of the United States in 1929 prices increased from 10.6 billion dollars in 1875 to 69.5 billion dollars in 1925 for an absolute rise of $58.9 billion and a relative increase of 655.7 percent. Thirty six and three tenths percent of this increase was due to the increase in the number

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[1]Walter F. Wilcox, "Immigration into the U.S.," International Migrations, II, ed. W.F. Wilcox (New York: National Bureau of Economic Research, 1931), p. 92.

[2]Simon Kuznets, "Long-Term Changes in the National Income of the United States of America since 1870," in Income and Wealth, Series II, ed. S. Kuznets (Cambridge: Bowes and Bowes, 1952), p. 198.

of gainfully occupied persons that occurred during the period.[3] According to Edward F. Denison,[4] changes in employment and hours were responsible for 1.11 percentage points of the 2.82 percent average annual rate of growth of the real national income of the United States from 1909-1929 and for 0.80 percentage points of the 3.33 percent average annual rate of growth that occurred from 1929-1957. Even if one takes into consideration Robert M. Solow's[5] skepticism about Denison's estimate of the beneficial effect of shorter hours on the productivity of labor by cutting the magnitude of this effect in half, one for example still finds that changes in employment and hours were responsible for 1.00 and 0.64 percentage points of the average annual rate of growth of real national income during the two periods, respectively.

It is, therefore, clear that immigration which made a major contribution to the increase in the gainfully occupied population of the United States prior to 1930 was a major factor in the rapid rise in the national income of the United States before 1930. Thus, one can say that the rapid growth of the Gross National Product of the United States prior to 1930 was to a large extent due to the tremendous amount of human capital that it received from the emigrating countries of Europe.

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[3]Simon Kuznets, National Income: A Summary of Findings (New York: National Bureau of Economic Research, 1946), p. 46.

[4]The Sources of Economic Growth in the U.S. and the Alternatives Before Us (New York: Committee for Economic Development, 1962), p. 266.

[5]"Economic Growth," in Economic Growth: An American Problem, ed. Peter M. Gutman (New Jersey: Prentice Hall, 1964), p. 112.

This aid did not come in the familiar form of the transfer of physical capital but in the form of the transfer of human capital.

Since the capital value of net immigration during any period depends on the contribution the immigrants made to the labor force, on their occupational distribution, and on their distribution by age and sex, it was necessary to have such information in order to calculate their capital value. This is done in Chapter II and in the Appendix where I derive estimates of net immigration of gainfully occupied persons into the United States cross classified by age, sex, and occupation for the period 1870-1930. These estimates were derived from decennial census data on the occupations of the foreign-born population of the United States. Such data is available only since 1870, and it is for this reason that this study begins with that year. It ends with 1930 because the restrictive immigration laws passed in the 1920's curtailed immigration to such an extent that its net contribution to the labor force became negligible.

In Chapter II and again in Chapter III I examine the widely held belief during the early decades of this century that the "old immigration," i.e., immigrants from Northern and Western Europe who made up ninety five percent of the immigrants who came to the United States before 1883, was more skilled than the "new immigrants," i.e., immigrants who came from Eastern and Southern Europe who made up eighty-one percent of the immigrants who came from 1883-1907. An examination of

estimates of the occupational distribution of gainfully occupied immigrants and of the foreign-born population of the United States from 1870-1930 shows that the opposite was actually the case.

From 1870-1930 net immigration into the United States totalled 20.86 million persons and accounted for a fifth of the total growth in the labor force and for about one seventh of the growth of the total population.[6] If we assume, as Denison[7] does, that due to quality differences the contribution to the rate of growth of an additional gainfully occupied immigrant is 2/3 of a native American, then net immigration accounted for about five percent of the increase of the real national income from 1875 to 1925 that was mentioned earlier. The capital value of net immigration during this period is estimated in Chapter III to have equalled $109.7 billion for an annual rate of $1.8 billion. If we take into account the maximum effect of the skilled upgrading of immigrants that took place after they came into the United States, then the capital value of these immigrants is reduced by 15.2 percent to $93.0 billion for an annual rate of $1.6 billion.

By making a relatively larger contribution to the gainfully occupied persons in some occupations than in others, immigration should have a relative wage effect, i.e., it should

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[6]Simon Kuznets and Ernest Rubin, Immigration and the Foreign-Born (New York: National Bureau of Economic Research, Occasional Paper No. 46, 1954), pp. 1-4 and 94.

[7]Edward F. Denison, "The Lagging U.S. Growth Rate," American Economic Review, LII (May, 1962), p. 71.

cause a change in the relative wage rate of one group of workers as compared with some other group of workers. Other things, such as changes in demand and extent of unionism, being equal, the wage rate in occupations where immigrants tend to concentrate should fall relative to the wage rate in other occupations. Thus, immigration should, other things being equal, produce a negative relative wage effect unless it is prevented from having such an effect by unions. The validity of this hypothesis is tested in Chapter IV where I examine the relative wage effect of immigration into the United States from 1870 to 1910.

During these four decades, immigration was a major contributor to the growth of the labor force of the United States. From 1870-1880 the increase in the foreign-born population accounted for 16.2 percent of the increase in the labor force, from 1880-1890 for 30.1 percent of the increase, for 10.1 percent of the increase from 1890-1900, and finally, for 24.9 percent of the increase from 1900-1910.[8] The reason for beginning with 1870 is that, as was mentioned earlier, there are no statistics on the occupations of the foreign-born prior to that date. I had to end with the 1900-1910 decade because there are no comparative wage data by occupation and industry for years after 1907. It was necessary to have such data in order to keep changes in demand equal for the particular group of occupations under examination.

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[8]Kuznets and Rubin, Immigration and the Foreign-Born, op. cit., pp. 1-4.

On the basis of correlation coefficients obtained by correlating the relative wage rates of a selected number of skilled occupations in a given industry in a particular geographic division or city within the relative proportion of foreign-born in each respective occupation, it is concluded in Chapter IV that during the period of heavy immigration from 1890-1910, immigration most probably had a negative relative wage effect on the wages of skilled workers in poorly organized industries while it most probably did not have such an effect in the strongly unionized building trades. The building trades unions appear to have been successful in preventing the new immigration from lowering their relative wages. From 1870-1890, the relation appears less negative and, as a matter of fact, it is not certain that it was negative at all. It would appear that the existence of the frontier during the latter period made it possible for many skilled workers to go West and consequently not to cause the relative wages to fall.

On the basis of the evidence contained in Chapter IV, one would have to agree with Douglas[9] that immigration was an important factor in keeping down the wage rate of the unskilled from 1890 to 1914. The reason being, it increased the ranks of the unskilled to a much larger degree than the skilled or the semiskilled. Since the unskilled were almost completely unorganized, immigration should have had a much larger negative

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[9]Paul H. Douglas, Real Wages in the United States, 1890-1926 (New York: Houghton and Mifflin Co., 1930), p. 178.

relative wage effect on them than on the skilled workers that I examine in Chapter IV. One can, therefore, say that although immigration helped the economic growth of the United States by providing human capital, in the short run it adversely affected the unorganized workers and especially the unskilled ones.

In addition to a relative wage effect, immigration may also have an absolute wage effect, i.e., it may change the real wage rate for the economy as a whole. It may cause the real wage rate in the economy as a whole to be lower than it would have had been in the absence of immigration by causing labor to be relatively less scarce in comparison with other factors of production. According to Douglas[10] the large volume of immigration from 1890 to 1914 was one of the forces that kept the average real annual earnings of employed wage earners in manufacturing stagnant during this period. Furthermore, he credits the falling-off in the volume of immigration that occurred after 1915 as being responsible in part for the thirty percent increase in such earnings that took place from 1914-1926. Although Rees[11] found that real earnings of manufacturing workers rose at an average rate 1.3 percent per year from 1890-1914, he still concludes that "the closing of the frontier and the high level of immigration ... did have some effect in holding down real wages," for the 1.3 percent rate is slightly lower than the one for the 1860-1890 period and considerably lower than the rate since 1914.

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[10] Ibid., pp. 231-41 and 564-66.

[11] Albert Rees, Real Wages in Manufacturing, 1890-1914 (Princeton: Princeton University Press, 1961), pp. 3-5.

The fact that according to both Douglas and Rees, immigration had a negative affect on the average real wage rate from 1890-1914 does not necessarily mean that the capital value of the immigration stream for that period should be diminished. If one agrees with Spengler's[12] assumption that until 1900 and possibly up to 1914 immigration raised per capita income, then the income lost by labor was more than offset by the gain to other income recipients. In such a case all that the lowering of the absolute level of wages accomplished was to lower the share of national income that went to labor. Since the marginal propensity to consume of wage earners is greater than the marginal propensity to consume of the other two major income recipients, i.e., profit recipients and farmers,[13] this was beneficial as far as the growth rate was concerned because it helped raise the rate of saving in the United States.

Immigration also impeded the rise of rural income that occurred via migration of rural workers to the cities. From 1890-1914 immigrants were substitutes for Negro migrants to the cities and when World War I checked immigration there was a rise in rural urban migration. However, the fact that about a quarter of the immigrants were either in skilled, semiskilled, professional, or commercial occupations which are complementary

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[12]J.J. Spengler, "Some Economic Aspects of Immigration," Law and Contemporary Problems, XXI (Spring, 1956), pp. 242-49.

[13]Gardner Ackley, Macroeconomic Theory (New York: The Macmillan Company, 1961), pp. 263-4.

rather than substitutes for unskilled rural migrants tended to some extent to offset this effect.[14]

Thus, it would appear from the above analysis that although immigration was a great aid in the economic growth of the United States by providing human capital, it had an adverse effect on the income of wage earners in general during the period of heavy immigration from 1890-1914. The wage earners who suffered the most were the unskilled city workers and potential rural migrants who were prevented from moving to the city and thereby raise their income.

As for the economic effects of increasing net immigration at present, it is shown by Reder[15] that although it is unclear whether it would raise or lower output per capita, it would increase the per capita income of natives, i.e., all persons other than new immigrants. Another beneficial effect of increased net immigration is that, as was mentioned earlier, adult immigrants constitute a source of labor whose costs of rearing, educating, and training were borne by foreign countries. From the point of view of economic growth, therefore, increased immigration would be desirable.

However, as Reder[16] shows, increased immigration tends to have undesirable effects on the income distribution of the

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[14]Melvin W. Reder, "The Economic Consequences of Increased Immigration," Review of Economics and Statistics, 45 (August, 1963), pp. 226-27.

[15]Ibid., pp. 222-24.

[16]Ibid., pp. 225-28.

population. By decreasing employment opportunities in the cities, it will impede the urban rural migration and thereby cause the rural wage to be lower than it would have otherwise been. In addition it would impede the raising of the income of poor rural workers that occurs via their moving to the cities. The relative wage rate of the unskilled would go down because the increased immigrants would largely be unskilled workers. My data of Chapter IV tends to confirm this prediction of his, for it shows that after the close of the frontier, immigration had a negative wage effect on the wage rate of poorly organized workers. Most of the unskilled workers today still do not have too much bargaining power. Since this negative effect would hit largely the poor Negroes and poor whites, it is against the present policy of eliminating poverty. Of course, workers whose services are complementary to those of non-skilled labor would gain from increased immigration as would the owners of the factors of production used with labor. This would tend to further cause an increase in the inequality of income.

It can, therefore, be seen that a non-discriminatory policy of increasing immigration would tend to be contrary to present domestic policy of fighting a war on poverty. However, by establishing quotas that discriminate in favor of skilled workers, professionals, or other occupational groups, we can avoid the adverse effects that immigration has on the poor. Reder[17] objects to such a policy on the grounds that "to grant

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[17] Ibid., p. 229.

special entry permits to certain groups of workers, whatever the reason, is to subsidize their employers and (perhaps) the consumers of their output, at the expense of their native labor market competitors." From my conclusion of Chapter IV that immigration had a negative relative wage effect on the wages of skilled workers who were poorly organized, we can see that admitting even only skilled immigrants would also interfere with the Negroes' ambition to gain equality with the whites. As long as there exists racial discrimination by trade unions, the skilled Negroes and other minority groups will tend to concentrate in the unorganized industries and consequently it will be they who will suffer from an increase in the immigration of skilled persons. Thus, increased immigration, while it will, according to Reder, increase the per capita income of natives in general, will tend to decrease the income of the poor and the minority groups.

Of course, increased immigration may be desirable on humanitarian or political grounds, but then one should make certain that it is not the poor and the minority groups who wind up paying the bill for it while the other members of society not only ease their conscience but also increase their income. This could be done by making sure that the strongly organized sector of the economy accept their fair share of the new immigrants and that the skill distribution of increased immigration does not differ greatly from that of the population of the United States.

CHAPTER II

OCCUPATIONAL DISTRIBUTION OF IMMIGRANTS, 1870-1930

Introduction

One of the most important characteristic of any group of persons, be they immigrants, Negroes, or native whites, is their occupational distribution. It determines their level of income which in turn determines to a large degree their social status and degree of political power. In the case of immigrants it is also one of the most important determinants of the value of the human capital received by a country via immigration, for, as is explained more fully in the next chapter, the capital value of immigrants depends, among other things, on the size of their future income stream which depends on their occupational distribution.

In this chapter, I, therefore, present the occupational distribution of immigrants for the period 1870 to 1930. It was derived from the decennial census data on the occupations of the foreign-born. However, in order not to burden the general reader with the rather complicated and tedious method by which this was accomplished, the technical aspects have been relegated to the Appendix. In this chapter, I also examine the validity of the widely held belief that the "new immigration," i.e., immigrants from Eastern and Southern Europe who made up eighty one percent of immigrants coming to the United States from 1883

to 1907, was more skilled than the "old immigration," i.e., immigrants from Northern and Western Europe who made up ninety-five percent of immigrants who came before 1883.

Official Immigration Statistics

The official record of immigration into the United States was begun as a result of legislation to regulate the conditions on passenger ships.[1] The Act of March 2, 1819, required that captains or masters of vessels arriving from abroad give the local collector of customs a list of all the passengers taken aboard classified by age, sex, occupation, and nationality. They were also required to report the number of passengers that had died during the voyage. There is no record of the number of alien passengers that arrived in the United States before 1819. However, it has been estimated by Bromwell that from the end of the Revolutionary War to 1819 a total of 250,000 foreign-born passengers arrived in the United States. The official record of emigration from the United States was begun in 1907 with the passage of the Immigration Act of 1907.[2]

The history of the official immigration statistics of the United States is one of changes in source, definitions, classifications, and completeness of coverage. For the period 1820-1867, the immigration figures were compiled by the Department of State and show the number of alien passengers that

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[1]Brinley Thomas, Migration and Economic Growth (Cambridge: Cambridge University Press, 1954), p. 42.

[2]United States Bureau of the Census, Historical Statistics of the United States Colonial Times to the Present (Washington: Government Printing Office, 1960), p. 48.

arrived in the United States. From 1868 to 1891 they were compiled by the Bureau of Statistics and show the number of immigrant aliens that came into the country. Since 1892 the figures have been compiled by the Bureau of Immigration and its successor the Immigration and Naturalization Service. From 1892-1894 the figures give a count of the number of aliens intending to reside permanently in the United States; from 1895 to 1897 the number of immigrant aliens, i.e., non visitors; from 1898 to 1906 they state the number of immigrant aliens who intended to reside permanently in the United States. In 1906 we get for the first time a distinction between immigrants and non-immigrants, i.e., between those aliens intending to reside permanently in this country who arrived for the first time and those who were reentering.[3]

In addition to the above defects, the immigration statistics also suffer from lack of completeness of coverage. Thus, arrivals at Pacific ports were not included until 1850, and arrivals at land borders were not fully reported until 1908.[4]

Although the Act of 1819 required that immigrants be classified by sex, it was not done satisfactorily until 1869. However, there is an official estimate of the sex distribution

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[3]Thomas, op. cit., pp. 42-44.

[4]United States Bureau of the Census, op. cit., p. 48.

for the years 1820-1867 that was made by the Immigration Commission in 1911. The age groups used to classify immigrants have varied. For the periods 1820-1898, 1899-1917, and 1918-1924, they were: under 15, 15-40, and over 40; under 14, 14-44, and 45 and over; and under 16, 16-44, and 45 and over, respectively. In 1925 the classification was enlarged to six groups, in 1940 to twelve, and finally, in 1945 it was further enlarged to twenty five year groups with a lower limit of under five and an upper open end limit of one hundred and over.[5]

Arriving immigrants have also been classified by occupational groups. For the years 1820-1898 the classification includes the following categories:

Professional--occupations which involve a liberal education or its equivalent and mental rather than manual skills; commercial--agents, bankers, hotelkeepers, manufacturers, and merchants and dealers; silled--occupations requiring special training of a manual rather than mental nature.

It also includes the categories of farmers, servants, laborers, miscellaneous, and those with no or unknown occupations. In 1945 the Immigration and Naturalization Service adopted the major occupational groups of the Sixteenth Census of the United States, Alphabetical Index of Occupations and Industries--Professional, technical, and kindred workers; farmers and farm managers; managers, officials and proprietors, except farm;

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[5] Ibid., p. 51.

craftsman, foremen, operatives, and kindred workers; private household workers; service workers, except private household; farm laborers and foremen; and laborers, except farm. In addition it grouped the occupations of immigrants from 1899-1944 into these groups.[6]

In addition to the above shortcomings, the official statistics on the occupations of immigrants could not be used to find the capital value of immigrants or the impact on relative wages in the United States because they are based on the occupation which the immigrants followed in the countries of emigration which may or may not reflect the occupation which they will go into after settling here. In his study of "the extent to which the immigrant, after coming to this country, utilized his skill as an industrial or agricultural worker," Louis Bloch concludes that there is a definite trend to show that "immigrants chose occupations without much regard to previous skills."[7] It was, therefore, necessary to derive the occupational distribution of immigrants after settling in the United States from census data on the occupations of the foreign-born.

Census Data on the Occupations of the Foreign Born

Although in 1820 and again in 1840 the decennial census reported the number of persons engaged in certain general classes

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[6] Ibid., pp. 51 and 60-62.

[7] "Occupations of Immigrants Before and After Coming to the United States," Journal of the American Statistical Association, 17 (June, 1921), pp. 750-63.

of occupations, it was not until the census of 1850 that an attempt was made to get a detailed statement about the occupations of the population. At the latter census an inquiry was made on the population schedule regarding the occupations of free males over fifteen years of age. However, the printed result listed in alphabetical order without classification according to major subgroup, such as agriculture or manufacturing, the number of persons in each of 323 occupations. Neither were details about the age composition or nationality given. In the census of 1860 a similar arrangement was followed with the exception that the number of occupational designations was expanded to 584.

The 1870 census tabulated the occupations of all persons ten years of age and over, and for the first time we get a division of these persons by age, sex, and nationality. It also classified them under four general headings--agriculture, professional and personal service, trade and transportation, and manufacturing and mechanical industries. The presentation covered 338 occupational designations. In 1880 the same arrangement was followed except that the number of occupations was reduced to 265.[8] The total number of persons in each occupation in 1870 and 1880 were divided by sex into three age intervals--10-15, 16-59, and 60 and over.

For the decennial years 1890, 1900, 1920, and 1930, the census gives the occupations of foreign-born whites and of the

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[8]United States Census Office, Report on the Population of the U.S. at the Eleventh Census: 1890 (Washington: Government Printing Office, 1897), pp. lXXV-Vl.

total population cross classified by age and sex. The age intervals used vary from one census to another. For 1890 the intervals are 10-14, 15-24, 25-34, 35-44, 45-54, 55-64, and 65 and over. The 1900 intervals are the same as those for 1890 with the exception that children up to age 16 are classified by single years of age. In 1920 the intervals were 10-17, 18 and 19, 20-24, 25-44, 45-64, and 65 and over. Finally, in 1930 they were 10-13, single years of age from fourteen through nineteen, five year age intervals until age seventy-five and seventy-five and over. The census of 1910 does not give the age distribution of the foreign-born but only of the total population.

Occupational Distribution of the Gainfully Occupied Foreign Born, 1870-1930

Table I shows the percentage distribution of foreign-born whites among the various occupational groups. Even though the figures for 1870 and 1880 also contain nonwhites, the series is comparable because the number of nonwhite foreign-born was negligible when compared with the number of foreign-born whites. Thus, in 1890 the foreign-born whites in the United States made up 14.5 percent of the population while foreign-born nonwhites made up only 0.2 percent.[9]

The occupational grouping of Table I is the same as

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[9]Niles Carpenter, Immigrants and Their Children, U.S., Bureau of the Census, Census Monograph VII (Washington, U.S. Government Printing Office, 1927), pp. 14-15.

TABLE 1. —Percentage distribution of gainfully occupied foreign-born white males and females of the U.S. by occupational group, 1870-1930[a]

Occupational Group and Sex	Percentage in Each Occupational Group						
	1930	1920	1910	1900	1890	1880[b]	1870[b]
Total Male[c]	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1. Professional	3.1	2.3	2.1	2.1	1.9	1.6	1.4
2. Proprietors, managers and officials	19.1	18.5	18.9	23.8	25.7	28.8	25.7
2a. Farmers (owners and tenants)	7.1	8.7	9.9	15.0	17.9	20.5	17.8
2b. Wholesale and retail dealers	7.5	6.4	5.5	6.1	5.7	6.1	5.9
2c. Other proprietors, etc.	4.4	3.5	3.5	2.7	2.2	2.2	2.0
3. Clerks and kindred workers	8.4	6.3	5.5	4.8	4.1	2.8	2.6
4. Skilled workmen and foremen	22.1	20.5	18.1	17.4	17.6	15.7	16.6
5. Semiskilled workers	18.8	18.6	16.2				
5a. In manufacturing	12.4	13.3	11.2				
5b. Other semiskilled workers	6.4	5.3	5.0				
6. Unskilled Workers	28.5	33.8	39.2	51.9	50.6	51.1	53.8
6a. Farm laborers	3.1	3.7	4.9				
6b. Factory and Building Construction	11.8	14.4	15.0				
6c. Other laborers	9.3	12.6	16.9				
6d. Servant classes	4.3	3.0	2.5				
Total Female[c]	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1. Professional	8.3	6.1	4.7	4.1	3.1	2.9	2.4
2. Proprietors, managers and officials	5.3	5.4	5.3	6.4	5.8	6.9	6.1
2a. Farmers (owners and tenants)	1.8	2.1	2.3	4.0	3.7	4.8	4.1
2b. Wholesale and retail dealers	2.3	2.4	2.2	1.8	1.7	1.9	1.7
2c. Other proprietors, etc.	1.1	0.9	0.7	0.6	0.4	0.4	0.2
3. Clerks and kindred workers	17.3	14.0	7.1	4.8	2.5	1.7	1.4
4. Skilled workmen and foremen	1.3	2.0	2.0	1.7	1.3	1.3	1.4
5. Semiskilled workers	36.0	42.7	41.7				
5a. In manufacturing	24.6	32.7	31.5				
5b. Other semiskilled workers	11.4	10.0	10.2				
6. Unskilled workers	31.8	30.0	39.2	83.2	87.2	87.1	88.9
6a. Farm laborers	0.4	1.3	1.4				
6b. Factory and building construction	1.2	2.4	1.7				
6c. Other laborers	0.3	0.5	0.3				
6d. Servant classes	29.8	25.6	35.8				

[a] Calculated from the data of Table II.
[b] Includes nonwhites.
[c] Totals may not add up to 100 due to rounding errors.

the one used by Alba M. Edwards[10] in his social and economic grouping of the gainfully occupied workers of the United States at the censuses of 1910 through 1930. The composition of the first two groups is self-explanatory. Clerks and kindred workers are the so-called white collar workers, and included in this group are office assistants, clerks, salesmen, and all others doing clerical or clerically related work. A person is considered skilled if his occupation requires a long period of training or apprenticeship and a degree of manual dexterity or judgment that is greater than that required by a semi-skilled worker. The semi-skilled group consists of persons whose occupations require a short period or no period of training and only a moderate degree of judgment and/or manual dexterity. The unskilled workers do jobs that usually require no special training, judgment, or manual dexterity but just muscular strength.

As can be seen from Table 1, the percentage of both professional and clerical workers among the foreign-born males and females rose in almost every decade from 1870-1930. On the other hand, the percentage male proprietors, managers, and officials fell in every decade with the exception of the one from 1870-1880. This decline is almost exclusively due to the decline in the percentage of farmers which, due to the close

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[10]United States Census Bureau, A Social Economic Grouping of Gainful Workers of the U.S., 1930 (Washington: U.S. Government Printing Office, 1938), pp. 2-7.

of the frontier and the general decline in the number of farmers that occurred after 1890, declined sharply. The percentage female proprietors, managers, and officials fluctuates between 5.8 and 7.8 from 1870-1900 and remains relatively stable at about 5.3 from 1900-1930. As in the case of males, changes in this group in the case females were also caused by fluctuations in the number of farmers.

The percentage of male skilled workmen and foremen increased from 16.2 in 1880 to 22.1 in 1930. It increased in every decade except for a decline of 1.0 from 1870-1880 and 0.2 from 1890-1900. In the case of females the percentage in this group fluctuated between 2.2 and 1.3. Finally, semi-skilled and unskilled workers made up 54.8 percent of the male gainfully occupied in 1870 but only 50.6 percent in 1890. The proportion of such workers increased to 51.9 percent in 1900 and to 55.4 in 1910. It then dropped to 52.4 percent by 1920 and to only 47.3 percent by 1930.

The above analysis of the figures of Table 1 tends to refute the conclusion of J.W. Jenks and W.J. Lauck[11] that the "old immigration," i.e., immigrants from Northern and Western Europe who made up ninety-five percent of the immigrants coming to the United States before 1883, was much easier to assimilate than the "new immigration," i.e., immigrants from Eastern and Southern Europe who made up eighty-one percent of

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[11] The Immigration Problem, (New York: Funk and Wagnals Co., 1912), pp. 24-32.

the immigrants from 1883 to 1907, because the former contained a smaller proportion of unskilled workers and a larger proportion of skilled workers than the latter. The analysis of Table 1, however, shows that this was not true, for the percentage of both professional and skilled among the foreign-born increased during the period of new immigration. If the new immigrants were only half as skilled as the old, one would have expected the ratio to fall and not to rise. Although my data does show a rise in the number of unskilled and semiskilled from 1890 to 1910, the figures for the latter are not much higher than in 1870 or in 1880 and the figures for 1900 are lower. In addition, if one adds to the unskilled and semiskilled the number of farmers who represent mostly unskilled peasants, he obtains the series 72.3, 72.2, 68.5, 66.9, 65.3, 63.31, and 54.4 for the percentage of gainfully occupied males that they represented at the censuses from 1870 through 1930. The corresponding figures for females are 91.3, 90.5, 90.9, 87.2, 87.2, 83.4, 74.8, and 69.6. This would tend to show that even the proportion of unskilled plus semiskilled declined during the period of the new immigration.

As Paul Douglas[12] points out, the major mistake of Jenks' and Lauck's comparison is that it compares the occupational distribution of the old immigration with that of the new immigration during the period 1899-1909 when the latter was the

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[12]"Is the New Immigration More Unskilled than the Old," Publications of the American Statistical Association, 16 (March, 1919), pp. 393-401.

major source of immigration into the United States instead of comparing their respective occupational distributions for periods during which each of them was the major source of immigration. By comparing the occupational distribution of the old immigration for the period 1871-1882, when it was the major source of immigration, with the occupational distribution of the new immigration for the period 1899-1909, when the latter was the major source of immigration, Douglas finds that the percentage skilled among immigrants for whom an occupation was reported was 22.9 and 18.1 for the old and new immigration, respectively. The new immigration was, therefore, eight tenth as skilled as the old and not, as was found by Jenks and Lauck, one half as skilled as the old.

In their calculations both Douglas and Jenks use the occupations that the immigrants followed in the countries of emigration. However, what is important from the stand point of how easy it was to absorb immigrants into the economy is what they did when they settled here. It is exactly this that my data on the occupations of the foreign-born indicate, and from them we see that the new immigration was actually more skilled than the old. The next section presents an estimate of the occupational distribution of immigrants for each decade from 1870-1930 that is based on the occupations that they adopted after settling in the United States. It will then be possible to see just how much more skilled was the new immigration than the old.

Occupational Distribution of Gainfully Occupied Immigrants, 1870-1930

As is more fully explained in the Appendix, the occupational distribution of white immigrants presented in Table 2 was derived from the census data on the occupations of the foreign-born whites by applying forward census survival ratios to the occupational distribution of foreign-born whites cross classified by five year age intervals from the age of ten to sixty-five and an open end interval of sixty-five and over and by sex. A forward census survival ratio tells us the fraction of persons in a particular age-sex group enumerated in a given census who are expected to be counted at the following census. Thus, for example, by applying such a ratio to the number of persons in a particular occupational group of a given sex in age interval 40-44 at, let us say, the 1870 census, one obtains the number of these persons who would be counted at the next census, i.e., the census of 1880, to be in age interval 50-54. If we then subtract these survivors from the number of persons of the same sex reported in the age interval 50-54 at the 1880 census, we obtain an estimate of the number of immigrants who entered that occupation in the 1870-1880 decade and who were in the age interval 50-54 at the census of 1880. If this is done for both males and females and for all age intervals, then we would have an estimate of net immigration of gainfully occupied persons for the 1870-1880 decade cross classified by age, sex, and occupational group. Using this procedure I derived such estimates for

TABLE 2.- Percentage net foreign born white gainfully occupied immigrants per decade in each occupational group by sex, 1870 - 1930[a]

Occupation	Sex	Percentage in each occupational group					
		1870 -1880[b]	1880 -1890[b]	1890 -1900	1900 -1910	1910 -1920	1920 -1930
Professional	Total	2.2	2.3	3.0	2.5	4.7	11.0
	Male	2.0	2.2	2.4	1.9	3.3	10.4
	Female	3.0	3.0	4.9	4.8	10.4	12.0
Proprietors, managers, and officials	Total	19.9	12.5	6.3	5.0	-2.7	-2.2
	Male	24.7	15.2	7.4	5.9	-2.9	-3.6
	Female	2.1	1.4	2.4	1.5	-1.6	0.0
Clerks	Total	3.7	5.4	8.1	7.4	20.2	35.7
	Male	4.1	6.4	8.2	6.9	15.4	36.8
	Female	2.1	3.2	7.8	9.4	39.8	34.0
Skilled workers and Foremen	Total	10.7	16.5	13.1	15.4	27.0	24.3
	Male	13.2	20.2	16.4	18.8	33.2	39.6
	Female	1.3	1.2	2.2	2.2	2.4	0.0
Semiskilled and unskilled workers	Total	63.3	62.8	69.5	69.8	50.5	31.2
	Male	55.9	56.1	65.5	66.6	50.9	17.0
	Female	91.9	91.0	83.0	81.9	49.0	53.8
Total[c]	Total	100.0	100.0	100.0	100.0	100.0	100.0
	Male	100.0	100.0	100.0	100.0	100.0	100.0
	Female	100.0	100.0	100.0	100.0	100.0	100.0

[a] Calculated from data in Table 12.

[b] Includes nonwhites.

[c] Totals may not add up to 100 due to rounding errors in Table 12 and in this table.

every decade from 1870-1930. They are presented in Table 12 which is contained in the Appendix.

In the last section it is shown that, on the basis of an analysis of the occupations of the gainfully occupied foreign-born whites shown in Table 1, the so-called "new immigration" was more skilled than the so-called "old immigration." The estimates of Table 2 support that conclusion because from them we see that the net immigration of skilled workers during the decade of old immigration of 1870-1880 constituted only 10.7 percent of the total net immigration of gainfully occupied foreign-born immigrants while during the 1900-1910 decade, which represented the height of the new immigration, they constituted 15.4 percent. The percentage professional was about the same for the two decades--2.2 and 2.5, respectively. Although the percentage semiskilled plus unskilled did rise from 63.3 for the 1870-1880 decade to 69.8 for the 1900-1910 decade, it was due entirely to the drop in the percentage of proprietors, managers, and officials. Since, as can be seen from Table 1, this was due to a drop in the percentage of farmers, who were generally unskilled, it does not represent a genuine increase in the proportion of unskilled among the new immigrants as opposed to the old. Jenks' and Lauck's statement, therefore, that the old immigration was much easier to assimilate than the new because it contained a larger proportion of skilled than the new is incorrect, for, as we see, the opposite was the case.

CHAPTER III

EFFECTS OF SKILL UPGRADING ON THE CAPITAL VALUE OF IMMIGRANTS, 1870-1930

Introduction

In this chapter, I present an estimate of the magnitude of the value of the human capital that the United States received free of charge from the net immigration of adult immigrants, i.e., immigrants ten years old and over, from 1870 to 1930. This magnitude was derived by valuing these immigrants in terms of their worth as productive assets with earnings over time. The capital value of children under ten years of age was excluded because their cost of rearing, education, and training was to a large degree borne by the United States. Although the leaving out of these children gives a downward bias to my estimates, because part of the costs incurred in their raising were borne by the countries of emigration, it is largely offset by the fact that part of the cost of rearing, educating, and training of children ten years old and over was borne by the United States.

The nonmarket contribution of immigrants to the social, cultural, and political life of the United States was neglected not because it is unimportant but because it was impossible to assign to it a market price. Furthermore, the immigrants' capital value was calculated gross of consumption because in a

free society personal consumption is viewed as a final social good and not as an intermediate one in the process of production. In addition, a net figure would be meaningless because their earnings either go to them or to their heirs and would, therefore, be equal to zero unless the taxes of the immigrants were greater than the free government services they received. A gross figure, on the other hand, has meaning, for it measures their contribution to the gross national product of the United States.

The reason for beginning with 1870 is that, as was explained in the last chapter, it was impossible to get the occupations of immigrants after entering the United States for the period preceding 1870. Consequently, it was, therefore, impossible to get an estimate of the future earnings of those immigrants who came here before that date. The year 1930 was chosen as the terminal year because the restrictive immigration laws passed in the early 1920's curtailed immigration to such an extent that its contribution to the labor force became negligible.

Part of the earnings of immigrants after they came to the United States was due to the fact that, since the United States was a land of opportunity for the new comers, it enabled them to enter more rewarding occupations than those which they followed in the countries of emigration. Providing such an opportunity to immigrants, therefore, raised the value of the free human capital that the United States received via immigration. The extent of such skill upgrading of the occupational

distribution of net immigration into the United States from 1870-1930 is estimated in the latter half of this chapter. I also estimated the maximum effect that such skill upgrading had on the capital value of net immigration during this period.

Method Used to Calculate Net Capital Value of Immigration into the United States Per Decade, 1870-1930

The capital value of an immigrant is equal to the discounted value of his earnings while he is in the United States. Given an immigrant of age a who intends to reside in the United States for the rest of his life, the capital inflow (c) caused by his coming here is given by

$$(1) \quad c = \sum_{n=a}^{\infty} (Y_n P_a^n)/(1+r)^{n-a}$$

where Y_n are his earnings at age n, P_a^n is the probability of his surviving to age n, and r is the rate of discount.[1]

Since the capital value of immigrants who are not gainfully occupied is equal to zero, the net capital value of adult immigrants per decade from 1870 to 1930 can be estimated by calculating the capital value of the net immigration per decade of gainfully occupied workers ten years of age and over shown in Table 12. If it is assumed that the capital value of an immigrant in a certain age interval is the same as that of an

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[1]Burton A. Weisbrod, "Valuation of Human Capital," Journal of Political Economy, 69 (October, 1961), pp. 426-27.

emigrant in that age interval, then for any decade the net capital value of net immigration (C) is given by

$$(2)\quad C=\sum_{j=1}^{5}\left\{I_j\sum_{n=\bar{a}}^{i}\bar{Y}_{nj}P_{\bar{a}}^{n}L_{nj}\frac{1}{(1+r)^{n-\bar{a}}}-E_j\sum_{m=\bar{e}}^{i}\bar{Y}_{mj}P_{\bar{e}}^{m}L_{mj}\frac{1}{(1+r)^{m-\bar{e}}}\right\}$$

where j is the occupational group of Table 12; Y_{nj} is the average annual earnings of immigrants in occupation j totalled over the appropriate five year period, i.e., the five year period during which they are in age interval i; I_j is the total number of gainfully occupied immigrants during the decade in the jth occupational group summed over all age intervals for which net immigration of such persons was positive; $\bar{a}$ is the midpoint of the mean age interval of these immigrants; $P_{\bar{a}}^{n}$ is the probability of their surviving to age interval i; L_{nj} is the proportion of them who will still be in occupation j at age interval i; r is the rate of discount; E_j is the total number of emigrants in the jth occupational group during the decade summed over all age intervals for which net immigration was negative; $\bar{e}$ is the midpoint of the mean age interval of these emigrants; $\bar{Y}_{mj}$ is the sum of the mean annual incomes that they would have had in the years during which they are in age interval i had they stayed in the United States; $P_{\bar{e}}^{m}$ is the probability of their surviving to age interval i; and L_{mj} is the proportion of them that would have still been in occupation j at age interval i.

The values of I_j, E_j, $\bar{a}$,[2] and $\bar{e}$ were calculated from the data of Table 12. The estimated five year survival ratios for the foreign-born white population of the United States by sex for the periods 1870-1880, 1880-1890, 1890-1900, 1903-1907, 1913-1917, 1923-1927, 1930-1935, and 1935-1940 of Kuznets and Rubin[3] were used as the values of $P_{\bar{a}}^{n}$ and $P_{\bar{e}}^{m}$ for

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[2]The midpoint of the open end interval sixty-five and over was derived from the age distribution by five year age intervals for the total foreign-born white population by sex by the following method: First it was assumed that the labor force participation rate for males and females in age intervals 65-69, 70-74, and 75 and over at each census from 1880 through 1920 was the same as in 1930. It was then further assumed that all gainfully occupied persons 75 and over in 1930 were less than 85. I then used the labor force participation rate for this group in 1930 to get the number in this group for the other census. By multiplying the number of persons in each of these age groups by the midpoints of these respective age groups, and then taking the average age, I obtained an estimate of the midpoint of the interval 65 and over. Since I felt that due to the increasing retirement rate at the higher ages the midpoints were too high estimates of the average age in each group, I used a figure that was one less than the one derived by the above method.

My reason for using the mean age interval instead of the median one is that both the mean and the capital value of a group of immigrants is affected by the fact that there may be more persons in the 50-54 age interval than in the 60-64 one. The median, on the other hand is not affected by such variations.

Finally, I used the midpoint of the mean age interval and not the calculated mean value so as to conform to Kuznets' survival ratios which are for persons distributed, with the exception of the effects of mortality, evenly over the five year age intervals.

[3]Simon Kuznets and Ernest Rubin, Immigration and the Foreign-Born (New York: National Bureau of Economic Research, Occasional Paper 46, 1954), Table B-2.

the years 1875-1940. Since after 1940 the life tables of the foreign-born white population and for the total white population of the United States seem to converge,[4] survival ratios based on the official life tables of the latter for the years 1946, 1950, 1955, 1960, and 1965 were used as values of $P_{\frac{n}{a}}$ and $P_{\frac{m}{e}}$ for the years after 1940. The basic assumption that was made in using these ratios is that they were the same for persons in the various occupational groups and that the ratios for the entire male or female foreign-born white population were the same as those for foreign-born white gainfully occupied males or females in the specified occupational groups. However, since the work a person does, the conditions of work, and the wage rate he receives to a large extent determine his standard of living, a person's occupation is, therefore, one of the most important factors in deciding his health and consequently his life expectancy. With the exception of agricultural workers, a social economic grouping of gainfully occupied males ages 15-64 in ten selected states in 1930, which is the same as the one used in Table 12, shows that the lower one is on this scale the higher is the standardized death rate for his group. The standardization death rate was almost twice as high for unskilled workers (except agricultural workers) as for professionals.[5]

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[4]Everett S. Lee, "Migration Estimates," in Population, Redistribution, and Economic Growth, United States, 1870-1950 (Philadelphia: The American Philosophical Society, 1957), I, p. 55.

[5]Louis I. Dublic & Alfred J. Lotka, Length of Life: A Study of the Life Table (New York: The Ronald Press Co., 1936), 221-23.

The error introduced by my procedure is, therefore, negative because the life expectancy of professionals will be underestimated while the one for the unskilled will be overestimated, but since the former earn more than the latter, the income stream earned by immigrants will be underestimated. Part of this error will be cancelled out by the fact that the income stream of emigrants will also be underestimated, but since the period under consideration was one of heavy net immigration, the error will be negative. The fact that the unskilled are much more numerous than the number of professionals and skilled does not affect the results because that means that the average survival ratios used are closer to the true survival ratios for the unskilled than for professionals or skilled workers. The reason being, each group affects the average according to its size.

As for the error introduced by applying survival ratios for the population in general to the gainfully occupied, it is slight and in the negative direction. Although there is no adequate information available concerning the differences in mortality rates of workers and nonworkers, it may be assumed that persons outside the labor force have a higher mortality because they include a relatively higher proportion of persons suffering from illness or serious disability. Since the retirement rate among males remains quite low until the late fifties and evidence from railroad workers shows that mortality rates for workers and nonworkers are not much different, the

error as far as males are concerned is slight.[6] In the case of females it may be greater because not such a great percentage of them is in the labor force but since the number of gainfully occupied females is small relative to the number of males, the error in the total estimate is slight.

Derivation of the Values of L_{nj} and L_{mj}

The values of L_{nj} and L_{mj} were derived by assuming that they were the same as for the foreign-born white population at the end of the respective decade. Thus,

$$(3) \quad L_{nj} = (O_{nj} / O_{\bar{a}j})(P_{\bar{a}} / P_n)$$

and

$$(4) \quad L_{mj} = (O_{mj} / O_{\bar{e}j})(P_{\bar{e}} / P_m),$$

where O_{mj} and O_{nj} are the number of foreign-born whites of occupation j in age intervals m and n, respectively; $O_{\bar{a}j}$ and $O_{\bar{e}j}$ are their number in age intervals $\bar{a}$ and $\bar{e}$, respectively; and $P_{\bar{a}}$, P_n, $P_{\bar{e}}$, and P_m are the total number of foreign-born white males or females in the respective age intervals. Equations (3) and (4) tell us the proportion of persons of occupation j in age interval $\bar{a}$ or $\bar{e}$ who would be in that occupation when they reached age interval i in a situation where the total population remained the same, i.e., if the survival

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[6] Bureau of Labor Statistics, Tables of Working Life: Length of Working Life for Men, Bulletin No. 1009, (August, 1950), p. 63.

ratio were one. They account for changes in the number of persons of the original cohort of age $\bar{a}$ or $\bar{e}$ when going from one age interval to another caused by persons entering or leaving the occupation for reasons other than death.

Determination of r

In order to convert the future earnings of immigrants into a capital flow per decade it is necessary to have an appropriate rate of discount. Since these earnings take place over a long period of time and represent a free import of human capital by the United States, the appropriate rate is one at which the United States would have had to pay if it had wanted to borrow funds for long periods of time. Thus, I should have used the interest rate on long term United States government bonds. However, from 1863 to 1918 the market yield on United States government bond must be disregarded as guide to long term interest rates in the United States because during this period national banks bought them at low yields so as to secure circulation and later this was reenforced by Treasury purchases at large premiums. For this period there is, however, Fredrick R. Macaulay's New England municipal bond index which is a good guide to the interest rate on high grade bonds for the period. For the 1910-1920 decade there is also the yield on prime long-term corporate bonds which are the best description of the yields of long-term United States bonds in the twentieth century.[7] From 1870-1910 I, therefore, used

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[7]Sidney Homer, A History of Interest Rates (New Brunswick, New Jersey: Rutgers University, 1963), pp. 285-91; 332-52.

Macaulay's index, from 1910-1920 the yield on prime long-term corporate bonds, and from 1920 on the average yield on long-term United States government bonds. I then used equation (2) to discount the income stream produced by the immigrants over time. This was done by assuming it was all produced at the midpoint of the particular five year interval and then discounting in steps of five years. The r used was the average of the above mentioned interest rates for the decade of immigration.

Derivation of the $\bar{Y}_{nj}$ and $\bar{Y}_{mj}$ Values

However, in order to calculate the capital value of immigrants by means of equation (2), I needed an annual series on earnings of immigrants and emigrants in each of the j occupational groups. This was necessary in order to get the values of $\bar{Y}_{nj}$ and $\bar{Y}_{mj}$ which are the average annual earnings of immigrants and emigrants, respectively, totalled over the appropriate five years. This was done by assuming that the average annual earnings of emigrants had they remained in the United States would have been the same as those of immigrants, or that $\bar{Y}_{nj} = \bar{Y}_{mj}$. It was then further assumed that the average annual earnings of immigrants in any occupational group were the same as the average annual earnings of all persons in that occupation. This should, however, not cause any significant upward bias in my estimate of the capital value of immigrants because even though there might have been

discrimination against immigrants which would cause their average income to be below that of the total population, it could only take one of these two forms--immigrants may be denied entrance into high paying occupations or immigrants in any particular occupation may be paid less than other persons in that occupation.

The fact that immigrants may be denied entrance to high paying occupations will not cause any upward bias in my estimates because it will be reflected in having immigrants concentrated in the low paying occupations of Table 12. As for the possibility that immigrants were paid less than other workers in an occupation, the Immigration Commission, after studying the racial composition of more than a half a million wage earners in mines and manufacturing, found no evidence to indicate that employers paid recent immigrants wages that were lower than those prevailing at the time of their employment and in the industry in which they were employed.[8]

The average annual earnings by sex of persons in each of the occupational groups of Table12 of the Appendix for the years 1875-1964 were obtained by the following method: First I derived annual estimates of the wage and salary income per fulltime equivalent worker for each occupational group. I then multiplied these estimates by the estimated average rate of unemployment for the respective years, which gave me the

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[8]Isaac A. Hourwich, Immigration and Labor (New York: G.P. Putnam's Sons, 1912), p. 288.

average annual earnings of gainfully occupied males and females in these occupational groups.

Average Annual Earnings of Employed Persons By Occupation and Sex, 1875-1970

The average annual earnings of employed persons by sex in each occupational group of Table 12 for the period 1875-1970 were estimated by the following method.

The Bureau of the Census'[9] series on the mean total income by sex and major occupational group for the years 1947-1964 was recomputed so as to be comparable with the occupational classification of Table 12. The Census' occupational groups professional, technical, and kindred workers and craftsmen, foremen, and kindred workers are comparable with the groups professional and skilled workers and foremen of Table 12. The Census' figures for these groups could, therefore, be used directly except that in the case of professionals for the years 1947-1949 the Census series broke them into two groups--professional and semiprofessional. These two were combined by using the total employed in them for the respective years as weights. However, in combining the Census' groups farmers and farm managers with managers, officials, and proprietors, except farm to get the Table 12 group proprietors, managers and officials, I used as weights the number of gainfully occupied foreign-born whites in these occupations at the census of 1930. The same weighting method was used in combining

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[9] Trends in Income of Families and Persons in the U.S., 1947-1964. Technical Paper No. 17 Wash.,D.C., (U.S. Government Printing Office, 1967), Table 38.

clerical and kindred workers with sales workers to obtain clerks and kindred workers of Table 12 and in combining operatives and kindred workers with service workers, except private household, private household workers, farm laborers and foremen, and laborers except farm and mine to obtain the group unskilled and semiskilled workers of Table 12.

This weighting procedure was used instead of using as weights the number of persons reported by the census to be in these occupations from 1947-1964 because the occupational distribution of the immigrants from 1870-1930 was more nearly like that of the foreign-born of 1930 than of the total white population of the United States from 1947-1964.

In the case of male private household workers; female farmers; farm laborers; and laborers, except farm and mine, the Census' series gives no mean total income because the base was less than two hundred thousand. The same is true of female craftsmen and kindred workers for the years 1947-1959. In the latter case it was assumed that the relationship between male and female earnings of craftsmen was the same for 1947-1959 as from 1960-1964. In the case of female farmers and farm managers it was assumed that for the years 1947-1964 the female/male earnings ratio was the same as for managers and officials, except farm. The earnings of male private household workers were estimated by the average ratio of the earnings of such female workers divided by female earnings of service workers, except private household, from 1947-1964. Similarly, the earnings of female farm laborers and laborers, except farm, were derived

by using the average ratio of male farm laborers' earnings divided by the earnings of service workers, including private household, and the average ratio of the earnings of laborers, except farm, divided by the earnings of service workers, including private household, respectively. Since the above ratios did not differ greatly from year to year, and since the number of persons in these groups was small, the above estimate should not introduce any significant error.

Although, in addition to wages, interests, rents, and profits, the above series on total money income includes transfer payments such as welfare payments, social security benefits, unemployment insurance, and pensions,[10] it does not differ to any significant extent from total earnings because the amount of such income received by employed persons is very small. In addition, it did not become significant until the late 1930's. It, therefore, can't affect my results to any signficant degree.

The series was traced back to 1875 by assuming that from 1928-1947 it had the same annual rate of movement as Albert Rees'[11] series on the total compensation of production workers in manufacturing. Because his series includes both the basic wage and supplementary benefits, it is a closer

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[10] Ibid., p. 38.

[11] New Measures of Wage-Earner Compensation in Manufacturing, 1914-1957 (New York: National Bureau of Economic Research, Occasional Paper No. 75, 1960), p. 3.

approximation to total earnings than is the average hourly earnings series of the Bureau of Labor Statistics which does not include supplementary benefits. The series was traced back to 1889 by assuming that from 1889-1926 it had the same annual rate of movement as Paul Douglas'[12] series of average annual earnings in all industries, and that from 1889-1890, its movement was the same as that of his series on the annual earnings in all manufacturing industries.

Finally, my series on annual earnings by sex and occupation was traced back to 1875 by assuming that it had the same annual rate of movement as the average annual earnings series which I constructed for the period 1869-89. The latter was constructed by the following method. I took Clarence D. Long's[13] estimates of average annual earnings in all census industries for the census years 1869, 1879, 1889 as benchmarks. The intercensal values were derived by assuming that the annual earnings had the same general movements during each decade as his annual series of the average hourly earnings in manufacturing and that any differences in the movements of the two over a decade were distributed evenly over the years of the decade in question.

Thus, for example, average annual earnings for the census years 1889 and 1879 were $445 and $346, respectively.

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[12] Real Wages in the United States, 1890-1926, (New York: Houghton Miflin Company, 1930), Tables 84 and 147.

[13] Wages and Earnings in the United States, 1860-1890 (Princeton: Princeton University Press, 1960), Tables 14 and A-11.

The 1889 figure of $445 was traced back to 1879 on the assumption that it had the same rate of movement during the decade as the aforementioned average hourly wage rate series. This procedure yielded a figure of $371 for the year 1879 which was $24 greater than the actual figure of $347. It was then assumed that the error of $24 occurred evenly over the course of the decade or at an annual rate of $2.40 per year. I, therefore, subtracted $2.40 from the estimate for 1888, $4.80, i.e., 2X$2.40, from the one for 1887, $7.20, i.e., 3X$2.40, from the estimate for 1886, and finally, $24, i.e., 10X$2.40, from the estimate of $371 for the census year 1879. This gave me an annual series of annual earnings consistent with the bench mark values. By repeating the above procedure for the 1869-79 decade, I obtained a series on the annual earnings for the period 1875-89.

The implicit assumption inherent in the above procedure of tracing the earnings data by occupation of 1947 back to 1875 is that the occupational wage differentials between the various occupational groups of Table 12 remained constant over the entire period. This assumption, however, is incorrect because from 1907 to 1947 the occupational wage differential between skilled and unskilled workers narrowed significantly. In 1907 the ratio of skilled to unskilled wages was equal to two while in 1947 it was only 1.50.[14] The assumption is,

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[14]Harry Ober, "Occupational Wage Differentials, 1907-1947," Monthly Labor Review, 67 (August, 1948), p. 130.

however, correct for the period before 1890 because if one compares the wage differentials between skilled and unskilled workers for the available wage surveys for the period 1860-90, one finds a lack of trend.[15]

My procedure, therefore, tends to understate the annual incomes of the skilled and to overstate those of the unskilled. If the proportion of unskilled among immigrants were the same as for the total population, then my resulting capitalized value of the future income stream of immigrants would be unaffected because the two errors would cancel each other out, but since the proportion of unskilled among immigrants was greater than for the rest of the population, the use of average wage rates which are based on the total population to trace back the occupational earnings has an upward bias on my estimates.

Another implicit assumption in my use of the average hourly earnings to trace back the annual earnings series is that differences in the length of the working day did not affect the relation between hourly earnings and annual earnings over time. This assumption is justified because both Rees' and Long's average hourly series used were derived by first finding average daily earnings and then dividing them by the average number of hours worked. Changes in the length of the working day are, therefore, reflected in the average hourly earnings series of both Long and Rees.

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[15]Robert Ozanne, "A Century of Occupational Differentials in Manufacturing," Review of Economics and Statistics, 44 (August, 1962), pp. 292-94.

Estimates of Unemployment Rates, 1871-99

The income estimates derived by the method described in the previous section were for employed persons because the earnings data for the period 1947-64 were for employed persons. In addition, none of the series used to trace the earnings data for 1947 back to 1875 took account of unemployment. Long's and Rees' series on average hourly earnings obviously do not take unemployment into account and the average annual earnings of Long and Douglas measure "the relative progress of those who continue to be employed by industry."[16] It was, therefore, necessary to have annual estimates of unemployment rates from 1875-1964 before I could calculate the $\bar{Y}$'s of equation (2) which measure earnings of gainfully occupied persons some of whom are unemployed during the course of a year.

For the years 1900-1954 I used the annual unemployment rates as given by Stanley Lebergott[17] which are consistent with the official unemployment figures that are available since 1940. The figures for 1955-64 were obtained from the Bureau of Labor Statistics.[18] However, there are no annual unemployment

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[16] Douglas, op. cit., p. 403.

[17] "Annual Estimates of Unemployment in the United States, 1900-1954," in The Measurement and Behavior of Unemployment (Princeton University Press for the NBER, 1957), pp. 215-16.

[18] Employment and Earnings, 12 (June, 1966), p. 23.

estimates for the period before 1900. It was, therefore, necessary to estimate them on the basis of the available annual series on hourly wage rates in manufacturing.

As in the case of any other commodity, if the demand for labor is high, i.e., unemployment rate low, then the wage rate should rise at a faster rate than when the demand for labor is low, i.e., unemployment rate high. One should, therefore, expect to find an inverse relation between annual percentage changes in the average hourly wage rate and the rate of unemployment. Such a relation has been found to be true for the United Kingdom by A.W. Philips[19] for the period 1861-1957 and by L.R. Klein and R.J. Ball[20] for the years 1948-56.

Chart 1 shows the relation between the annual percentage change in Albert Rees'[21] average hourly earnings in manufacturing series from year t-1 to year t and Stanley Lebergott's estimate of the rate of unemployment in year t with t going from the year 1901 through 1914. As can be seen from the chart, there does exist an inverse relation between the two

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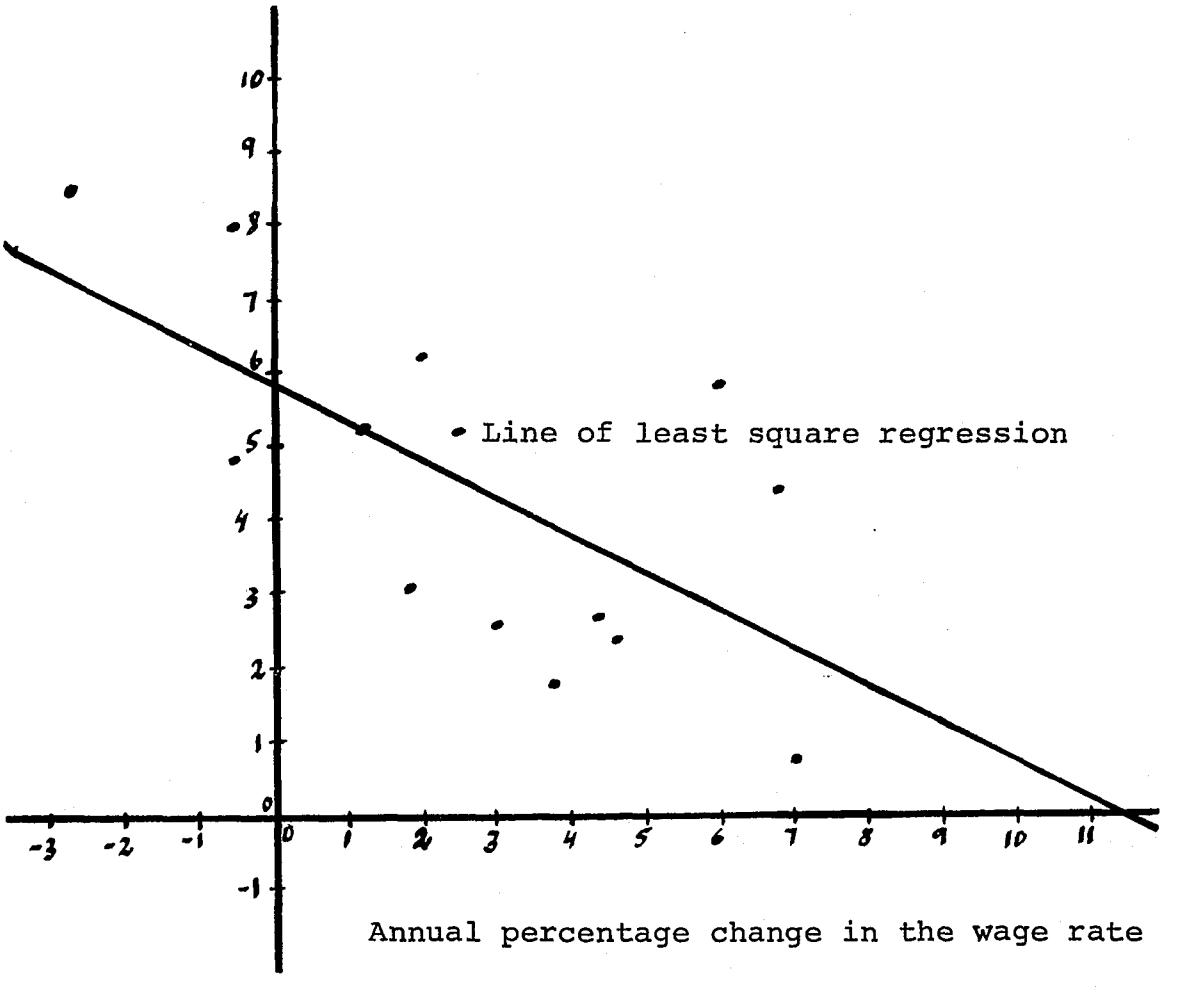
[19] "The Relation Between Unemployment and the Rate of Change of Money Wage Rates in the United Kingdom, 1861-1957," Economica, New Series, 25 (November, 1958).

[20] "Some Econometrics of the Determination of Absolute Prices and Wages," Economic Journal, 69 (September, 1959).

[21] Real Wages in Manufacturing, 1890-1914 (Princeton: Princeton University Press, 1961), Table 10.

Chart 1 - Relationship between annual percentage changes in the wage rate and the Rate of Unemployment in the United States, 1900-1914



variables, and the straight line fitted by the method of least squares appears to be as good a fit as any other type of curve. The equation of the fitted line is

$$u_t' = 5.7536 - 0.4897\, p_w \tag{5}$$

where u_t' is the percent of the labor force that is unemployed in year t and p_w is the percentage change in the average hourly wage rate in manufacturing from year t-1 to t.

Although the coefficient of correlation between the two variables is significant at the one percent level of significance, it is equal to only -0.6588, and consequently the coefficient of determination is only 0.4340. Hence, only about forty-three percent of the variation in the rate of unemployment is explained by the linear relation expressed in equation (5). Almost fifty-seven percent of the variation in the annual rates of unemployment is not explained by equation (5). However, for the purposes of finding the effect unemployment had on the future income stream of immigrants, unemployment rates estimated by means of equation (5), which are shown in Table 3, are sufficiently accurate because the errors involved will sometimes be positive and sometimes negative and will, therefore, tend to cancel each other out. The Standard error of estimate is equal to 1.7, and one must keep it in mind when looking at the unemployment rates of Table 3. They were derived by using the percentage change per year in Long's[22] average hourly earnings

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[22] op. cit., Table A-11.

series as the p_t's for the years 1870-1890. For the years 1891-1899, the aforementioned average hourly earnings series by Rees was used. The 1889 value of 5.4 and the 1890 value of 51. seem to be in line with the 5.1 percent rate of unemployment for the census year ending May 31, 1890 that was calculated by Long from the unemployment data of the 1890 census.[23]

TABLE 3

ANNUAL ESTIMATES OF UNEMPLOYMENT IN THE UNITED STATES, 1871-1899

Year	Unemployment Rate	Year	Unemployment Rate
1899	2.5%	1884	5.1%
1898	6.9	1883	4.3
1897	7.1	1882	4.7
1896	3.6	1881	4.0
1895	6.1	1880	4.2
1894	9.6	1879	6.5
1893	3.7	1878	7.2
1892	5.4	1877	7.5
1891	5.8	1876	6.9
1890	5.1	1875	7.1
1889	5.4	1874	7.7
1888	5.4	1873	5.1
1887	3.7	1872	5.4
1886	5.1	1871	5.1
1885	6.8		

Since Lebergott's unemployment rates are for persons fourteen years of age and over, the estimates of Table 3 are for the same age range. However, the data of Table 12 show net immigration of gainfully occupied persons ten years of age and over. The use of these unemployment estimates is, therefore,

[23] Ibid., p. 47 note 13.

not strictly correct, but due to the fact that children 10-13 years of age made up only a small percentage of the labor force, the error introduced is negligible. On the other hand, the use of the average unemployment rates underestimates the true level of unemployment among immigrants because the percentage of immigrants in semiskilled and unskilled occupations was greater than for the rest of the population, and the latter have above average unemployment rates. In addition it might have taken a while for newly arrived immigrants to find jobs, and discrimination against immigrants would also cause their unemployment rates to be above average. My use of the average rate of unemployment, therefore, causes an upward bias in my estimates of the capital value of immigrants, for it causes their future income stream to be overestimated.

Capital Value of Net Immigration into the United States, 1870-1930

In Table 4 are presented my estimates of the capital value of net immigration of foreign-born white persons ten years old and over into the United States for the period 1870-1930. The estimates were derived by centering the net immigration of gainfully occupied immigrants shown in Table 12 at the middle of each decade and then using equation (2) to calculate their capital value.

From Table 4 one can see that the amount of human capital that the United States received free of charge from the emigrating countries of Europe during the sixty year period from 1870-1930 was substantial. Thus, the total capital value

TABLE 4

CAPITAL VALUE OF NET IMMIGRATION INTO THE UNITED STATES BY SEX AND NET CAPITAL FORMATION IN THE UNITED STATES, PER DECADE, 1870-1930

Decade[b]	Capital Value of Immigrants in Millions of Dollars			Net Capital Formation in Billions of Dollars[a]	Capital Value as Percent of Net Capita Formation
	Total	Male	Female		
1870-1880	3,554.0	3,288.2	265.9	8.8	40.9
1880-1890	10,444.4	9,951.9	492.5	12.8	81.3
1890-1900	10,318.7	9,504.0	813.2	16.2	63.6
1900-1910	32,297.0	29,575.6	2,721.5	27.6	117.0
1910-1920	20,294.9	19,009.9	1,285.0	42.8	47.4
1920-1930	32,834.4	29,273.0	3,561.4	84.6	38.8
Total	109,742.0	100,602.5	9,139.5	192.8	56.9

[a]Calculated from Simon Kuznets, Capital Formation in the American Economy (Princeton: Princeton University Press, 1961), Table R14, p. 524. I took his average per decade and multiplied it by ten.

[b]In case of net capital formation the decades are 1869-1878, 1879-1888, etc..

net immigration during this period was equal to 109.7 billion dollars or 56.9 percent of the net capital formation that occurred during this period. During the 1900-1910 decade the amount of human capital the United States received actually exceeded net capital formation by 17.0 percent. As was discussed in Chapter I, the importance of this tremendous inflow of human capital to the economic growth of the United States is difficult to exaggerate.

Unfortunately, it is impossible to compare the above estimates of the amount of free human capital received by the United States via immigration with the amount of foreign aid that underdeveloped countries receive at present. The reason for this being, while foreign aid is valued in terms of the cost to the giving country, the estimates of Table 4 represent the capitalized value of the contribution that the immigrants made to the gross national product of the United States. From the point of view of trying to measure the impact of free capital inflows on the economic development of a country, my method of evaluation is, I believe, more pertinent because it tells us the effect that such an inflow had on the gross national product of the receiving country. All the cost method, on the other hand, tells us is the amount that the giving country gave away. It does not tell us what effect, if any, the capital inflow had on the gross national product of the receiving country.

Of course, present day underdeveloped countries could not use a large proportion of the free human capital that the

United States received because as can be seen from Table 5 most of it came in the form of unskilled laborers and farmers with whom these countries are blessed to such an extent that their marginal productivity is in many cases zero. However, this was not true in the case of the United States where capital stocks were growing faster than labor[24] and where land was abundant. Although present day underdeveloped countries could use the professional and skilled immigrants that the United States received, such persons do not want to go today to these countries. As a matter of fact, there seems to be a net emigration of such persons from these countries into the United States. Thus, the latter is still receiving free human capital of a form which it can use and is receiving it from countries that are poorer than it.[25] Unskilled immigrants, on the other hand, are kept out by our immigration laws except in special circumstances, such as the reuniting of families.

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[24]John W. Kendrick, Productivity Trends in the United States (Princeton: Princeton University Press, 1961), pp. 60-68.

[25]For a partial measure of this flow see: H.G. Grubel A.R. Scott, "The Immigration of Scientists and Engineers to the United States, 1949-1961," Journal of Political Economy, 74 (August, 1966), pp. 368-378. They measure the benefit to the United States in terms of money saved in not having to educate them. In addition, they also estimate the loss suffered by the countries of emigration.

TABLE 5

PERCENTAGE DISTRIBUTION OF OCCUPIED IMMIGRANTS INTO THE UNITED STATES BY OCCUPATION, 1870-1898 AND 1900-1929a

Occupational Group	Percent in Specified Group per Period					
	1870-79	1880-89	1890-98	1900-09	1910-19	1920-29
Professional	1.6	1.0	1.1	1.4	2.2	4.4
Commercial[b]	4.1	3.0	2.7	4.1	5.4	10.2
Skilled[b]	23.3	20.8	21.4	18.1	18.6	23.5
Farmers except farm laborers[c]	8.7	5.8	5.2	1.93	4.51	5.23
Servants, Laborers, and miscellaneous[b]	62.2	69.5	69.6	74.8	71.8	57.1
Total[d]	99.9	100.1	100.0	100.0	99.9	100.0

[a]Calculated from: United States Bureau of the Census, Historical Statistics of the United States, Colonial Times to 1957 (Wash., D.C., 1960), pp. 60-61.

[b]From 1900 onward Commercial consists of Clerical, sales and kindred workers, plus managers, officials, and proprietors, except farm; skilled consists of craftsmen, foremen, operatives, and kindred workers; and servants, etc., consists of private household workers; service workers, except private household; farm laborers and foremen; and laborers, except farm and mine.

[c]Assumed same proportion farmers in 1870-98 as the one given for immigrants from the United Kingdom by Brinley Thomas in Migration and Economic Growth (Cambridge; Cambridge University Press, 1954), Table 80, p. 268.

[d]Totals do not add up to 100.0 due to rounding errors.

When looking at the figures for the individual decades in Table 4, one has to bear in mind that part of the capital value for one decade is due to the fact that some immigrants who came during previous decades moved from one occupational group to another. This is picked up by my estimates of net immigration per decade shown in Table 12, and by the L_{nj}'s. The reason for this being that if an unskilled immigrant who came in in decade t becomes a skilled worker in decade t+1, will be enumerated by the census at the end of decade t+1 as a skilled foreign-born worker while at the census at the beginning of the decade, he will have been enumerated as an unskilled foreign-born worker. Since the estimates of Table 12 were derived by applying forward census survival ratios to the census data on the occupations of the foreign-born, he will show up as a skilled immigrant and an unskilled emigrant for the decade t+1.

Extent of the Upgrading of the Skills of Immigrants, 1870-1930

The extent to which immigrants improve their skills after entering the United States can be seen by comparing the occupational distribution of immigrants before they come to the United States, which is shown in Table 5, with the occupational distribution of immigrants after they come here, which is shown in Table 2. Unfortunately, a direct comparison between the occupational distribution shown in Table 5 with the one shown in Table 2 can only be made for professionals because the occupational groups of these Tables are not comparable.

However, by combining the commercial group with the farmers group in Table 5, one gets an occupational group that is comparable with the group that one gets by combining the group clerks with the group proprietors, managers, and officials of Table 2. The skilled group of Table 5 is not comparable with the skilled group of Table 2 because the former includes semiskilled operatives while the latter does not.

Table 6 shows the percentage of gainfully occupied immigrants that entered each of the shown occupational groups after coming to the United States, as given in Table 2, per the percentage of these immigrants in these occupational groups before coming to the United States, as given in Table 5. The skilled and foremen column was calculated by assuming that the proportion of skilled workers and foremen in the skilled group of Table 5, which, as was mentioned earlier, also contains semiskilled operatives, was the same as for the total number of foreign-born white gainfully occupied persons at the end of each respective decade. The latter ratio was derived by cominbing the skilled and semiskilled groups of Table 11, which is contained in the Appendix. Since for censuses before 1910, the data of Table 11 combine the semi-skilled with the unskilled, it was necessary to use the ratio for 1910 for the decades from 1870 through 1900. This procedure tends to overstate the proportion of gainfully occupied skilled workers and foremen among immigrants upon arriving in the United States because, judging by the results obtained in Table 6 for the professionals and the clerks and proprietors,

managers, and officials, there tends to be an upgrading of the skill level of the immigrants after they come to the United States. Immigrants upon arriving will, therefore, have a lower skilled/semiskilled ratio than the total foreign-born population of the United States. For this reason the skilled and foremen column of Table 6 represents a minimum index of upgrading of the skills of immigrants after settling in the United States.

TABLE 6

PERCENTAGE GAINFULLY OCCUPIED IMMIGRANTS IN EACH OCCUPATIONAL GROUP AFTER COMING TO THE UNITED STATES PER PERCENTAGE IN EACH RESPECTIVE OCCUPATIONAL GROUP BEFORE COMING TO THE UNITED STATES, 1870-1930

Decade	Occupational Group			
	Profes-sionals	Clerks, Managers & Proprietors, Officials	Skilled Workmen and Foreman	Semi-skilled & Unskilled Workers
1870-1880	1.4	1.8	1.0	0.9
1880-1890	2.3	2.0	1.8	0.8
1890-1900[a]	2.7	1.8	1.4	0.9
1900-1910	1.8	2.2	1.9	0.8
1910-1920	2.1	2.4	3.6	0.6
1920-1930	2.5	2.2	2.2	0.5
Mean	2.1	2.1	2.0	0.7

[a]Immigrant figures cover only nine year interval of 1890-1898.

From Table 6 it can be seen that the percentage of gainfully occupied workers among immigrants who become either professionals; clerks, proprietors, managers, and officials; or skilled workmen and foremen after settling in the United States is about twice as great as when they arrived here while the percentage who are semiskilled and unskilled is only about 0.7 as when they arrived. Thus, we see that although there was discrimination against aliens by unions, management, and various licensing procedures that kept aliens out of certain professions, such as medicine, law, engineering, pharmacy, and management,[26] the United States was still a land of opportunity for immigrants.

The greatest upgrading in the skill level of immigrants shown in Table 6 was made during the 1910-1920 decade and the least during the decade of 1870-1880. This is as might be expected because most of the former decade represents a time of war prosperity, rising real wage rates, and a shortage of labor during which the barriers of discrimination against immigrants are at their minimum while most of the latter decade was characterized by high unemployment, stagnant real wage rates, falling money wage rates, and depression at which time opportunities for advancement are smallest and discrimination against immigrants the greatest.

It would have had been very useful in the analysis of Table 6 to have been able to make the comparison of the

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[26] H. Fields, "Unemployment and the Alien," South Atlantic Quarterly, 30 (January, 1931), pp. 64-76, and "Where Shall the Aliens Work," Social Forces, 12 (December, 1933), pp. 213-21.

occupational distribution of immigrants before coming to the United States and after coming here not only for the total number of gainfully occupied immigrants but also for immigrants in different age groups. This would have had enabled me to see the amount of skill upgrading that occurred for immigrants in various age groups. Unfortunately, the official data of the occupations of immigrants in the countries of emigration are not classified by age. It was, therefore, impossible to see whether there was a cleavage between the occupational distribtuion of immigrants before and after coming to the United States at any particular age.

The implicit assumption in the construction of Table 6 is that the occupational distribution before coming to the United States was the same for immigrants as for emigrants. That enabled me to compare the occupational distribution of Table 2, which is for net immigration, with the one of Table 5, which is for gross immigration. However, emigration during this period was small when compared with immigration. In addition, noneconomic reasons that cause an alien to return, such as not liking life in the United States or going back to live with his relatives, should affect all groups in substantially the same way. As for economic reasons for leaving the United States, the fact that it is easier for a skilled immigrant to find employment here than for unskilled will cause the former to have a smaller emigration rate than the latter. However, the fact that the same is true in the country of emigration will tend to have the opposite effect. The two effects will, therefore, at the

least, partially cancel each other. For the above reasons it is unlikely that the skill distribution of emigrant aliens before coming to the United States differed to any great extent from the one immigrant aliens had in the countries of emigration. Finally, since there is such a marked degree of upgrading shown by the data of Table 6, we can be certain that it actually existed.

Effect of Skill Upgrading on the Capital Value of Net Immigration into the United States, 1870-1930

To see the effect of skill upgrading on the capital value of net immigration into the United States from 1870-1930, I calculated the capital value of net immigration during this period by assuming that the immigrants had the same occupational distribution after settling in the United States as they had in the countries of emigration. I, therefore, assigned to the total net immigration of gainfully occupied persons per decade from 1870-1930 shown in Table 12 in the Appendix the occupational distribution that these immigrants had in the countries of emigration shown in Table 5. Of course, before I was able to do that, I had to make the occupational classifications of the two tables comparable. Since Table 12 has the same occupational classification as Table 2, this was done in the same manner as was described earlier in the derivation of Table 6, which involved a comparison of the occupational classifications of Tables 2 and 5, with the exception that for the decades from 1890-1930, farmers were put into the semiskilled and unskilled group instead of the

commercial one, i.e., clerks and proprietors, managers, and officials.

The reason for making this exception is the fact that the average annual earnings of farmers and farm managers, i.e., farmers, were much lower than the average for the group proprietors, managers, and officials to which farmers belong. For example, in 1947 the average annual earnings of all male proprietors, managers, and officials were $4,037 while those of farmers and farm managers were only $2,790. On the other hand, the average annual earnings of unskilled and semiskilled males were $1,998. It can, therefore, be seen that farmers' earnings were much closer to the latter group than to those of proprietors, managers, and officials.

As can be seen from Table 11 in the Appendix, the number of foreign-born farmers fell during each decade from 1890-1930. The number of immigrants during this period, therefore, who became farmers after settling in the United States was negligible. This means that the group proprietors, managers, and officials of Table 2, which shows the proportion of immigrants who entered that occupational group after settling in the United States, consists almost exclusively of nonfarmers whose earnings, as we have seen are much greater than those of farmers. It would have, therefore, been a gross underestimate of the effect of skill upgrading on the capital value of immigrants to have included farmers in the group proprietors, managers, and officials. Since the average annual income of farmers was greater than that of the unskilled and semiskilled

group, my inclusion of farmers in the latter causes my estimates of the effect of skill upgrading on the capital value of immigrants to have an upward bias. However, because on the average from 1890-1930 only 3.4 percent of immigrants were farmers in the countries of emigration, the error introduced is small.

Using the method outlined above, I divided the total number of gainfully occupied immigrants during each decade from 1870-1930 shown in Table 12, according to the occupations they followed in the countries of emigration, into the occupational groups of Table 6. The total number of persons each occupational group during each decade was then given the same sex distribution as the one immigrants had in these groups after settling in the United States during these respective decades. This procedure resulted in my having too many gainfully occupied females and too few males because the percentage females among unskilled workers is greater than among other groups. The application of the occupational distribution of immigrants in the countries of emigration to the total number of gainfully occupied workers based on the occupations followed after settling in the United States results in having too many females because the latter contains a smaller proportion of unskilled than the former. To account for this, I transferred any excess females into the unskilled male group. Finally, since my income data were for clerks and for proprietors, etc., separately while the occupational classification of immigrants according to the occupations they

followed in the emigrating countries combines the two groups into the group commercial, I had to use the distribution of immigrants between these two groups after they settled here in order to separate the commercial groups into clerks and managers, etc., for the decades from 1870-1900.

From Table 7 it can be seen that $16.7 billion of the estimated $109.7 billion capital value of net immigration into the United States from 1870-1930 was due to the skill upgrading of the occupational distribution of immigrants that occurred after they came to the United States. Thus, the fact that the United States was a land of opportunity for immigrants which allowed them to move up the occupational ladder was responsible for about fifteen percent of the capitalized value of the future income stream of immigrants after they came to the United States. The relative effect of skill upgrading rises from 12.1 percent in the 1870-1880 decade to a peak of 21.5 percent from 1890-1900 and then drops to a low of 10.9 percent during the decade of 1920-1930. One can, therefore, see that during the period when the "new immigration" was at its peak, i.e., from 1890-1920, the relative effect of skill upgrading was the greatest. Thus, it would appear that the "new" immigrants were more successful in improving their skills than the "old" immigrants.

The increase in the capitalized value of his future income stream may be obtained by moving up the occupational ladder after coming to the United States is one of the forces that pulls immigrants to come to the United States. One should,

TABLE 7

EFFECT OF SKILL UPGRADING ON CAPITAL VALUE OF NET IMMIGRATION INTO THE UNITED STATES PER DECADE, 1870-1930

Decade	Capital Value in Millions of Dollars		Percentage of capital value due to skill upgrading
	With skill upgrading	Without skill upgrading	
1870-1880	3,554.0	3,124.0	12.1
1880-1890	10,444.4	8,838.9	15.4
1890-1900	10,317.2	8,096.5	21.5
1900-1910	32,297.0	26,354.2	18.4
1910-1920	20,294.9	17,036.6	16.1
1920-1930	32,834.4	29,592.3	10.9
Total	109,742.0	93,042.5	15.2

therefore, expect to find that the level of immigration during any decade should vary directly with the degree of skill upgrading that occurred during that decade. If one compares the degree of upgrading per decade shown in Table 7 with the data on net immigration for these respective decades shown in Table 13 in the Appendix, he will find that with the exception of the 1890-1900 decade there is such a relation between them. The reason why it does not hold for the latter decade is the fact that a crisis in agriculture in Europe during that decade caused emigration to the United States to be very high.[27]

[27]Brinley Thomas, op. cit., p. 10.

Movement of Physical Capital

In addition to the capital value of the future earnings of an immigrant, one must also account for the movement of physical capital that he causes between the country of emigration and immigration. Thus, one must subtract from the capitalized value of earnings the goods or money that immigrants transferred out of the country and one must add to it the goods or money that they caused to be brought into the country. The former consists chiefly of remittances which the immigrant sends to his native land to support families and friends, enable others to emigrate, purchase land and clear mortgages, and/or funds for speculation and investment. Although the exact amount of these remittances has never been discovered because of lack of records, it has been estimated that in the post World War I period they averaged from four to five hundred million dollars annually and from 1919-1921 private remittances and relief totalled 1.8 billion dollars.[28] Prior to World War I remittances reached a high of 275 million dollars in 1907. The latter estimate by the Immigration Commission[29] covers only money sent by money orders or through drafts on foreign banks. In addition to remittances, immigration causes money to leave the United States by means of the large sums carried abroad by

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[28]Eliot C. Mears, "Financial Aspects of Immigration," Economic Journal, (Sept., 1923), pp. 338-40.

[29]U.S. Immigration Commission, Reports of the Immigration Commission, 37 (Washington: Government Printing Office), pp. 27-28.

returning emigrants. Mears has estimated that on the average, each emigrant took out $400 during the first quarter of the twentieth century.[30] Finally, one must subtract the cost of the prepaid tickets which were paid with American savings and sent over seas to bring the immigrants. It has been variously estimated that from 10 to 60 percent of immigrants arrived on such tickets. During the height of the immigration stream at the turn of the century it must have amounted to at least forty million dollars annually.[31]

On the positive side one should add the amount of money brought in by immigrants when coming here. The Immigration Commission estimated that from 1905 to 1909, inclusive, the total amount of money brought in by all immigrants was $124,642,320 for a per capita average of $22.47. However, these figures are not a reliable guide to the total amount of money brought in by immigrants because information was obtained only in cases where it amounts to less than fifty dollars per person; furthermore, children and other dependents need not make any money showing.[32] In addition to the money carried in person, immigrants also sent funds into the United States through banking institutions which must have amounted to millions of dollars.[33]

Since "there seems to be a fairly general agreement that, in the aggregate, the amount of money individually taken out of

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[30] Mears, op. cit., p. 340.
[31] Ibid., p. 335.
[32] Ibid., p. 336.
[33] Ibid., pp. 337-338.

the country exceeds that brought in in persons,"[34] and since it is safe to assume that remittances sent out by immigrants are greater than the amount of money sent into the country by immigrants, my estimates of the capital value of immigrants presented in this chapter is biased upward.

Related Studies

The only other study that I have been able to locate that estimates the capital value of immigrants that came into the United States by discounting the capital value of their future income after coming to the United States, is the one by Agostino de Vita.[35] He estimates the capital value of the 27.5 million who came to the United States from 1821-1930 by interpolating the estimates of net immigration per decade derived by Wilcox into three year age intervals from age zero to 19, various uneven intervals up to age 51, and 51 and over. The immigrants in each age interval are then given a value that is equal to the net capitalized value of such a person's future income as given by Dublin and Lotka[36] for a man whose peak income is $2,500 per year and whose future earnings are discounted at a rate of 3.5 percent. Using this method de Vita finds that the capital value of immigrants from 1870-1930 was equal to $563.0 billion.

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[34] Ibid., p. 335.

[35] "Europa un Amerika: Zwei Welten," Weltwirtschaftliches Archiv, 52 (July, 1940), pp. 31-35.

[36] Louis I. Dublin and Alfred J. Lotka, The Money Value of Man, (New York: The Ronald Press Company, 1930), pp. 37-45.

Of course, the above figure is incorrect for the following reasons: 1) The earnings of women are much lower than those of men because women have a lower labor force participation rate than men and because the earnings of gainfully occupied women are lower than those of men; 2) The future income of a foreign-born person is on the average lower than that of a native person for which Dublin and Lotka calculated their estimates because the foreign-born have an inferior skill distribution; 3) Earnings in years prior to 1926, the year for which the capitalized value of future earnings were calculated by Dublin and Lotka, were much greater than in, let us say, 1890.

Corrado Gini[37] concedes the above faults in de Vita's estimates. To account for the upward bias resulting from the use of men's earnings, he reduces the figures obtained by de Vita by 2/3. The resultant is then further reduced by one half to account for the fact that earnings before 1926 were lower than those in 1926. He does these reductions in a rule of thumb manner. However, if these reductions are done to de Vita's estimate of the net capital value of immigrants from 1870-1930, we obtain a value of $93.8 billion, which is almost the same as the figure of $93.0 that I obtained as the gross capital value of these immigrants after subtracting the effect of skill upgrading. Gini's estimates, therefore, still have an

[37]"Europa un Amerika: Zwei Welten," Weltwirtschaftliches Archiv, 52 (July, 1940), pp. 1-31.

upward bias because while my capital value is gross of consumption, his is net of consumption.

The only other attempt that I know of to measure the benefits of immigration to the United States quantitatively is the one by Grubel and Scott[38] who measure the monetary gain to the United States of scientists and engineers from 1949-1961. However, they measure the benefit in terms of money saved by the United States in not having to educate them and not in terms of the present discounted value of their future earnings as I have done. In addition, they also measure the loss suffered by the countries of emigration.

My reason for using the earnings instead of the cost approach is that as far as the period of heavy immigration 1870-1930 is concerned, it would be idle to speculate how much it would have cost the United States to raise these persons, for if they had not come we would not have raised them. However, once they did come they did help the economic growth of the United States and the aid they gave in this respect was determined by what contribution they made to the gross national product of the United States and not how much it would have cost to raise them.

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[38]H.G. Grubel and A.R. Scott, "The Immigration of Scientists and Engineeers to the United States, 1949-1961," Journal of Political Economy, 74 (August, 1966), pp. 368-78.

CHAPTER IV

RELATIVE WAGE EFFECTS OF IMMIGRATION 1870-1910

Introduction

Immigration may cause the following wage effects; (a) It may cause a change in the real wage for the economy as a whole and/or (b) it may cause a change in the relative wage rate of one group of workers as compared with the average wage rate in the economy as a whole or with the wage rate of some other group of workers. The first of these effects may be called the absolute wage effect while the second may be called the relative wage effect.[1] In this chapter, I investigate the relative wage effects of immigration upon a selected number of occupations during the period 1870-1910.

The reason immigration has a relative wage effect is due to the fact that the occupational distribution of immigrants upon settling in the United States is different from that of the native population. Immigration will, therefore, increase the supply of labor to certain occupations relatively more than to others. The occupations to which immigrants flock will experience relatively larger increases in the supply of labor than would have been the case had immigration not occurred. The wage rate in these occupations will, therefore, rise at a

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[1] H.G. Lewis, Unionism and Relative Wages in the United States (Chicago: The University of Chicago Press, 1963), pp. 1-2.

slower rate relative to other occupations than would have been the case in the absence of immigration. On the other hand, the wage rate in occupations that are complementary to these will rise at relatively faster rate than would have otherwise been the case.[2]

Method Used to Investigate the Existence of the Relative Wage Effect of Immigration into the United States, 1870-1910

The proportion of foreign-born workers in an occupation may be looked upon as a measure of the relative contribution that immigration has made to the supply of labor to that occupation. Thus, for example, if the foreign-born make up one third of the gainfully occupied in occupation i and one half of those in occupation j, then immigration, by providing the foreign-born, will have had made a relatively larger contribution to the supply of labor of occupation j than to that of i. Similarly, the relative contribution that immigration has made to the supply of labor to an occupation during any decade may be measured by the change in the proportion of foreign-born persons that occurred over that decade. Thus, for example, if the indices of the proportion of foreign-born workers in occupations i and j for the year 1880 relative to the base

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[2]J.J. Spengler, "Some Economic Aspects of Immigration," Law and Contemporary Problems, XXI (Spring, 1956), pp. 246-53 and "Effects Produced in Receiving Countries by Pre-1939 Immigration," in Economics of International Migration, ed. Brinley Thomas (New York: St. Martin's Press, 1959), pp. 18-22.

year 1870 are equal to 120 and 105, respectively, then we can say that during the 1870-80 decade the foreign-born and consequently, immigration will have had a greater effect in increasing the supply of labor to occupation i than to occupation j.

Part or even all of the difference between the of proportion of foreign-born workers in 1880, for example, in occupations i and j, may have been caused by differential changes in the percentage of native workers that either entered or left these occupations rather than by differential changes in the percentage increase of foreign-born workers that occurred from 1870-1880 in these occupations. Thus, for example, the reason why the index for occupation i rose to 120 while the one for occupation j rose only to 105 may be due to the fact that a larger percentage of native workers left occupation i than occupation j or that the number of native workers in occupation j increased by a larger percentage than in occupation i. In either one of these situations, it is possible that the index of the proportion of foreign-born in occupation i will rise at a faster rate than that for occupation j even if the percentage increase in the number of foreign-born in occupational i was smaller than the percentage increase in the number of foreign-born in occupation j.

However, the above example does not invalidate changes in the proportion of foreign-born workers over time as a measure of the relative effect of immigration on the supply of labor to an occupation because even if the rise in the index

is due to the fact that greater percentage of native workers than foreign-born workers have left the occupation, immigration, by providing these foreign-born who became locked into the occupation to a greater degree than the natives, had in effect caused the supply of labor to that occupation at the end of the decade to be greater than it would have otherwise been. Similarly, the fact that the proportion of foreign-born workers in an occupation varies inversely with the percentage increase in the number of native workers does not invalidate the changes in that proportion as being a measure of the relative effect of immigration on the supply of labor to an occupation over time because the relative effect of a given change in the percentage of foreign-born on the total change in the labor supply of an occupation depends also on the percentage change that has occurred in the number of native workers. We can, therefore, conclude that for any decade the effect that immigration had on the supply of labor to any occupation is directly related to the change that has occurred in the proportion of foreign-born workers in that occupation.

Therefore, if we were to compare for a group of occupations within a given industry the indices of the proportion of foreign-born workers in each of them over time with the respective indices of the wage rates in these occupations over the same period of time, we should expect to find an inverse relation between them. The reason for this being, changes on the demand side with the exception of variations in the occupational proportion caused by technological change

are equal for all the occupations because they are in the same industry. Hence, the differences in the rate of movement over time in the individual occupations' wage rates as shown by their respective wage indices are primarily due to the differential movements in the supply of labor to these occupations. The indices of the wage rates in these occupations will, therefore, be inversely related to the indices of the supply of labor to the respective occupations. Since, as we have seen earlier, the contribution that immigration made to the supply of labor to these occupations varies directly with the indices of the proportion of foreign-born in them, there will, therefore, also exist an inverse relation between the wage indices in these occupations and the respective indices of the proportion of foreign-born in them.

In the next two sections, I try to find evidence for the relative wage effect of immigrations into the United States during the periods 1870-1889 and 1890-1910, respectively. This is done by calculating the coefficients of correlation between the indices of the wage rates and the respective indices of the proportion of foreign-born in these occupations from 1870 to 1890 and from 1890-1910 for a selected group of occupations in various industries.

Evidence of Relative Wage Effect of Immigration, 1890-1910

Table 8 shows the proportion of foreign-born white males in thirteen manufacturing and building trades as enumerated by the censuses of 1890, 1900, and 1910 and the

TABLE 8

PROPORTION FOREIGN-BORN WHITES IN SELECTED OCCUPATIONS, 1870-1910a

Occupation	Proportion Foreign-Born White[b]				
	1910	1900	1890	1880	1870
Blacksmiths	0.2737	0.2780	0.3092	0.2728	0.2839
Boiler makers . . .	0.2556	0.2959	0.3647	0.4563	0.5434
Brick and stone masons and tile layers	0.3682	0.3539	0.3778	0.3537	0.3852
Cabinetmakers . . .	0.5691	0.5623	0.5601	0.4176	0.4095
Carpenters	0.2592	0.2548	0.2569	0.2347	0.2303
Machinists	0.2743	0.2770	0.3075	0.3011	0.3529
Painters, glaziers, varnishers, etc. .	0.2479	0.2353	0.2518	0.2416	0.2362
Paper hangers . . .	0.1703	0.1355	0.1604	----	----
Pattern makers . .	0.2616	0.2841	0.3099	0.2950	0.3040
Plasterers	0.2812	0.2583	0.2637	----	----
Plumbers and gas and steam fitters.	0.1806	0.1914	0.2135	0.2787	0.4027
Roofers and slaters	0.2771	0.2946	0.3386	0.3705	0.3792
Upholsterers . . .	0.3473	0.2807	0.3091	----	----

[a]For source of data see footnote 7 of the Appendix.

[b]For the years 1910, 1900, and 1890 figures are for foreign-born white males and for the years 1880 and 1870 they are for total foreign-born. Since the number of females in these occupations was negligible and the number of non-white foreign born very small, the series is comparable.

----Not calculated.

proportion of foreign-born in ten manufacturing and building trades at the decennial census years 1870 and 1880. As can be seen from Table 8, the proportion of foreign-born in these occupations varies from less than a fifth among paper hangers and plumbers to more than one half among cabinetmakers. It would not, however, make sense to compare the relative wage rates in each of these occupations in each of these years with the relative proportions of foreign-born in these occupations because the wage differentials that are established among these occupations reflect, in addition to possible effects of the entrance of foreign-born, such factors as cost of training, opportunities for advancement, nonpecuniary benefits, and market demand, that may differ from one occupation to another. As explained earlier, what does make sense is to compare the relative changes over time in the wage rates for these occupations in a parituclar industry with the relative changes over the same period of time in the proportion of foreign-born in these occupations.

This is done in Table 9 which using 1890 as a base, compares the relative wage rates for males in skilled occupations in five industries for the years 1900 and 1907 with the relative proportions of foreign-born white males in these occupations in census years 1900 and 1910, respectively. The reason for doing the comparison by industry is, as was explained earlier, that it keeps factors on the demand side with the exception of variations in the occupational proportions caused by technological change equal. For each industry of Table 9 the comparison is

TABLE 9.—Correlation of relative wage rates in sele
with relative proportion foreign-born white males
(1890

Industry, Occupation and Coefficient of Correlation, (r)	1900				
	Relative Proportion Foreign-Born White Males	Relative Wage Rate for			
		North Atlantic States	North Central States	Western States	South Atlantic
1. Agricultural implements					
Blacksmiths	89.91	100.44	98.02	83.94	—
Machinists	90.08	103.92	104.96	94.81	—
Painters	93.45	82.35	113.14	90.91	—
Pattern makers	91.67	107.18	106.58	72.22	—
r (1900 through 1910)					
Level of significance					
2. Building trades					
Carpenters	99.18	110.77	118.78	108.80	11
Masons	93.67	112.28	105.24	105.04	10
Painters	93.45	113.20	118.32	111.35	11
Paper hangers	84.48	107.90	108.66	113.79	11
Plasterers	97.95	110.66	117.05	101.61	11
Plumbers	89.65	107.45	119.19	108.24	11
Roofers and slaters	87.01	113.61	106.02	99.20	11
r (1900 through 1910)					
Level of significance					
3. Foundry and machine shop					
Blacksmiths	89.91	97.44	103.43	98.61	1(
Boiler makers	81.14	110.52	100.04	94.18	11
Machinists	90.08	104.29	100.64	99.94	1(
Pattern makers	91.67	107.14	101.36	99.62	9
r (1900 through 1910)					
Level of significance					

:lected occupations by industry and geographic area, 1900 and 1907,
'es in those occupations for the United States, 1900 and 1910, respectively
'90 = 100)

		1910	1907				
Males		Relative Proportion Foreign-Born White Males	Relative Wage Rate for Males				
South Atlantic States	South Central States		North Atlantic States	North Central States	Western States	South Atlantic States	South Central States
---	---	88.52	159.91	123.56	105.31	---	---
---	---	89.20	137.22	112.63	123.10	---	---
---	---	98.45	111.25	150.11	135.35	---	---
---	---	84.41	119.21	125.93	119.36	---	---
---	---	---	-0.3897	0.4176	0.1134	---	---
---	---	---	0.36	0.32	0.87	---	---
110.83	105.77	100.90	160.02	164.37	164.82	161.04	133.90
104.01	96.46	97.46	148.96	135.21	132.73	158.45	138.65
115.17	111.52	98.45	141.75	153.55	163.37	148.53	142.50
110.45	116.66	106.17	164.52	136.35	167.18	178.29	119.24
111.79	106.35	106.64	150.98	159.71	134.62	180.18	164.66
113.03	110.63	84.59	156.39	154.85	164.88	174.72	160.52
106.79	119.30	81.84	125.15	126.19	129.73	150.09	135.74[a]
---	---	---	0.4730	0.4448	0.3152	0.3848	0.0810
---	---	---	0.08	0.11	0.28	0.18	0.79
100.92	102.44	88.52	113.88	122.69	124.69	133.60	118.43
110.54	101.88	70.09	122.64	122.49	133.21	126.72	107.29
100.90	104.19	89.20	124.02	128.27	124.68	133.33	120.47
99.14	103.37	84.41	129.67	124.93	132.89	138.77	118.55
---	---	---	-0.3039	-0.2975	-0.4487	-0.1466	0.0777
---	---	---	0.48	0.49	0.28	0.74	0.87

TABLE 9. - Continued

Industry, Occupation and Coefficient of correlation, (r)	1900				
	Relative Proportion Foreign-Born White Males	Relative Wage Rate for Mal			
		North Atlantic States	North Central States	Western States	South Atlantic stat
4. Cars, steam railroad					
Blacksmiths	89.91	96.97	90.08	93.52	104.4
Boiler makers	81.14	100.08	96.17	97.14	109.9
Cabinetmakers	100.39	99.36	97.57	100.84	100.0
Carpenters	99.18	106.27	99.62	93.30	101.8
Machinists	90.08	99.19	99.21	97.09	106.9
Painters	93.45	103.74	85.98	99.06	104.2
Pattern makers	91.67	107.16	97.89	90.29	106.5
Upholsterers	90.81	81.99	90.71	96.74	95.4
r (1900 through 1910)	------	------	------	------	------
Level of significance	------	------	------	------	------
5. Shipbuilding					
Blacksmiths	89.91	102.82	---	69.53	100.3
Boiler makers	81.14	97.64	---	94.67	96.3
Carpenters and joiners	99.18	108.28	---	89.20	103.2
Machinists	90.08	101.83	---	91.15	104.8
Painters	93.45	109.85	---	---	123.8
Pattern makers	91.67	111.01	---	94.82	100.4
r (1900 through 1910)	------	------	------	------	------
Level of significance	------	------	------	------	------

[a] Does not include roofers, gravel and tar.
--- Data not available.

		1910	1907				
or Males			Relative Wage Rate for Men				
South Atlantic States	South Central States	Relative Proportion Foreign-Born White Males	North Atlantic States	North Central States	Western States	South Atlantic States	South Central States
104.43	99.35	88.52	107.47	132.90	105.66	129.28	112.58
109.96	92.97	70.09	120.98	128.58	115.18	132.52	106.54
100.00	107.14	101.61	173.66	127.52	113.46	126.07	101.64
101.89	100.09	100.90	133.99	142.67	108.27	121.63	108.74
106.99	99.15	89.20	104.38	135.48	112.73	134.22	112.68
104.22	97.48	98.45	152.66	121.09	100.64	112.40	92.73
106.57	95.65	84.41	136.53	121.50	98.90	128.48	96.28
95.43	103.02	112.36	112.36	122.20	104.87	84.79	109.22
----------		------	0.2176	0.0359	-0.0637	-0.5310	0.1619
----------		------	0.43	0.89	0.82	0.03	0.56
100.35	---	88.52	118.42	---	89.90	99.08	---
96.34	---	70.09	122.34	---	144.68	103.11	---
103.21	---	100.90	116.35	---	119.98	114.80	---
104.86	---	89.20	113.15	---	119.03	116.22	---
123.82	---	98.45	102.66	---	---	140.16	---
100.44	---	84.41	119.15	---	141.15	122.92	---
----------		------	-0.2826	---	-0.4531	0.3825	---
----------		------	0.38	---	0.20	0.23	---

also done on a regional basis, i.e., North Atlantic States, North Central States, Western States, South Atlantic States, and South Central States, in order to see whether one obtains different relationships in regions where the foreign-born made up different proportions of the total population. Ideally, I should have compared the relative wage rates in each region with the relative proportions of foreign-born in occupations for the respective region. Unfortunately such data were available only for the census of 1900.

The wage rates underlying the wage indices of Table 9 are from the following sources: The data for the years 1890 and 1900 are from the Nineteenth Annual Report of the Commissioner of Labor[3] which took the figures directly from payrolls and other existing records and presented them for identical or nearly identical establishments within each industry for the years 1890 through 1903. All rates shown are per hour rates with piece rates included only if it was possible to reduce them to an hourly basis.[4] The work of the Nineteenth Annual Report was continued for the years 1904 through 1907 in the annual bulletins of the Bureau of Labor.[5] From 1907 to 1912,

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[3]U.S. Department of Commerce and Labor, Nineteenth Annual Report of the Commissioner of Labor: Wages and Hours of Labor, 1904 (Washington: Government Printing Office, 1905), Table III.

[4]Ibid., pp. 15-17.

[5]Namely, Bulletins 59, 65, 71, and 77.

these wage studies were discontinued, and when the work was renewed in 1912, it took the following two forms: (1) A study of union wage rates and hours and (2) wages and hours as shown by an examination of payrolls.[6] However, the latter included only one of the industries shown in Table 9 - car-building. It was, therefore, necessary to compare the 1907 wage indexes with the indexes of the proportion foreign-born for the census year 1910. Since the change in the proportion of foreign-born whites in any occupation from 1900 to 1910 most probably occurred at a smooth rate during the decade, for there was no sharp fluctuations in the level of immigration during the decade, the comparison should yield the same type of relationship. The reason being, from 1900 through 1907 about seventy percent of the immigration during the decade had already occurred.

In the analysis of the correlations ot Table 9, one must separate the building trades from the other industries because unionism in the former was well established during this period. Unionism in the other industries, which belong to the group Metal, Machinery, and Shipbuilding, covered only a small proportion of the workers.[7] In addition one must keep in mind

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[6]Paul H. Douglas, Real Wages in the United States, 1890-1926 (New York: Houghton Mifflin Company, 1930), pp. 73-81.

[7]Leo Wolman, The Growth of American Trade Unions, 1880-1923 (New York: National Bureau of Economic Research, Inc., 1924), pp. 22-25, and 92.

the fact that the foreign-born made up less than three percent of the total population of the South Atlantic and South Central States but from seventeen to about twenty-five percent of the total population of the other regions.[8]

Since unions will tend to restrict admissions during periods when there is unemployment and falling wages, an increase in the proportion of foreign-born in an occupation will be associated with a rising wage rate. The more acute is the shortage of labor in a particular occupation the more willing are unions to let them in and, of course, the more eager are the foreign-born to try to get into the occupation, for the wage rate will be rising and unemployment very low in that occupation. In the unionized building trades, one should, therefore, expect to find a positive correlation between the index of the proportion of foreign-born workers in an occupation and the index of the wage rate in that occupation. The greater the degree of unionization the stronger should be the relationship because the less likely are the foreign-born to enter an occupation unless there is a shortage and consequently, a rising wage rate. In the case of workers in nonunion industries or poorly organized ones, on the other hand, we should expect to find a negative relationship because, as was explained in the last section, the greater the increase in the proportion of foreign-born in an occupation

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[8]Niles Carpenter, Immigrants and Their Children, U.S. Bureau of the Census, Census Monographs VII (Washington: U.S. Government Printing Office, 1927), Tables 8 and 136.

the more will they have had augmented the supply of labor to that occupation and the less should the rate of increase in the wage rate be.

The correlation coefficients between the relative proportions of foreign-born whites in each occupation for the United States as whole and the relative wage rates for these respective occupations in the various geographic divisions given in Table 9 confirm the above hypothesis for 1890-1910. Thus, for the North Atlantic States, the correlation coefficients for the four poorly organized industries of agricultural implements; foundry and machine shop; cars, steam railraod; and shipbuilding are -0.39, -0.30, 0.22, and -0.28, respectively. Even though none of these correlation coefficients are significant by themselves, it is highly unlikely that one would get such negative correlations in three out of four samples if the true population correlation coefficient, p, were equal to zero. If we assume that the industries of Table 9 represent independent experiments, then the probability of getting three such negative correlations, if p=0, is only .065, i.e., 0.36x0.48x0.38. Since I obtained such negative correlations in three out of four cases, it would tend to indicate that p is most probably less than zero.

One gets a similar result by examining the correlation coefficients for these four industries for establishments located in the Western States. If we assume again that the four industries represent independent samples and that p=0, then the probability of obtaining the three negative coefficients

shown in Table 9 is only 0.046, i.e., 0.28x0.20x0.82. Since I obtained them in only three out of four cases, it would tend to indicate that p is probably less than zero. However, if one examines the data of Table 9, one will find that there is no observable trend in the coefficients of correlation for the North Central States. One is positive; one is negative; and one is negative but close to zero. The reason for this lack of trend in these states may be found in the fact that the proportion of foreign-born whites in the total population of the North Central States was about four percent lower than in the Western States and about six to eleven percent lower than in the Eastern States during the period 1890-1910. In addition, the North Central States do not lie next to a port of entry for immigrants which would make it more difficult for immigrants to get there. They would, therefore, go there only if they heard of good job opportunities. This would tend to make it less likely that they would create a negative relative wage effect.

As for the South Central States there is no correlation for any industries, which is not at all surprising, because foreign-born whites made up only two percent of the total population of the region and hence, could not have affected the relative wages to any appreciable degree. In the South Atlantic States where the percentage foreign-born went from 2.3 in 1890 to 2.0 in 1900 and then to 2.4 in 1910, there is no general trend, and none of the coefficients have any individual significance at all except in the case of cars,

steam railroad, whose coefficient of correlation of -0.53 is significant at a three percent level of significance. The negative sign of the coefficient of correlation is as expected, for unionism in the Southern States was very weak. The magnitude is, however, surprising because of the small proportion that the foreign-born made up of that regions population. It would, therefore, appear that either the cars, steam railroad, industry had a concentration of foreign-born in the South or that the high correlation was due to some third force.

Turning to the unionized building trades, one finds that in the North Atlantic States, where the proportion of foreign-born in the population and the impact of immigration during the period were the greatest and where unions were relatively strong, there is a quite large positive correlation of 0.4730 between the index of the proportion of foreign-born in an occupation and index of the wage rate for that occupation. Such a high correlation could have been obtained by chance in only eight cases out of one hundred. Furthermore, there is a similar high positive correaltion of 0.4448 for the North Central States where unionism was strong and the proportion of foreign-born whites in the population was about 17 percent. In the Western States, where unions were not as strong as in the other regions, there is also a positive correlation but it is not too significant. If we assume that the data for the three regions represent independent samples, then the probability of getting three such positive correlations in a situation where

the true population correlation coefficient was zero is only 0.0025, i.e., 0.08x0.11x0.28. Hence, one may conclude that in the unionized building trades during the period 1890-1910 immigration had no negative relative wage effect in the skilled building trades.

However, as was shown earlier, changes in the proportion of foreign-born in an occupation were inversely related to changes in the wage rate in the weakly organized industries of Table 9. The relationship was strongest in the North Atlantic States where the foreign-born made up the largest proportion of the population and of the gainfully occupied and where these proportions grew the quickest from 1890 to 1910. Therefore, we may conclude that if immigration increased the proportion of foreign-born in one occupation relatively more than in another, then in the absence of strong unions and other things being equal, it had a negative relative wage effect.

The above conclusion based on the data of Table 9 is the exact opposite of the one reached by Isaac A. Hourwich[11] that "as a general rule, the employment of large numbers of recent immigrants has gone together with substantial advances in wages." His conclusion is based on the fact that "the employment of a high percentage of immigrants in any section, industry, or occupation, is an indication of an active demand for labor in excess of the native supply."[12] As I have pointed

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[11] Immigration and Labor, (New York: G.P. Putnam's & Sons, 1912), Chapter XII.

[12] Ibid., pp. 25-26.

out, this is true in the case of the strongly unionized building trades but not in the case of the poorly organized industries. He cites as proof for his conclusion the fact that wages are higher in cities than in rural areas, wages in states with large immigrant populations are higher than in states with small immigrant populations, and that in the Pittsburgh steel mills wages "have varied directly with the proportion of recent immigrants." The inconclusiveness in his first two arguments is obvious, for it may just as well be that demand factors cause the wage rates to be higher in these places in spite of heavy immigration. It is precisely this higher wage rate that attracts the immigrants. However, it is quite possible that without immigration the wage rates would have been even higher. Finally, the proof from the Pittsburgh steel mills is inconclusive, for as he himself states, in that industry technological change had increased the demand of unskilled workers relative to skilled ones by substantial amounts. This would cause an excess supply of skilled workers relative to unskilled ones, which would then cause the wage rates of unskilled workers relative to the ones for skilled workers to rise despite the influx of unskilled immigrants. However, in absence of such changes, immigration would lower the relative wages of those occupations whose supply it increases the most. What Hourwich fails to do is to keep demand factors constant. It is exactly on this ground that he attacks Professors Jenks' and Laucks' example to prove that the "new immigration" had caused a negative relative wage effect.[13]

[13] Ibid., pp. 302-4.

Relative Wage Effects of Immigration 1870-1890

Using 1870 as a base, Table 10 presents a comparison between the relative wage rates in ten manufacturing occupations and the relative proportions of foreign-born in those occupations by industry for the years 1880 and 1890. The relative daily wage rates were calculated from the daily wage rates for the month of January as presented in the Aldrich Report.[14] The wage data of the latter were taken from actual payrolls of business firms by investigators of the Department of Labor. Unlike the Nineteenth Annual Report, the Aldrich Report does not provide data for different sections of the country. It is confined to the New England and Middle Atlantic States.

Although the Aldrich Report covered seventy-eight establishments, I could use only eight in my study because in the case of the others, the occupational designations either did not match the ones of the census or there were too few occupations represented. It was, therefore, possible to use only eight of them. Furthermore, it was not possible to combine establishments because the report does not state exactly what they produce and in order to keep things on the demand side equal, one must deal with one industry only.

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[14]Nelson W. Aldrich, Wholesale Prices, Wages, and Transportation, Report by Mr. Aldrich from the Committee on Finance, March 3, 1893, 52nd Congress, 2nd Session, Senate Report 1394, Vol. 3, Parts 1-4.

TABLE 10.- Correlation of relative daily wage rates for v
of the Aldrich Report with the relative proportion foreign-born
(1870 = 100)

Occupation, Coefficient of Correlation and Level of Significance	Relative Proportion Foreign Born	Relative: Car and Ship-building[a] (Estab. 32, Delaware)	Relative: City Public Works (Estab. 35, New York)	Relative: Illuminating Gas (Estab. 47, New York)	Relative (
Blacksmith	96.09	80.12	71.43	83.87	
Boiler makers	83.97	---	---	---	
Brick and stone masons and Tile layers	91.82	---	58.96	68.75	
Cabinet makers	101.98	80.44	---	---	
Carpenters	100.47	102.91	62.50	74.72	
Machinists	85.32	68.71	71.43	82.14	
Painters, glazier, varnishers, etc.	101.34	79.14	66.67	82.14	
Pattern makers	97.04	---	---	---	
Plumbers and gas and steam fitters	69.21	---	50.00	---	
Roofers and slaters	97.71	---	---	53.33	
Blacksmith	108,91	85.38	85.71	82.74	
Boiler makers	66.76	---	---	---	
Brick and stone masons and tile layers	98.05	---	82.55	92.13	
Cabinet makers	135.97	89.72	---	---	
Carpenters	110.57	121.52	75.00	88.32	
Machinists	87.11	80.16	85.71	82.14	
Painters, glaziers, varnishers, etc.	105.45	88.55	80.00	83.29	
Pattern makers	100.89	---	---	---	
Plumbers and gas and steam fitters	52.99	---	70.00	---	
Coefficient of correlation	---	0.4233	0.4131	0.2028	
Level of significance	---	0.2302	0.1868	0.5620	

[a] Wage data for years 1871, 1881 and 1891.
---Data not available.

ge rates for various occupations in selected establishments
n foreign-born in those occupations, 1880 and 1890
870 = 100)

Relative Daily Wage Rate						
Public Works (Estab. 35, York)	Illuminating Gas (Estab. 47, New York)	Metalic and Metalic Goods (Estab. 72, New York)	(Estab. 73, Penna.)	(Estab. 54, Connecticut)	(Estab. 57, Maryland)	(Estab. 68, New York)
		1880				
.43	83.87	104.00	62.60	95.65	80.66	87.60
--	---	---	---	123.71	95.74	80.22
8.96	68.75	85.76	---	---	---	---
--	---	---	---	---	---	---
1.50	74.72	110.00	---	---	---	---
1.43	82.14	88.63	72.51	86.78	93.35	84.99
.67	82.14	---	73.90	---	70.00	---
--	---	---	82.79	65.38	72.65	66.35
.00	---	---	---	---	---	---
--	53.33	---	---	---	---	---
		1890				
.71	82.74	118.75	79.08	121.74	91.88	121.29
--	---	---	---	89.69	117.02	95.91
.55	92.13	102.92	---	---	---	---
--	---	---	---	---	---	---
5.00	88.32	90.20	---	---	---	---
5.71	82.14	100.63	84.19	93.67	99.80	87.74
.00	83.29	---	92.38	---	80.00	---
--	---	---	104.45	82.00	85.47	78.97
.00	---	---	---	---	---	---
.4131	0.2028	0.4404	0.2895	0.0352	-0.7787	0.1765
.1868	0.5620	0.2892	0.5092	0.9362	0.0058	0.6892

881 and 1891.

It is for this reason that I could not combine the small samples of both Tables 9 and 10 to get larger ones.

As can be seen from Table 10, the results of the correlation of the relative wage rates and the relative proportions of foreign-born in those occupations are insignificant with the exception of the correlation for establishment 57 whose negative correlation coefficient of -0.7787 is significant at a one percent level of significance. It would, therefore, appear that in the metal and metallic goods industry in the state of Maryland, where establishment 57 was located, immigration had a negative relative wage effect. As for the other establishments of Table 10, the relative wage effect may have been negative because even though all of the correlation coefficients are positive, their very low level of significance does not rule out with any reasonable degree of certainty a negative correaltion.

The reasons for the lack of significant correlations in most cases of Tables 10 and 9 are as follows:

1. The small sizes of the samples.

2. The fact that the proportions of foreign-born in each occupation are for the United States as a whole while the wage data are for a particular region in the case of 9 and for a particular establishment in the case of Table 10. Due to lack of information and mobility, ignorance, and discrimination immigrants may have had concentrated in particular sections of the country or in particular establishments.

3. The effect of unions and the forces of discrimination to let in the foreign-born only when wages are rising or at the least not falling. To the degree that these forces are successful they tend to hide the negative relative wage effect of immigration that would occur in their absence. The fact that I was dealing with skilled trades would tend to make these forces particularly strong due to the relatively high degree of trade union organization among the skilled trades.

Conclusion

From the above analysis of Tables 9 and 10, it would appear that for the period of heavy immigration from 1890-1910, immigration most probably had a negative relative wage effect on the wages of skilled workers in poorly organized industries while it most probably did not have such an effect in the strongly unionized building trades. The latter appear to have had been successful in preventing immigrants from lowering their relative wage rates.

However, if one looks at the data for the period 1870-1890, one is less certain whether immigration had a negative relative wage effect. Except for the case of one establishment which showed a significant negative relative wage effect, the others showed a positive relation. Even though the latter were insignificant, it would still appear likely that the relation was less negative during this period than from 1890-1910 for which most of the coefficients suggest a negative relation. The reason for the difference among the two periods, I believe, may be found in the fact that from 1870-1890 the existence of

the frontier made it possible for many skilled immigrants to go West which thus, eased the pressure on the wage rates. From 1890-1910, on the other hand, the frontier was no longer available.

APPENDIX

Method of Obtaining Occupations of Gainfully Occupied Immigrants from Occupations of Foreign-Born at Each Census

Given a closed population, i.e., a population into which people can enter only by birth and leave only by death, a forward census survival ratio (FCSR) for that population consists of "a fraction in which the numerator is the number of persons in an age-sex group" of the Population "at a given census and the denominator is the number ten years younger at the preceding census." Thus, the FCSR for native white males, who form a closed population, "aged 10-14 in 1930 and 20-24 in 1940 is: Native white males aged 20-24, U.S., 1940/Native white males aged 10-14, U.S., 1930."[1] In terms of actual data, the FCSR for this group was 0.9417. This means that 0.9417 of the native white males aged 10-14 enumerated in the census of 1930 were enumerated again in the census of 1940 when they were 20-24 years of age.

Since the foreign-born do not represent a closed population, it is necessary to estimate their forward census

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[1]Everett S. Lee, "Migration Estimates," in Population, Redistribution, and Economic Growth, United States, 1870-1950 (Philadelphia: The American Philosophical Society, 1957), I, p. 15.

survival ratios from those of the native population. Lee[2] does this by first constructing ten-year life table survival ratios for both the foreign-born and the native white population by sex. He then divides the ratios for foreign-born whites by those for native whites for each census from 1900 through 1940. The resulting quotients are then multiplied by the FCSR of the native white population to get the FCSR of the foreign-born population. The FCSR for the foreign-born for the censuses 1870 through 1890 are obtained by the same method with the exception that it is assumed that the ratios between foreign-born and native white life table survival ratios of the period 1900-1910 also held true for the earlier period. The implicit assumption in the above procedure of adjusting the FCSR of the native white population to get those of the foreign-born is that there is no difference in the completeness of enumeration or in the accuracy of age reporting for native whites and the foreign-born by the census. The validity of this assumption, states Lee, could not be tested.

If one multiplies the enumerated number of foreign-born of a particular sex in a certain age group by the appropriate FCSR, r and subtracts the result from the number of foreign-born of that sex but ten years older enumerated at the next census, then the difference is an approximation of net immigration of such persons during the decade.

Symbolically, if we let M stand for net immigration of persons of a particular sex and in a specific age group, then

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[2] Ibid., pp. 55-56.

(1) $M = f' - rf$,

where f is the number of such persons at the first census and f' is the number of such persons ten years older enumerated at the second census.

Hence, by applying Lee's FCSR for the foreign-born to the census data on the occupations of the gainfully occupied foreign-born, we can get an estimate of net immigration of gainfully occupied persons into the United States cross classified by age, sex, and occupation per decade. In using this method, one is assuming that any differences in the completeness of enumeration and in the accuracy of age reporting between any two censuses of the foreign-born gainfully occupied and of the foreign-born population as a whole were the same. Since it concerns differences between censuses, this assumption is reasonable, for if there were differences in age reporting and in completeness of enumeration between the occupation and population data they should not vary to any significant extent from one census to another. Another implicit assumption is that the quotient obtained by dividing ten-year life table survival ratios for the foreign-born by those for native whites is the same for each occupational group as for the entire population. This assumption is necessary because such quotients are used by Lee in calculating the FCSR for the foreign-born. Again this assumption is reasonable because even though there are differences in life tables for persons in different occupations[3] there is no

[3]Louis J. Dublin and Alfred J. Lotka, Length of Life: A Study of the Life Table (New York: The Ronald Press Co., 1936), pp. 220-21.

reason to assume that such differences should affect the foreign-born differently then the native white.

Occupational Grouping of the Gainfully Occupied Foreign-Born, 1870-1930

In order to use the forward census survival ratio method to find the occupations of immigrants, it was necessary to have a comparable series on the occupations of the gainfully occupied foreign-born in the United States cross classified by age and sex. However, due to differences in scope, enumeration, processing of returns, and presentation, the published occupational statistics for the different censuses are frequently not comparable. The census itself has been aware of the need for a comparable series of occupation statistics and has from time to time published comparisons for previous censuses. Dr. Alba M. Edwards[4] presents a comparable series of the occupations of total gainful workers, male gainful workers, and female gainful workers ten years of age and over arranged according to the occupational classification of the fifteenth census for each census from 1870-1930. In another work[5] he classifies the total gainfully occupied by sex at the censuses of 1910-1930 into the following social-economic groups:

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[4]United States Bureau of the Census, Sixteenth Census of the U.S.: 1940. Population. Comparative Occupation Statistics for the U.S., 1870-1940, pp. 104-136.

[5]United States Census Bureau, A Social Economic Grouping of the Gainful Workers of the U.S. 1930 by Dr. Alba M. Edwards (Washington, D.C.: U.S. Government Printing Office, 1938), pp. 2-7.

1. Professional persons.
2. Proprietors, managers, and officials:
   - 2-a. Farmers (owners and tenants).
   - 2-b. Wholesale and retail dealers.
   - 2-c. Other proprietors, managers and officials.
3. Clerks and kindred workers.
4. Skilled workmen and foremen.
5. Semiskilled workers:
   - 5-a. Semiskilled workers in manufacturing.
   - 5-b. Other semiskilled workers.
6. Unskilled workers.
   - 6-a. Farm laborers.
   - 6-b. Factory and building construction laborers.
   - 6-c. Other laborers.
   - 6-d. Servant classes.

Edwards classifies the gainfully occupied workers according to the above scheme by rearranging the 1930 census occupational categories to fit into his groupings. This rearrangement does not classify all the gainfully occupied workers strictly according to these groups. However, in no group are these misclassifications "numerous enough to affect the group total materially."[6]

By first arranging the occupational designations of the censuses from 1870 through 1920 according to the 1930 census occupational classification and then rearranging them into the above social economic groups, I was able to get a comparable series on the occupations of the foreign-born from 1870 through 1930. In certain cases an occupational designation of a census

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[6] Ibid., p. 2.

before 1910 included two designations of the 1930 census which belonged to two different occupational groups. In such instances two alternative procedures were followed. If one of the 1930 designations contained a very small number of persons, then it was put in the group into which the other designation belonged. If this was not the case then it was assumed that the two designations made up the same proportion of the greater designation as they did in 1910 or for the closest census for which there was a comparable number for the greater designation and for the designations of 1930.

Thus, for example, the 1900 designation "nurses and midwives" includes the 1930 designations, "Nurses (trained)" and "Midwives and nurses (not trained," the former of which belongs in the professional group while the latter belongs in the semiskilled one. Since both of these designations had a significant number of persons in them, it was assumed that nurses (trained) made up the same proportion of the 1900 designation nurses and midwives as in 1910--0.26 of males and 0.38 of females. Similarly, the 1900 designation "Tailors and tailoresses" includes the 1930 skilled designation "Tailors and Tailoresses," the semiskilled group "Operatives, suit, coat, and overall factories," as well as the designation "Laborers, suit, coat, and overall factories." To find the number of skilled tailors and tailoresses in 1920 it was assumed that they made up the same proportion of the broader 1900 group as in 1920 -- 0.68 of the males and 0.34 for females. The reason why 1910 figures were not used is that it was not possible to construct a

comparable broader group for 1910 and 1900.[7]

Table 11 shows the occupational grouping of the gainfully occupied foreign-born for each of the census years from 1870-1930. Although the data for 1870 and 1880 includes nonwhites while the one for later years does not, the series is comparable

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[7]To get a comparative series for the 1870-1930 censuses, I used the following census sources: The "Comparison of the Occupation Classification of 1930, 1920, and 1910," as given by the General Report on Occupations of the Fifteenth Census, 1930, Table I and the "Comparison of Occupations at the Censuses of 1870 to 1900," as given by the Twelfth Census: 1900. Speical Reports. Occupations, Table III were used to get comparative series for the censuses 1910 through 1930 and the censuses 1870 through 1900, respectively. The series for 1900 and earlier was then made comparable to the one for 1910 through 1930 by using the comparison of the 1900 and 1930 occupational classifications made by Alba Edwards in U.S. Bureau of the Census, Sixteenth Census of the United States: 1940. Population. Comparative Occupation Statistics for the U.S., 1870-1940, Table 11, pp. 130-136.

The actual figures of the number gainfully occupied foreign-born in each occupational classification were gotten from the following U.S. Bureau of the Census sources: The figures of 1930 from General Report on Occupations of the Fifteenth Census, 1930, Table 8; of 1920 from Fourteenth Census: 1920. Population, Tables 5 and 9; of 1910 from Edwards, Comparative Occupation Statistics, op. cit., Tables 14 and 15 and Thirteenth Census: 1910. Occupations; of 1900 from Twelfth Census, op. cit., Tables 2, 7, and 13; of 1890 from Eleventh Census: 1890. Population Statistics, II. Tables 82 and 87; of 1880 and 1870 from Compendium of the Tenth Census,Table XIII and Compendium of the Ninth Census, Table LXV, respectively.

TABLE 11.– Occupational grouping of the gainfully occupied foreign-born white population of the United States by sex, 1870 – 1930[a]

Occupational Group and Sex	Number in Thousands of Persons						
	1930	1920	1910[d]	1900	1890	1880[b]	1870[b]
Total male[c]	6255	6628	6582	4887	4330	2974	2290
1. Professional	192	153	139	103	82	49	32
2. Proprietors, managers and officials	1193	1227	1245	1161	1112	856	588
2a. Farmers (owners and tenants)	447	574	649	735	773	609	408
2b. Wholesale and Retail dealers	470	421	364	296	245	182	134
2c. Other proprietors, etc.	276	233	232	130	94	64	46
3. Clerks and kindred workers	528	416	359	237	179	84	59
4. Skilled workmen and foremen	1384	1356	1192	852	763	463	380
5. Semiskilled workers	1177	1235	1065				
5a. In manufacturing	775	884	734				
5b. Other semiskilled workers	402	351	331				
6. Unskilled workers	1782	2241	2583	2534	2193	1521	1231
6a. Farm Laborers	194	245	321				
6b. Factory and building construction	737	956	985				
6c. Other Laborers	583	838	1112				
6d. Servant Classes	267	208	164				
Total female[c]	1156	1118	1211	880	775	521	414
1. Professional	96	68	57	36	24	15	10
2. Proprietors, managers and officials	61	60	64	56	45	36	25
2a. Farmers (owners and tenants)	21	23	28	35	29	25	17
2b. Wholesale and retail dealers	27	27	27	16	13	10	7
2c. Other proprietors, etc.	13	10	8	5	3	2	1
3. Clerks and kindred workers	200	156	86	42	19	9	6
4. Skilled workmen and foremen	15	22	24	15	10	7	6
5. Semiskilled workers	416	477	505				
5a. In manufacturing	284	366	381				
5b. Other semiskilled workers	132	112	124				
6. Unskilled workers	368	335	475	732	676	454	368
6a. Farm Laborers	5	15	17				
6b. Factory and building construction	14	27	20				
6c. Other Laborers	4	6	4				
6d. Servant classes	344	286	434				
Total[c]	7411	7746	7793	5767	5105	3495	2704

[a] For source of data see footnote 7.

[b] Includes nonwhites and sex distribution estimated.

[c] Totals may not add up due to rounding errors.

[d] Six thousand six hundred and thirty nine males and 12066 females subtracted to account for overcount of women and children in agriculture.

because nonwhite immigration from 1880 to 1930 was negligible when compared with total immigration.[8] Due to the fact that at the censuses before 1910 occupations were classified in less detail than at the censuses of 1910 and later, it was not possible to separate the unskilled workers from the skilled ones. Although it is frequently true that in the case of a particular occupation that went into the occupational grouping of Table 11, the figures for the censuses before 1910 are only roughly comparable with those for later censuses, the errors within each occupational group tend to some extent, and possibly to a large extent, to cancel each other out.

Unlike Edwards[9] I have not adjusted the 1870 figures for the undercount in the Southern States nor the 1920 ones for the undercount of gainful workers that he alleges occurred as a result of the census being taken in January instead of in April. The reason being, in the former case the same relative undercount occurred in the enumeration of both the total foreign-born population and the foreign-born gainfully occupied and Lee's FCSR are based on the uncorrected data for the total foreign-born population. As for the alleged undercount in 1920, a report on labor force estimates has concluded that the apparent undercount in 1920 was due to cyclical variations rather than to the date of the census.[10] The data were adjusted for

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[8] S. Kuznets and E. Rubin, Immigration & the Foreign-Born (National Bureau of Economic Research, Occasional Paper 46, 1954) p. 1

[9] Comparative Occupation Statistics, pp. 137-141.

[10] Stanley Lebergott, "Annual Estimates of Unemployment in the U.S., 1900-1954," in The Measurement and Behavior of Unemployment: A Conference of the Universities, (Princeton: Princeton University Press, 1957), p. 239, note 51.

the overcount of the number of gainfully occupied women and children in agriculture that occurred in 1910.[11]

Occupational Distribution of Immigrants, 1870-1930

As discussed in an earlier section, I found the occupational distribution of immigrants by applying Lee's forward census survival ratios to the occupational distribution of the foreign-born shown in Table 11. Before that could be done, however, the gainfully occupied foriegn-born in each occupational group had to be divided into the five year age intervals from the age of ten to sixty-five and a open end interval of sixty-five over for which the forward census survival ratios (FCSR) were calculated.

The 1880 and 1870 totals were divided into the age distribution of the 1890 census by assuming that for any two adjacent age groups the constant of proportiality (C_n) in the relationship

$$(2) \quad O_{n+1}/O_n = C_n P_{n+1}/P_n,$$

where O_n and P_n stand for the number of foreign-born and number

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[11]The number of overcounted foreign-born females was estimated by assuming that the same proportion of gainfully occupied foreign-born white females were overcounted as in the total population; for males it was assumed that the same proportion of foreign-born children 10-15 were overcounted as for the total population 10-15. Since Edwards estimated these figures for the total population in the case of males on the basis of the total number of males 10-15, my latter assumption is justified. The former one is made on the assumption that there is no reason why enumerators anxious to find occupations for females should overestimate the foreign-born to any different degree than the total population.

of foreign-born of a particular occupation in age interval n, respectively, was the same for 1880 and 1870 as for 1890. What this means is that I assumed that if the age distribution of the foreign-born were the same in 1880 as in 1890, then the age distribution of the gainfully occupied foreign-born for these two censuses would also have been the same. If we let X be the number of persons in the first age interval, we have the relationship

$$(3) \quad X + a_2X + a_3X + \ldots\ldots + a_nX = T,$$

where T is the total number of gainfully occupied foreign-born of a particular sex in a certain occupational group, and where

$$(4) \quad a_n = C_{n-1}(P_n/P_{n-1})a_{n-1},$$

because from the notation in equation (3)

$$(5) \quad a_nX = O_n$$

and for simplicity we let $a_1 = 1$. Therefore, if we substitute (5) into (2) we get

$$(6) \quad (a_nX) \,/\, (a_{n-1}X) = C_{n-1}P_n/P_{n-1}$$

from which the recursion formula in equation (4) follows.

By first solving equation (2) for C_n for the census of 1890 and then using these values for C_n to calculate the values of the a_n's for 1880 and for 1870, I obtained the age distribution of the gainfully occupied foreign-born by sex for the latter two censuses by solving equation (3) for X, and then multiplying X by the appropriate a_n to get the O_n's. The resulting

age distribution for the censuses of 1870 through 1900 of 10-14, ten year intervals until age 65, and 65 and over was converted into the required five year intervals from 10-65 and 65 and over by spliting each ten year interval from 14-65 into five year intervals by means of equations (2) - (4) but with T restricted to the number of gainfully occupied foreign-born in each ten year age group, and using the occupational data of the 1930 census, which has the required five year intervals, to calculate the C_n's.

Using the 1930 C_n's, the 1920 census intervals of 10-17, 18 and 19, 25-44, and 45-64 were converted into five year intervals. Similarly, the 1910 data, for which no age distribution is available, was first divided into the 1920 age intervals by use of 1920 C_n's and then into five year intervals of the 1930 census by use of 1930 C_n's. The reason for using 1930 data and not the 1900 data for the 1910 census is that the passage of child labor legislation which occurred during the decade from 1900 to 1910[12] made it more comparable to the former rather than to the latter. In addition, since the 1900 figures were not separated into skilled and semiskilled, it would have been impossible to find the age distribution of these groups by use of the 1900 data.

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[12]For a concise history of child labor legislation in the United States see Elizabeth Brandeis, "Labor Legislation," in History of Labor in the U.S., III (New York: The Macmillan Company, 1958).

If we apply the FCSR to the number of foreign-born in a particular age interval n, we get the number of these foreign-born that would still be in that occupation at the following census in the age interval n+2 provided none of them had switched to another occupation or no persons of the original census in the age interval n had entered this occupation during the decade. Since neither of these is the case, one must multiply the number of persons in age interval n of a particular occupation not only by the appropriate FCSR but also by a coefficient that will show the difference in the labor force participation rate for that occupation between the age intervals n and n+2 in order to get the number of persons in the age interval n+2 of the following census who are survivors from the previous one.

If it is assumed that differences in the labor force participation rate among different age groups did not change from the beginning of one decade to the beginning of the next one, then the number of persons in age interval n of a particular occupational group would have to be multiplied by (a) the coefficient $R_{n,}$ where

$$(7) \quad R_n = (O_{n+2}/O_n)\ (P_n/P_{n+2})$$

with O and P representing the number of gainfully occupied persons of a particular occupational group and the total number of foreign-born white persons of that sex, respectively, in the specified age intervals, and by (b) the appropriate FCSR to get the number of gainfully occupied foreign-born whites of the same

occupation in age interval n+2 at census 2 who are survivors from foreign-born whites who were in the United States at census 1. By subtracting the survivors from the number enumerated at census 1, one obtains an estimate of the number of immigrants or emigrants during the decade from census 1 to 2 in age interval n+2 who belonged to the particular occupational group.

The above method was used to find the number of immigrants by sex and occupational group in the five year age intervals from 20 to 65 and those 65 and over. In order to calculate the R_n's for the intervals 55-59, 60-64, and 65 and over, it was necessary to have an occupational distribution by five year age intervals up to age 75. Because such information is available only for the 1930 census, the 1930 R_n's had to be used for age intervals above 55 for all the censuses from 1870 to 1930. Since during this period there was very little change in either government or private old age pensions schemes, there should not have been much change in the labor force participation rate of older persons. Therefore, my use of the 1930 R_n's for the other censuses appears justified.

The number of survivors in the age intervals 10-14 and 15-19 were estimated by assuming that they had the same labor force participation rate by occupation as the gainfully occupied foreign-born whites in those age intervals at census 2. Thus, to get the number of gainfully occupied who are survivors from the previous census' age intervals of 0-4 and 5-9, I multiplied the number of foreign-born whites in these age groups at the

previous census by the appropriate FCSR and by the labor force participation rate for the particular occupation in the age intervals 10-14, and 15-19 at the second census (R'_{c+1}) where

$$(8) \quad R'_c = O_n/P_n$$

with O_n and P_n being equal to the number of foreign-born whites 10-14 or 15-19 who are in the particular occupation and to the total number of foreign-born whites 10-14 or 15-19, respectively.

Table 12 shows net immigration of gainfully occupied foreign-bornwhites classified by sex, age, and occupation for the period 1870-1930 as derived by the method which was just explained. The figures are in thousands of persons because the estimates are rather rough and it would, therefore, be misleading to present the figures to the last digit. This does not mean, however, that they are not reliable or useful. All it means is that the margin of error is such that it is impossible to measure small magnitudes for they may be due to errors of estimates. However, as is shown in the next section, a comparison of my estimates with estimates of net immigration by Kuznets and Rubin indicates that these estimates are reasonably accurate.

Comparison with Estimates of Kuznets and Rubin

Table 13 presents a comparison between the estimates of net immigration per decade made by Kuznets and Rubin[13] and

[13] op. cit., Tables B-4, and B-5, pp. 100-101.

TABLE 12.- Net immigration per decade of gainfully o
sex and age,

Decade and Occupational Group	Sex	Number of Persons				
		10-14	15-19	20-24	25-29	30-3
Total† 1870-1930	M and F	96	1039	2751	2918	1868
	Male	63	569	1949	2436	1660
	Female	35	471	804	482	209
Total† 1870-1880*	M and F	18	106	260	240	176
	Male	12	57	178	202	155
	Female	6	49	82	39	21
1. Professional	Male	---	---	2	4	3
	Female	---	---	2	2	1
2. Proprietors, managers and officials	Male	---	2	20	35	38
	Female	---	---	---	---	---
3. Clerks and kindred workers	Male	1	4	8	8	5
	Female	---	1	2	1	---
4. Skilled workers and foremen	Male	---	5	26	33	23
	Female	---	1	1	---	---
5 plus 6. Semiskilled and unskilled workers	Male	10	46	122	121	87
	Female	6	47	76	35	19
Total† 1880-1890*	M and F	43	221	563	497	356
	Male	27	126	394	427	324
	Female	16	95	170	69	33
1. Professional	Male	---	1	5	9	6
	Female	---	1	5	3	2
2. Proprietors, managers and officials	Male	1	5	38	63	64
	Female	---	---	1	1	1
3. Clerks and kindred workers	Male	3	11	27	25	15
	Female	1	3	6	2	1
4. Skilled workers and foremen	Male	1	13	68	84	57
	Female	---	1	2	1	---
5 plus 6. Semiskilled and unskilled workers	Male	22	97	257	247	181
	Female	15	89	156	63	29

ully occupied white immigrants into the United States by age, 1870-1930

ersons in Thousands in Specified Age Interval								
9 30-34	35-39	40-44	45-49	50-54	55-59	60-64	65 and over	Total at 10 and over
1868	949	499	276	20	29	53	244	10743
1660	819	407	215	-21	3	33	218	8350
209	132	90	62	41	24	20	24	2393
176	91	60	49	31	24	24	53	1133
155	80	52	43	27	20	21	49	896
21	12	8	6	4	3	3	4	237
3	2	2	1	1	1	1	1	18
1	1	1	---	---	---	---	---	7
38	26	20	18	14	11	11	26	221
---	---	---	---	---	1	---	1	5
5	3	2	2	1	1	1	1	37
---	---	---	---	---	---	---	---	5
23	10	6	4	2	1	2	6	118
---	---	---	---	---	---	---	---	3
87	38	23	17	9	7	7	15	501
19	10	7	5	4	2	2	3	216
356	194	126	71	41	26	22	76	2236
324	178	115	65	36	22	20	70	1806
33	15	11	6	4	3	2	5	431
6	5	4	2	2	1	1	2	39
2	1	1	---	---	---	---	---	13
64	37	23	10	2	1	2	29	274
1	1	1	1	---	---	---	1	6
15	11	8	5	4	2	2	2	116
1	---	---	---	---	---	---	---	14
57	42	31	21	14	10	8	15	364
---	---	---	---	---	---	---	---	5
181	83	50	26	13	8	7	22	1013
29	13	9	5	4	2	2	4	392

TABLE 12. - Continued

Decade and Occupational Group	Sex	Number of Perso				
		10-14	15-19	20-24	25-29	30-
Total† 1890-1900	M and F	29	179	422	402	26
	Male	19	98	290	339	24
	Female	11	81	133	63	2
1. Professional	Male	---	1	4	9	6
	Female	---	1	5	4	2
2. Proprietors, managers and officials	Male	---	3	20	42	36
	Female	---	---	1	1	1
3. Clerks and kindred workers	Male	3	10	24	22	13
	Female	1	6	13	5	2
4. Skilled workmen and foremen	Male	1	10	48	57	38
	Female	---	1	3	1	---
5 plus 6. Semiskilled and unskilled workers	Male	15	74	194	209	151
	Female	10	72	110	53	20
Total† 1900-1910	M and F	3	265	776	821	52
	Male	2	141	615	694	46
	Female	1	124	161	127	60
1. Professional	Male	---	1	11	20	12
	Female	---	2	9	8	1
2. Proprietors, managers and officials	Male	---	2	43	79	66
	Female	---	---	2	3	
3. Clerks and kindred workers	Male	1	23	55	46	21
	Female	---	21	21	10	
4. Skilled workmen and foremen	Male	---	14	100	146	102
	Female	---	2	5	3	2
5 plus 6. Semiskilled and unskilled workers	Male	1	100	407	403	261
	Female	1	98	124	103	4
Total† 1910-1920	M and F	2	157	386	538	23
	Male	2	90	277	453	21
	Female	1	68	109	85	2

Persons in Thousands in Specified Age Interval								
30-34	35-39	40-44	45-49	50-54	55-59	60-64	65 and over	Total 10 and over
269	117	64	48	8	1	4	60	1605
243	102	53	39	1	-1	1	53	1235
25	15	10	10	7	2	4	7	369
6	3	2	1	1	1	1	2	30
2	1	1	1	1	1	---	1	18
36	5	-3	1	-11	-12	-9	21	92
1	1	1	1	1	-1	2	2	9
13	8	5	5	4	3	3	3	102
2	1	1	---	---	---	---	---	30
38	19	10	7	---	1	1	11	203
---	1	1	---	---	---	---	---	8
151	68	40	24	7	5	4	18	808
20	41	8	8	6	3	2	4	305
527	332	215	118	59	41	28	31	3215
467	283	176	79	29	20	12	23	2542
60	50	39	39	30	21	15	8	673
12	1	-4	2	1	1	1	1	47
4	2	2	2	1	1	1	1	32
66	35	14	-13	-19	-20	-17	-21	149
3	3	3	---	---	-2	-1	-2	10
24	3	-1	6	4	5	4	5	176
3	2	1	2	1	---	---	---	63
102	47	26	19	8	4	3	7	477
2	1	1	1	1	---	---	---	15
264	197	140	65	35	29	22	30	1694
47	41	32	35	26	20	16	11	552
239	48	-34	-14	-52	-32	-10	17	1245
218	45	-31	-6	-42	-24	-5	19	996
21	3	-4	-8	-10	-8	-5	-2	249

TABLE 12.- Continued

Decade and Occupational Group	Sex	Number of Pe				
		10-14	15-19	20-24	25-29	30-
1910-1920 Continued						
1. Professional	Male	---	1	5	14	
	Female	---	1	6	8	
2. Proprietors, managers and officials	Male	---	1	17	43	1
	Female	---	---	1	1	--
3. Clerks and kindred workers	Male	1	17	31	41	2
	Female	---	22	32	20	
4. Skilled workmen and foremen	Male	---	10	52	107	6
	Female	---	1	2	2	--
5. Semiskilled workers	Male	---	25	77	112	6
	Female	---	33	49	34	1
6. Unskilled workers	Male	1	35	95	136	3
	Female	---	12	19	20	-
Total† 1920-1930	M and F	1	110	341	420	30
	Male	1	56	193	321	25
	Female	---	54	148	99	5
1. Professional	Male	---	1	8	17	1
	Female	---	2	11	10	
2. Proprietors, managers and officials	Male	---	1	8	30	3
	Female	---	---	1	1	
3. Clerks and kindred workers	Male	---	13	41	54	4
	Female	---	17	47	30	1
4. Skilled workmen and foremen	Male	---	7	45	79	6
	Female	---	---	1	1	--
5. Semiskilled workers	Male	---	16	48	77	6
	Female	---	20	37	29	1
6. Unskilled workers	Male	---	18	42	64	3
	Female	---	15	51	28	1

*Includes nonwhites.

---Less than 500.

†Totals may not add up due to rounding errors.

Persons in Thousands in Specified Age Interval								
30-34	35-39	40-44	45-49	50-54	55-59	60-64	65 and over	Total 10 and over
7	2	1	1	---	---	1	1	33
4	2	2	1	1	1	---	1	26
18	-11	-23	-16	-25	-18	-9	-6	-29
---	---	-1	-1	-1	-1	-1	---	-4
22	11	6	7	5	4	3	4	153
8	5	4	3	2	1	1	1	99
64	33	15	16	7	7	7	14	331
---	---	---	1	---	---	---	---	6
69	41	21	19	11	9	8	11	404
12	5	2	---	---	-1	---	---	133
37	-32	-51	-33	-40	-26	-13	-6	103
-3	-9	-10	-12	-11	-8	-5	-4	-11
305	167	68	4	-67	-31	-15	7	1309
254	131	42	-5	-72	-34	-16	4	875
51	36	26	9	6	3	1	2	434
15	11	10	3	2	1	1	2	70
6	5	4	4	3	2	1	1	49
33	19	6	-17	-21	-20	-14	-5	21
1	1	---	---	---	---	---	---	2
42	33	29	11	8	5	5	6	247
14	10	8	6	4	2	1	1	140
68	48	31	9	2	-1	2	5	295
---	---	---	---	---	---	---	---	1
61	40	23	7	1	-1	1	3	277
16	10	6	-1	-1	-1	-1	---	115
36	-21	-56	-18	-65	-18	-11	-6	-34
14	10	7	1	1	---	---	1	128

TABLE 13.—Comparison of my estimates of net immigration to the United States derived from the data of Table 12 with those of Kuznets and Rubin by sex, 1870–1930

Estimate	Net Immigration in Thousands					
	1920-30	1910-20	1900-10	1890-1900	1880-90	1870-80
Male						
1. Present	1095.0	1304.5	2914.5	1514.6	2219.0	1112.7
2. Kuznets and Rubin	1511.1	1612.0	3182.6	1259.5	2659.5	1330.3
3. Difference (1-2)	-416.1	-307.5	-268.1	255.1	-440.5	-217.6
4. Census enumeration minus Kuznets' estimate of foreign-born white population at end of decade	-123.0[a]	-206.0[a]	58.6[a]	371.1	-354.1	-118.7
5. Revised difference (3-4)	-293.1	-101.5	-209.5	-116.0	-86.4	-98.9
6. Percent discrepancy (5/2 x 100)	-19.4	-6.3	-6.6	-9.2	-3.2	-7.4
Female						
1. Present	1526.2	855.8	2984.9	1597.2	1810.6	1107.6
2. Kuznets and Rubin	1574.0	1585.1	2102.0	1272.6	1833.1	938.8
3. Difference (1-2)	-47.8	-729.3	882.9	324.6	-22.5	168.8
4. Census enumeration minus Kuznets' estimate of foreign-born white population at end of decade	-101.4[a]	-152.4[a]	-1.4[a]	137.0	-12.6	39.8
5. Revised difference (3-4)	53.6	-566.9	881.5	187.6	-9.9	129.0
6. Percent discrepancy (5/2 x 100)	3.4	-35.8	41.9	14.7	-0.5	13.7

[a] Net emigration of naturalized foreign-born and Mexicans subtracted and net migration of nonwhites added.

my estimates of net immigration based on the data of Table 12. The present estimates of Table 13 were derived from those of Table 12 by assuming that for each sex the labor force participation ratio at a particular age interval was the same as the labor force participation ratio for foreign-born whites of that sex and age at the end of the decade during which the immigration occurred.

Row 3 gives the difference between my estimates and those of Kuznets and Rubin. However, in their estimate of net immigration per decade they wound up with a foreign-born white population at the end of a decade that was either larger or smaller than the one enumerated by the Census. In addition, their estimates do not include net emigration of naturalized foreign-born, and of Mexicans which are included in my estimates. Since the latter tend to raise Kuznets' estimate of net immigration, they were added to Kuznets' estimates of the foreign-born population. Similarly, Kuznets' estimates include net immigration of nonwhites for the entire period[14] while mine include them only from 1870-1880. Net immigration of nonwhites was, therefore, subtracted from Kuznets' population estimates before getting the difference between the Census enumeration of the foreign-born white population and the one estimated by Kuznets. This difference is shown in row 4.

Since my estimates are based on the gainfully occupied foreign-born white population as enumerated by the Census, the difference between the foreign born population as enumerated

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[14] Ibid., Table 10, p. 74.

by the Census and the one estimated by Kuznets and Rubin was subtracted from the difference between my estimates and their estimates of net immigration per decade. The revised difference is shown in row 5. As can be seen from row 6, the revised percentage difference between my estimates and theirs ranges from minus 3.2 to minus 9.2 for the period 1870-1920 for males. This underestimate is, as is explained in the next section, inherent in using the forward census survival ratio method. The minus 19.4 discrepancy for the 1920-30 decade is, however, too large to be explained by that alone. It is most probably due to the fact that "largely because of legislative changes, immigration during that decade became more a matter of brining in relatives and dependents," and therefore "the ratio of males fit to join the labor force dropped appreciably."[15] The labor force participation rate among male immigrants during that decade was, therefore, lower than the foreign-born white population of 1930. This would result in my underestimation of net immigration.

The comparison for females seems rather erratic. However, if one excludes the decades of 1900-10 and 1910-20, one gets a discrepancy ranging from -0.5 to 14.7 percent with an average discrepancy of 5.3 percent. The reason why the female discrepancy is positive while the male one is negative is that recent immigrant females most probably have a higher labor force participation rate than does the foreign-born population. Finally, one has to

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[15] Ibid., pp. 48-49.

explain in the discrepancy of 41.9 percent for 1900-10 which is then followed by a discrepancy of -35.8 percent for the following decade. I would explain it by assuming that many married male immigrants of the 1900-10 decade brought over their wives and children during the next decade. Thus, the female immigrants of 1900-10 contained a disproportionate number of unmarried females who have a higher than average labor force participation rate which would account for the overestimate. Similarly, the 1910-20 decade contained a disproportionate number of married females who have lower than average labor force participation rate which would account for the underestimate. If I combine both decades I get an overestimate of 8.0 which is in line with the average for the other decades. One can explain in the same manner the -0.5 and 14.7 percent discrepancies for the decades of 1889-90 and 1890-1900, respectively.

One finds evidence for the above assumption by looking at the sex distribution of Kuznets' net immigration estimates. Thus, the 1900-10 female/male ratio was about 2/3 while for the following decade it is slightly over one. Similarly, the ratio for the 1880-90 decade is 0.69 while for the following one it is 1.0. For this reason, although my female estimates for the entire period are close to those of Kuznets and Rubin, the estimates for the individual decades are not. Since the factors that cause disparity between my decade estimates and theirs do not operate in the case of the estimates of Table 12, this comparison would tend to indicate that my estimates are reliable.

Sources of Error

The change in the number of foreign-born persons between any two censuses, f' - f, is equal to the number of immigrants who have entered the country during the decade, I, minus the number of foreign-born who have emigrated, E, and the number of foreign-born who have died during the decade, d, i.e.,

(9) $f' - f = I - (E+d)$.

Net immigration for any decade, I_n which is equal to the number of immigrants minus the number of emigrants, i.e., I-E, is, therefore, given by

(10) $I_n = f' - f+d$.[16]

Hence, in order to measure net immigration from census data precisely one would have to know the number of foreign-born who died during the decade. Since this is not known it becomes necessary to use some survival ratio technique.

By substituting $f-(1 - r) f$ for rf in the forward census survival ratio formula (1), we get

(11) $I_n = M = f' - f+(1 - r)f$

which is the same as (10) except that $(1 - r)f$ has been substituted for d. Assuming correct enumeration by the census, the forward census survival method will fail to yield exact net immigration estimates to the same extent that $(1 - r)f$ fails to estimate correctly the number of deaths during the decade. If deaths are overestimated then net immigration will be

[16]Simon Kuznets, op. cit.,, p. 11.

overestimated and if deaths are underestimated then net immigration will also be underestimated.

In equation (10) the number of deaths that occur during a decade, d, consists of the deaths of nonimmigrant foreign-born, d_{nk}, i.e., deaths of foreign-born who came in previous decades, and the deaths of immigrants who came during the decade, d_i. These are not the deaths that are obtained by (1 - r)f of the forward census survival method, for the latter imputes a death rate to the foreign-born population that was here at the beginning of the decade. This consists of deaths of emigrants, d_e, and death of those who did not emigrate but remained in this country, c_{ne}. No allowance is made for the death of immigrants who arrived during the decade but died before the decennial census, d_i. The error that is introduced by the forward census survival method is, therefore, equal to $d_e - d_i$, for $d_{ni} = d_{ne}$. Net immigration is overstated by deaths of emigrants and understated by deaths of immigrants.[17] Since the period covered by Table 12 is one of heavy net immigration, the error is negative.

In addition to the above source of error the estimates of Table 12 may fail to represent the exact amount of net immigration for the following reasons:

1. The use of Lee's FCSR which are for the entire foreign-born white population to calculate survivors for particular occupational groups. As was explained earlier, this should not

[17] Lee, op. cit., pp. 16 and 24.

cause any significant error for as long as differences in enumeration between censuses are the same for both groups the FCSR are the same.

2. The derivation of the age distribution of the gainfully occupied for some censuses on the basis of the known distribution of the entire foreign-born population and the distribution for the gainfully occupied foreign-born of another census by means of equation (2.) This procedure did not introduce much error because the C_n's, which measure the age distribtuion of the gainfully occupied in each of the occupational groups for a standardized total population, do not differ greatly for the censuses for which the age distribution is given. The difference is almost always less than ten percent in the great majority of cases less than five percent. The only exception is the 10-14 interval where a sharp break occurs from 1900 to 1930 but since it is due to the child labor legislation which was passed in the 1900-1910 decade, it should not affect the use of the 1890 data for 1880 and 1870 nor the use of the 1930 data for 1910 and 1920.

3. My use of equation (7) to account for the differences in the labor force participation rate of the respective occupational groups from age interval n at census 1 to age interval n+2 at census 2 is not strictly correct. The reason for this being that (7) is based on data of persons in age intervals n and n+2 at census 1 but what we need is the data for these at census 2. It may be the case that ten years later these persons

may have improved their skill due to the fact that they are here ten years longer and to the fact that the occupational composition of the total labor force in the United States will have changed. However, since such changes occur rather slowly over the decades, the use of (7) is reasonable.

4. Finally, there is the inaccuracy introduced by my series on the occupations of the gainfully occupied foreign-born which, as discussed earlier, contains some degree of incomparability.

For the above reasons it was decided to present the figures in Table 12 in thousands.

Other Methods of Estimating Net Immigration from Census Data on the Foreign-Born

Instead of estimating net immigration of gainfully occupied through the use of forward census survival ratios, one could do it by applying the reciprocal of the forward census survival ratio, i.e., the reverse ratio, 1/r, to the foreign-born gainfully occupied at the second census. Thus, if we let M' equal net immigration of gainfully occupied person per decade, f' the number of such persons enumerated at census 2, and f their number at census 1, then

$$(12) \quad M' = f'(1/r) - f.$$

By substituting $f'+f'([1-r]/r)$ for f'/r in (12), we get

$$(13) \quad M' = f' - f + f'([1-r]/r).$$

The imputed death rate is therefore equal to $f'([1-r]/r)$. In this method deaths of immigrants, i.e., those foreign-born

enumerated at census 2 who came in as immigrants during the decade, are exaggerated because they are revived for the entire ten year period even though they have been in the country only part of that time. The resulting error d_i, in the estimation of M', is, therefore, positive. On the other hand, deaths of nonimmigrants, i.e., those who came in earlier decades, is underestimated because the emigrants of this group are not enumerated at census 2 and are consequently not revived. The resulting error, d_e, is obviously negative.[18] Since the period covered by this study, 1870-1930, is one of heavy net immigration, the total error that would have been caused by use of this method, d_i+d_e, would have been positive. It would have had affected our results appreciably for we would have counted these non existent immigrants as being here for the rest of their life. In the forward census survival method, however, the negative error was not serious, for, as was explained earlier, the missed immigrants were here only at the most ten years.

Another way of estimating the net immigration of the gainfully occupied is by using life table survival ratios instead of census survival ratios. This was the method followed by Kuznets and Rubin[19] to estimate net immigration from 1870-1940.

However, since "the data used in the calculation of official life tables have been smoothed and corrected to modify

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[18] Ibid.

[19] op. cit., Part II.

the effect of underenumeration, misstatement or age, and erratic fluctuations in mortality rates,"[20] their application to imperfect census data may give misleading results. Thus, for example, suppose a life table survival ratio of .9 accurately reflects survival from the age interval 10-14 to 20-24 and that the actual number of foreign-born at the beginning of the decade is 1000 but only 900 are enumerated and that during the decade there were 1000 immigrants. Then, if we assume that those 20-24 are enumerated by the census perfectly, the forward census survival ratio would be equal to 1.00. If the latter were used to get an estimate of immigrants and survivors and 1000 immigrants which is correct. Life table ratios would, on the other hand give us an estimate of 810 survivors, i.e., 0.9 or 900, and 1090 immigrants which is incorrect. Hence, we see that differences in enumeration among different age groups will lead to errors in estimates of net immigration. This will not be the case with census ratios for they will be reflected in the ratios. Another reason for not using life table ratios is that there are no official life tables for the country as a whole or for an appreciable number of states prior to 1900 and the ones for the death registration areas of 1900-02 and 1909-11 are based on only ten states and the District of Columbia and those of 1919-21 are based on the mortality experience of thirty-four states and the District of Columbia.[21]

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[20] Lee, op. cit., p. 24.

[21] Ibid., pp. 25-26.

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