IMMIGRATION, MINIMUM WAGES, AND NON-POVERTY POPULATION GROWTH

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ABSTRACT

Traditional measures of poverty are informative in indicating the degree of economic deprivation in a population at a cross-sectional point in time, but they do not consider growth in the size of the non-poverty population. We develop a measure of non-poverty population growth in order to explore whether it constitutes a useful indicator of an important demographic dynamic. We illustrate our approach with an analysis of the U.S. states using Census data from 1990, 2000, and 2010. The results indicate that the extent to which the non-poor population increased across states is uncorrelated with the initial poverty rate as conventionally measured. Broken down by nativity, the findings further show that some states with official poverty rates above the national average (e.g., Arizona, Georgia, and Texas) nonetheless had some of the highest rates of non-poor population growth among less skilled immigrants. By contrast, other states with official poverty rates below the national average (e.g., Connecticut, New Hampshire and Vermont) often had low rates of non-poor population growth among less skilled immigrants. These findings suggest that low initial poverty rates do not necessarily contribute substantially to the alleviation of global poverty through the immigration of less skilled persons from less developed nations. However, the rate of non-poor population growth among less skilled immigrants also appears to be uncorrelated with state variation in minimum wages even after taking into account a couple of control variables.

Poverty research has made notable progress in recent years, but the focus has been on poverty rates viewed in cross-section. The following is an exploratory analysis which seeks to provide a broader perspective on population change relating to poverty reduction. Part of the rationale for our investigation is the immigration of less skilled workers from less developed nations into the U.S. Cross-sectional poverty rates for the U.S. do not count the reduction in poverty that often occurs when an immigrant from a less developed nation escapes poverty in her or his native country by immigrating to the U.S. Although less skilled immigrants have a higher poverty rate than the native born in the U.S., the poverty rate among these immigrants in the U.S. would often be even higher were they residing in a less developed nation with lower average wages.

In the following, we consider an alternative descriptive measure by exploring a measure of non-poor population growth. Decomposition methods are then utilized to assess the extent to which non-poverty population growth derives from the immigration of less skilled immigrants who are usually at high risk of poverty in their countries of origin. Our analysis further derives components for high skilled immigrants as well as native born (i.e., non-immigrant) persons. We also investigate correlations and regression analysis across the U.S. states in regard to variation in non-poverty population growth and minimum wages.

THEORETICAL BACKGROUND

The classic Malthusian theory (Malthus 2000 [1798]) highlighted the significance of the high fertility of the poor in 18th century England. The theory identified population growth as a fundamental cause of demographic disequilibrium that leads to resource scarcity. Malthus' general prediction was that a rate of fertility which exceeds the rate of increase in the food supply would result in mass starvation to restore demographic equilibrium. This basic Malthusian "population principle" would later become associated with the term "the dismal science."

While dropping any explicit reliance on Malthusian theory, the relation between poverty and population growth has continued to be a topic of demographic research. Demographic discussions of economic development typically assume that a reduction in the fertility rate (i.e., to a level below natural fertility) is associated with the demographic transition which ultimately leads to higher living standards in a society (Kirk 1996). A major mediating factor in this regard is human capital investment, and high fertility is often believed to result in fewer resources that are available for per capita investments in education, health, and public infrastructure (Cypher and Dietz 2008).

While the precise relationship between poverty and population growth continues to be debated for developing countries, this issue has not been considered for developed nations. Developed nations are characterized by a low level of fertility as well as a low level of absolute poverty (reflected in higher living standards) particularly in comparison to developing nations. Population growth is also typically quite low in most developed nations so the Malthusian theory would seem to bear little relevance to them.

In recent years, however, the issue of describing poverty in developed nations has become somewhat more complicated by variation in the rates of immigration of persons from developing nations (with comparatively high rates of poverty) to developed nations (with comparatively low rates of poverty). Due to the disparity in living standards between developed and developing nations, persons from the latter are often motivated to emigrate to the former. The poverty rate may be impacted in those developed nations that have received a large number of immigrants from developing nations.

Immigration is not traditionally considered when comparing poverty rates across different developed nations. Instead, the most common approach is to use headcount measures of poverty (e.g., the proportion of persons whose annual income falls below some specified poverty line). Conventional headcount measures of poverty do not systematically indicate any specific information on immigration, population size or population growth. Their objective is simply to describe the proportion of the population that lives in poverty for any given year.

Figure 1: Welfare Implications of Changes in Poverty and Population Size in Developed Nations given Immigration from Less Developed Nations

		POVERTY RATE (in a Developed Nation)	
		DECREASE	**INCREASE**
POPULATION SIZE (in a Developed Nation in Relation to Immigration from a Low-Wage Nation)	**DECREASE (due to Emigration to Less Developed Nations)**	Ambiguous Change in Total Welfare (seemingly positive)	Definite Decrease in Total Welfare
	INCREASE (due to Immigration from Less Developed Nations)	Definite Increase in Total Welfare	Ambiguous Change in Total Welfare (seemingly negative)

When immigration from developing nations to developed nations is common, aggregate human welfare is presumably enhanced when (ceteris paribus) larger numbers of immigrants to developed nations can enjoy a higher standard of living and avoid poverty in less developed economies. In other words, in the context of high immigration from developing nations to developed nations, total human welfare is increased by enlarging the total number of people that is above the poverty line. This conclusion obviously follows from the classical utilitarian theories of John Stuart Mill and Jeremy Bentham, but it would also appear to be generally consistent with the "maxi-min" welfare perspective developed by John Rawls.

Figure 1 summarizes the welfare implications of changes in poverty and population size in developed nations given the context of immigration from less developed nations that have notably higher poverty rates. A definite gain in total welfare seems unambiguous in the case when the poverty rate is declining and the population size is increasing due to the immigration of less skilled workers from less developed nations. In this case, less skilled immigrants will tend to be paid higher wages in the developed nation (compared to average wages in less developed nations) while the poverty rate is declining overall in the developed population as a whole. Conversely, a definite loss in total welfare seems unambiguous in the case when the poverty rate is rising in the developed population overall and its population size is decreasing due to the emigration of less skilled workers to less developed nations where average wages are lower (i.e., the less skilled emigrants are not counted in the poverty rate for the developed nation but they are likely to experience even higher poverty rates in the less developed nations to which the emigrants return).

On the other hand, the shaded cells of Figure 1 illustrate more ambiguous cases in regard to the change in total welfare. For example, when the poverty rate increases then this would seemingly imply a reduction in welfare. However, if the poverty rate increases during a period in which the population size is also increasing due to the immigration of less skilled workers from less developed nations, then the increase in the poverty observed in the developed nation could conceivably be less than the number of less skilled immigrants who are brought out of poverty by coming to reside in the developed nation. Conversely, another ambiguous case arises when the poverty rate decreases during a period in which the population size declines due to the emigration of less skilled workers to less developed nations. In this case, the decrease in poverty observed in the developed nation might be less than the number of less skilled immigrants who fall into poverty by returning to a less developed nation.

Our objective in the following analysis, however, is not to derive a methodology for international welfare assessments. We refer to Figure 1 only to provide a theoretical context to further motivate our investigation of poverty and population changes. Our analysis is primarily exploratory, but we suggest that it is worthwhile to consider a broader perspective on the details of population dynamics in relation to changes in poverty. In particular, by investigating the growth in the non-poverty population directly, our study seeks to avoid ambiguity in the accounting of changes in total welfare.

A METHOD FOR STUDYING NON-POVERTY POPULATION GROWTH

In traditional approaches, headcount measures of poverty are often used in terms of a basic proportion (e.g., Iceland 2006):

$$HPR = \text{headcount poverty rate} = \frac{\text{persons below poverty threshold}}{\text{total population}} \tag{1}$$

Calculated in this way, the HPR is an important demographic characteristic that simply refers to the extent of aggregate economic deprivation in a society at a particular point in time. When comparing developed nations using 21st century data, the U.S. usually stands out as having a higher rate of poverty both in terms of absolute and relative poverty thresholds (Iceland 2006; Meyer and Wallace 2009).

While we agree that headcount measures (of the sort relating to equation 1) are informative, we propose an additional indicator that we refer to as the rate of non-poor population growth.[1] As a population characteristic, the rate of non-poor population growth is not meant to be indicative of the proportion of persons in economic hardship at any point in time for a given society. Rather, we define the rate of non-poor population growth (NPPG) as *the change in the number of persons who are non-poor in a society at a later point in time (time 2) relative to an earlier point in time (time 1), standardized by the population size at time 1*. That is, the NPPG refers to the extent to which a population is increasing the number of persons who are not poor over time relative to its baseline size. Rather than measuring the extent of economic deprivation at any point in time for a given society, NPPG indicates the extent of increased aggregate economic non-deprivation over time for a given society. While we agree that aggregate economic well-being for a given society is increased when the HPR declines (ceteris paribus), we point out that aggregate societal economic well-being is also increased in absolute terms when the NPPG increases.

[1] In principle, poverty gap measures are theoretically attractive (e.g., Sen 1976), but in practice their validity requires far more reliable information on income than do headcount measures. We leave aside debates about the appropriate derivation of the poverty threshold or the proper measurement of income (Iceland 2006) because our approach is flexible in regard to those methodological issues.

In contrast to equation 1, the rate of non-poor population growth may be defined as:

$$NPPG = \frac{NP_2 - NP_1}{T_1} \qquad (2)$$

where NP_2 refers to the number of persons who are non-poor at time 2, NP_1 refers to the number of persons who are non-poor at time 1, and T_1 refers to the total population size at time 1 (i.e., T_1 refers to NP_1 plus the number of persons who are poor at time 1 [P_1]). Equation (2) thus identifies as a population characteristic the rate at which a society is increasing its number of non-poor persons.

NP_2 may be further broken down as follows:

$$NP_2 = NP_2^{NB} + NP_2^{FB-LS} + NP_2^{FB-HS} \qquad (3)$$

where NP_2^{NB} refers to the number of native-born persons who are non-poor at time 2, NP_2^{FB-LS} refers to the number of less skilled, foreign-born persons who are non-poor at time 2, and NP_2^{FB-HS} refers to the number of high skilled, foreign-born persons who are non-poor at time 2. Similarly, NP_1 may be broken down as:

$$NP_1 = NP_1^{NB} + NP_1^{FB-LS} + NP_1^{FB-HS} \qquad (4)$$

where NP_1^{NB} refers to the number of native-born persons who are non-poor at time 1, NP_1^{FB-LS} refers to the number of less skilled, foreign-born persons who are non-poor at time 1, and NP_1^{FB-HS} refers to the number of high skilled, foreign-born persons who are non-poor at time 1.

Inserting equations (3) and (4) into (2), we then obtain

$$NPPG = NPPG^{NB} + NPPG^{FB-LS} + NPPG^{FB-HS} \qquad (5)$$

where $NPPG^{NB}$ refers to the component of NPPG that is due to non-poor population growth among native-born persons, $NPPG^{FB\text{-}LS}$ refers to the component of NPPG that is due to non-poor population growth among less skilled, foreign-born persons, and $NPPG^{FB\text{-}HS}$ refers to the component of NPPG that is due to non-poor population growth among high skilled, foreign-born persons.

Although a decline in the HPR indicates improved societal economic well-being, the latter may also occur due to an increase in the NPPG, and these two rates need not necessarily have a high negative correlation across developed nations or other places. Countries that have a low HPR may be more effective at providing economic resources and opportunities to disadvantaged persons at a particular point in time, but this source of spending may limit the capacity of those societies to generate non-poverty opportunities at a later point in time. Indeed, unlike the HPR, the NPPG may actually be negative if the non-poor population at time 2 is less than the non-poor population at time 1 (in which case the numerator of equation 2 will be negative).

Furthermore, the decomposition given by equation (5) permits the assessment of the extent to which non-poor population growth may be benefitting less skilled immigrants (i.e., $NPPG_{fb\text{-}ls}$) and high skilled immigrants (i.e., $NPPG_{fb\text{-}hs}$). In a more globalized world where international migration is constantly occurring (Bane 2009), this decomposition provides useful descriptive information about how much a population may be successfully absorbing less skilled immigrants which may contribute to the alleviation of global poverty.

Although classic Malthusian theory was not concerned with immigration, our approach is nonetheless inspired by the "population principle". First, our measure is consistent with the dynamic aspect of poverty and population growth as is underscored by the Malthusian perspective. Second, its fundamental insight---that population growth may deplete the amount of resources that are available per capita to remove people from poverty---is implicitly reflected in our construction of the NPPG.

We further note that since NPPG can be decomposed into additive components, shown in equation (5), the relative contribution of each component easily follows. Given that a society has increased its non-poor population over some time period, the decomposition reveals which part of the growth is due to native- or foreign-born persons, as well as less skilled and high skilled among the foreign-born. For example, the proportion of $NPPG^{FB\text{-}LS}$ out of the overall NPPG indicates the extent to which the growth in the non-poor population was more focused on the absorption of less skilled immigrants who are potentially at high risk of poverty in their home countries (i.e., especially in the case of less developed nations). It is conceivable that the components of NPPG operate in different directions (e.g., positive non-poor growth for native born population and negative for foreign born). Hence, the proportion of each component may exceed 100 percent of the overall NPPG provided that the components sum to unity.

DATA AND VARIABLES

The aforementioned decomposition of NPPG may also be applied regionally to a single nation. In the following, we explore these measures using data from the 1990 and 2000 U.S. Census for the 51 U.S. states (including Washington, D.C.), as well as annual data from the American Community Survey (ACS) for the period of 2001-2010. Focusing on the U.S. states as the unit of analysis, we use the 5% Public Use Microdata

Samples (PUMS) from the 1990 and 2000 U.S. Census. Since the year 2000, the U.S. Census Bureau began collecting annual demographic, social, and economic data on American households using the American Community Survey, designed to replace the census long-form sample (U.S. Bureau of the Census 2009). Hence, we use the 2010 ACS nationally representative PUMS to produce NPPG estimates by state. For the U.S. as a whole, we supplement the decennial figures with annual estimates for the period of 2001-2009.

In these samples each individual is assigned a poverty status based on the federal poverty definition which itself depends on a person's household income level and number/composition of household family members (U.S. Bureau of the Census 2003). Once the household income ranks below the poverty threshold all household family members are considered poor. In the PUMS data, poverty status is represented as a percentage of the poverty threshold which we then collapsed into a binary category (i.e., whether below the threshold or not) as is commonly done (Iceland 2006). To adjust for the Census sampling design and match estimates in official publications[2] we exclude from the poverty universe populations lacking a poverty status[3] and use person-weights to estimate aggregate measures. Persons of all ages are included in our analysis.

Because our main objective is to illustrate the NPPG, we also simplify nativity status by measuring it as a dichotomy referring to native-born versus foreign-born. The former are those born in any U.S. state, in U.S. territories, or to American parents abroad

[2] Poverty: 1999; Census 2000 Brief. http://www.census.gov/hhes/www/poverty/publications/c2kbr-19.pdf (Retrieved on 1/2011).

[3] Populations outside of the census poverty universe include individuals living in institutions, military quarters and college dormitories, as well as unrelated individuals under 15 years of age.

while the latter are those born outside of the U.S. to non-American parents (whether naturalized or not). We define high skilled versus less skilled individuals based on educational attainment. Less skilled persons are those whose highest level of educational attainment is a high school degree or less. High skilled persons are those who have at least some college education (whether graduated or not) or any higher level of educational attainment (e.g., a bachelor's or graduate degree).

[Table 1 about here]

EMPIRICAL RESULTS

Results by State for 1990 to 2000

As is evident in Table 1, the HPR declined nationally from 13.1 percent in 1990 to 12.4 percent in 2000. Table 1 also shows significant state level variation with, for example, a 2.7 percentage point increase in Washington, D.C. and a 5.0 percentage point decrease in Mississippi from m1990 to 2000. The results in Table 1 indicate that 38 of the 51 states experienced reductions in the HPR during the decade while only 12 experienced an increase. New Hampshire maintained the nation's lowest poverty rate at 6.4 percent in both decades.

Although informative, these conventional results are not indicative of the considerable population dynamics that may occur despite only small fluctuations in poverty rates. For example, population growth in Connecticut was just 3.7 percent over during the 1990's. By contrast, Arizona experienced a remarkable population growth of 40.7 percent during that time span.

Given such substantial differences in population growth, the NPPG provides complementary information to the HPR by indicating the change in the size of the non-poor population. The latter may occur by reductions in poverty among existing residents or by the incorporation of new non-poor residents in the state (by birth or migration). States that have a low HPR at any given point in time are not necessarily those that increase the size of their non-poor population at a later point in time. The NPPG and the HPR are therefore both informative measures.

[Table 2 about here]

Table 2 shows the NPPG and its decomposition for each of the 51 states. For Connecticut, the NPPG is 2.24 percent. This figure implies that the non-poor population in Connecticut in 2000 had grown by 2.24 percent relative to the total population of Connecticut in 1990. By contrast, the NPPG is 37.00 percent for Arizona. This figure implies that the non-poor population in Arizona in 2000 had grown by 37.00 percent relative to the total population of Arizona in 1990. Arizona is thus adding more non-poor population than is Connecticut over this decade despite the fact that Arizona consistently had a poverty rate above the national average while Connecticut consistently had a poverty rate below the national average.

Table 2 also shows that the 37.00 percent growth rate for the non-poor population (i.e., NPPG) in Arizona may be broken down to 28.51 percent for native-born persons (i.e., $NPPG_{nb}$), 5.92 for foreign-born less skilled persons (i.e., $NPPG_{fb\text{-}ls}$), and 2.57 for foreign-born high skilled persons (i.e., $NPPG_{fb\text{-}hs}$). These figures are higher than the corresponding national figures that are given at the bottom of Table 2. Across the nation as a whole, non-poor population growth (i.e., NPPG) was 12.5 percent which may be decomposed into 8.55 percent for native-born persons (i.e., $NPPG_{nb}$), 2.16 percent for foreign-born less skilled persons (i.e., $NPPG_{fb-ls}$), and 1.79 percent for foreign-born high skilled persons (i.e., $NPPG_{fb-hs}$). Over this decade, Arizona was clearly well above average in adding non-poor population including all three of the demographic groups that we have identified.

The figures for Connecticut, on the other hand, are below the national average. Table 2 shows that the growth rate for the non-poor population in Connecticut between 1990 and 2000 was 2.24 percent which may be broken down to -0.04 percent for native-born persons, 0.85 for foreign-born less skilled persons, and 1.43 percent for foreign-born high skilled persons. That is, the population of non-poor native-born persons actually *declined* in Connecticut over this decade while increasing slightly for foreign-born less skilled persons, and slightly more for foreign-born high skilled persons.

Note that wide variation in these measures is apparent across many of the states as shown in Table 2. California, for example, was below the national average in terms of the NPPG but was above the national average in terms of the $NPPG_{fb-ls}$. That is, California had less than average percentage growth in the non-poor population overall but had an above average percentage growth in the non-poor population of less skilled immigrants. The HPR in California was below the national average in 1990 but it rose above the national average in 2000 (i.e., ΔHPR1990-2000 = 1.7 for California as shown in Table 1).

North Dakota represents the case with very little NPPG (i.e., 3.21 percent). However, the NPPG that it did have dominated its total population growth as its poverty rate declined (i.e., ΔHPR1990-2000 = -1.9 in Table 1). NPPG in North Dakota did not involve many foreign-born persons, however, as its $NPPG_{fb\text{-}ls}$, and $NPPG_{fb\text{-}hs}$, and are both far below their respective national averages.

By contrast, Nevada had virtually explosive non-poor population growth (i.e., NPPG = 60.39 percent). Its levels of $NPPG_{nb}$, $NPPG_{fb\text{-}ls}$, and $NPPG_{fb\text{-}hs}$ were each the highest scores on these indicators in the nation (i.e., 45.00 percent, 11.01 percent and 4.37 percent, respectively). Poverty did not decline during the 1990's in Nevada (i.e., ΔHPR1990-2000 = 0.0 in Table 1).

Aggregated to the national level, the growth of non-poor persons comprises nearly 92.8 percent of the overall growth in U.S. population. Of the non-poor growth, 17.3 percent can be attributed to the addition of non-poor less skilled immigrants. Within one decade, the U.S. has increased its net non-poor less skilled and high skilled immigrant populations by 2.16 percent and 1.79 percent (i.e., $NPPG_{fb\text{-}ls}$ and $NPPG_{fb\text{-}hs}$, respectively) of the overall 1990 population size (as shown at the bottom of Table 2). In terms of absolute numbers, these percentages imply that nearly 10 million foreign-born immigrants either overcame poverty or joined the U.S. population as non-poor residents between 1990 and 2000.

Results by State from 2000 to 2010

Table 1 was shows the HPR in 2010. Nationally, the HPR increased from 12.4 percent in 2000 to 15.5 percent in 2010 (which is also up from 13.1 percent in 1990 as shown at the bottom of Table 1). The poverty rate increased between 2000 and 2010 in almost every state. The increases were the greatest in Michigan, Indiana, Georgia, and North Carolina.

Table 2 shows that the NPPG was much lower from 2000 to 2010 than from 1990 to 2000. Nationally, the NNPG was just 5.42 percent from 2000 to 2010 which is less than half of what it was for the previous decade. Nationally, the figures for the total U.S. (at the bottom of Table 2) imply that $NPPG_{nb}$ was about 55.4 percent of NPPG during the 2000's (compared to 68.4 percent during the 1990's) while $NPPG_{fb\text{-}ls}$ was about 13.3 percent of NPPG during the 2000's (compared to 17.3 percent during the 1990's). Conversely, $NPPG_{fb\text{-}hs}$ increased to about 31.0 percent during the 2000's (compared to 14.3 percent during the 1990's). That is, during the most recent decade with its economic downturn, non-poverty population growth was generated more by high skilled immigrants than by low skilled immigrants.

During the 2000's, the states with the higher levels of NPPG tended to be those with higher levels of NPPG during the 1990's (although the rates were lower in the 2000's). Although $NPPG_{fb\text{-}ls}$ was lower during the 2000's, relatively higher rates for this decade were evident in Nevada, Texas, and Maryland. Maryland was one of only five states which actually experienced a tiny increase in $NPPG_{fb\text{-}ls}$ during the 2000's.

[Tables 3 and 4 about here]

Correlations across U.S. States

Table 3 shows the descriptive statistics across the states without weighting by population size. The correlations between the measures across the states (without weighting) are shown in Table 4. Regarding the correlation between NPPG and the poverty rate, Table 4 shows that it is nearly zero for either 1990 (HRP 1990) or 2000 (HPR 2000). In other words, states with higher poverty rates are no more (and no less) likely to experience higher rates of non-poor population growth.

Similarly, Table 4 shows that $NPPG_{fb-ls}$ is uncorrelated with either HPR 1990 or HPR 2000 as well as the change between them (i.e., ΔHPR). The growth rate for native-born persons (i.e., $NPPG_{nb}$) is highly correlated with the growth rate for non-poor less skilled immigrants ($NPPG_{fb-ls}$) suggesting that these sub-populations share mutual trends in their respective states. The wide range of these measures across states combined with a less than clear correlation matrix suggests an underlying multitude of interrelations between population dynamics and poverty at the state level.

[Table 5 about here]

Table 5 shows additional correlations between the states (again without weighting by population size). Minimum wages vary by state and they also change over time by state. Table 5 reports that minimum wages are not significantly correlated with NPPG during the 1990's (NPPG1990-2000) or during the 2000's (NPPG2000-2010). For example, the minimum wage in 2000 has a correlation of -.042 with NPPG during the 2000's (NPPG2000-2010) which is not statistically significant at any conventional level (i.e., p = .769 as shown in Table 5).The minimum wage in 1991 has a correlation of -.215 with NPPG during the 1900's (NPPG19900-200) but this is not statistically significant at even the 10 percent level (i.e., p = .13 as shown in Table 5). Table 5 furthermore shows that changes in minimum wages (from 1991 to 2000 or from 2000 to 2010) do not correlate significantly with NPPG in either decade.

[Table 6 about here]

Regression Analysis across U.S. States

Table 6 shows the results from OLS regressions of non-poor population growth for less skilled immigrants (i.e., $NPPG_{fb-ls}$). Due to the positive skew in the distribution of $NPPG_{fb\text{-}ls}$, however, we transformed it into $\log(NPPG_{fb\text{-}ls}+1)$ to use as the actual dependent variable in the estimated regression. This transformation generates a more symmetric, bell-shaped distribution for the dependent variable and the resulting residuals are also more homoscedastic. The addition of unity into the transformation was necessary because a few of the $NPPG_{fb\text{-}ls}$ values are slightly negative.

The results for the three models shown in Table 6 indicate that minimum wages do not predict non-poor population growth for less skilled immigrants. The minimum wage in 1991 and its change between 2000 and 1991 are not statistically significant at any conventional level in any of the three regression specifications (which vary by controlling for population density and median housing value). Although not shown in Table 6, this finding also equally applies when $NPPG_{fb\text{-}ls}$ is used as the dependent variable without any transformation. This conclusion seems consistent with the low correlations between minimum wages and $NPPG_{fb\text{-}ls}$ shown in Table 5.

DISCUSSION AND CONCLUSION

Cross-sectional measures of poverty are inherently static by design. They ignore the dynamic demographic characteristic of a given population to improve aggregate social welfare by accommodating non-poverty growth at a later point in time. The latter process may in fact occur but remain undocumented when simply considering the proportion of the population that is above the poverty line at any one point in time.

In our analysis of 51 U.S. states, we investigated the growth rate of non-poor populations which may be seen as being complementary to traditional measures of poverty. The NPPG is sensitive to population increase (by either natural growth or migration) in both the poor and the non-poor populations. Decomposition then permits the partitioning of non-poor population growth by sub-populations to reveal variation by nativity or other variables of interest.

Our findings indicate that some states with official poverty rates above the national average (e.g., Arizona, Georgia, and Texas) nonetheless had some of the highest rates of non-poor population growth among less skilled immigrants. By contrast, other states with official poverty rates below the national average (e.g., Connecticut, New Hampshire and Vermont) often had low rates of non-poor population growth among less skilled immigrants. These findings suggest that low initial poverty rates do not necessarily contribute so substantially to the alleviation of global poverty through the immigration of less skilled persons from less developed nations.

On the other hand, variation in minimum wage rates across states does not appear to be correlated with non-poor population growth. This randomness is evident in terms of non-poor population growth overall or when broken down by native born, less skilled immigrants or high skilled immigrants. Basic regression analysis also suggests that, after controlling for population density and median housing value, minimum wages do not predict the non-poor population growth of less skilled immigrants. That is, neither a higher nor a lower minimum wage seems to be consistently associated with $NPPG_{fb\text{-}ls}$. Perhaps this conclusion suggests that, on the one hand, a lower minimum wage may facilitate more opportunities for less skilled immigrants to obtain employment and gain work experience. On the other hand, however, a lower minimum wage may increase poverty by reducing a worker’s annual earnings.

Future research may extend our methodology to investigate European and other OECD nations. Although the U.S. has a higher poverty rate that most European nations (Iceland 2006; Meyer and Wallace 2009), some of the latter countries might possibly lag behind the U.S. in terms of NPPG and especially $NPPG^{FB\text{-}LS}$. Studying this issue is important because we need to understand how the alleviation of global poverty may take place even when local, momentary poverty rates suggest opposite trends. To comprehend the source-sink dynamics of global poverty, we should consider the capacity of particular populations to grow, naturally or otherwise, without increasing poverty in the process. Global poverty may well be significantly alleviated by population flows---rather than simply the redistribution of non-human resources---across national borders.

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Table 1: Estimated headcount poverty rate and change in poverty rate by state, U.S. 1990-2010

State	HPR 1990	HPR 2000	HPR 2010	ΔHPR 1990-2000	ΔHPR 2000-2010
Alabama	18.3	16.1	19.3	-2.2	3.2
Alaska	8.3	9.2	10.9	0.9	1.7
Arizona	15.7	13.8	17.8	-1.9	4.0
Arkansas	19.5	15.9	19.0	-3.6	3.1
California	12.5	14.2	16.0	1.7	1.7
Colorado	11.6	9.3	13.3	-2.2	3.9
Connecticut	6.7	8.0	10.0	1.2	2.1
DC	17.0	19.7	19.4	2.7	-0.3
Delaware	8.6	9.2	12.2	0.6	3.0
Florida	12.6	12.5	16.8	-0.1	4.2
Georgia	14.4	13.0	18.2	-1.4	5.2
Hawaii	8.2	10.8	10.4	2.6	-0.4
Idaho	12.9	11.5	15.6	-1.3	4.1
Illinois	11.9	10.8	14.1	-1.1	3.3
Indiana	10.9	9.6	15.5	-1.3	5.9
Iowa	11.6	9.0	12.9	-2.6	3.9
Kansas	11.4	10.0	13.3	-1.5	3.4
Kentucky	18.8	15.8	18.9	-3.0	3.1
Louisiana	23.6	19.6	18.7	-4.0	-0.9
Maine	11.1	11.0	13.8	-0.1	2.9
Maryland	8.2	8.4	10.1	0.2	1.7
Massachusetts	8.9	9.4	11.5	0.5	2.1
Michigan	13.0	10.5	16.8	-2.6	6.3
Minnesota	10.3	8.1	11.5	-2.2	3.4
Mississippi	25.0	20.1	22.5	-5.0	2.5
Missouri	13.2	11.7	15.7	-1.5	3.9
Montana	16.4	14.8	14.7	-1.6	-0.2
Nebraska	11.1	9.4	13.2	-1.8	3.8
Nevada	10.3	10.4	15.4	0.0	5.0
New Hampshire	6.4	6.4	8.4	0.0	2.0
New Jersey	7.5	8.6	10.3	1.1	1.7
New Mexico	20.6	18.2	20.5	-2.5	2.3
New York	12.9	14.5	15.1	1.6	0.6
North Carolina	13.1	12.3	17.5	-0.7	5.2
North Dakota	14.0	12.1	12.3	-1.9	0.2
Ohio	12.4	10.6	16.1	-1.8	5.5
Oklahoma	16.9	14.8	17.3	-2.1	2.5
Oregon	12.2	11.5	16.1	-0.7	4.6
Pennsylvania	11.2	11.0	13.4	-0.2	2.4
Rhode Island	9.7	12.1	14.8	2.3	2.7
South Carolina	15.5	14.1	18.4	-1.4	4.3
South Dakota	16.0	12.9	15.2	-3.1	2.3
Tennessee	15.9	13.5	17.8	-2.3	4.3
Texas	18.0	15.3	18.0	-2.7	2.7
Utah	11.6	9.6	13.5	-2.0	3.9

(Table 1 continued)

Vermont	9.7	9.4	12.0	-0.4	2.6
Virginia	10.3	9.6	11.4	-0.7	1.8
Washington	10.7	10.7	13.6	0.0	2.9
West Virginia	19.7	17.9	18.5	-1.8	0.6
Wisconsin	10.5	8.7	13.2	-1.8	4.5
Wyoming	11.7	11.6	10.9	-0.1	-0.7
Total	**13.1**	**12.4**	**15.5**	**-0.7**	**3.1**

Table 2: Non-poor population growth rate (as % of total population at time 1) by state, U.S. 1990-2010

	1990-2000				2000-2010			
State	**NPPG**	**$NPPG^{NB}$**	**$NPPG^{FB\text{-}LS}$**	**$NPPG^{FB\text{-}HS}$**	**NPPG**	**$NPPG^{NB}$**	**$NPPG^{FB\text{-}LS}$**	**$NPPG^{FB\text{-}HS}$**
Alabama	10.57	9.64	0.58	0.35	3.00	1.54	0.94	0.51
Alaska	12.57	10.10	1.45	1.02	11.04	9.79	0.10	1.11
Arizona	37.00	28.51	5.92	2.57	16.38	13.82	0.54	2.01
Arkansas	15.12	13.57	1.13	0.42	4.42	2.83	1.06	0.51
California	10.57	3.46	3.64	3.48	7.09	3.92	0.23	2.89
Colorado	30.54	24.56	4.07	1.91	11.18	9.24	0.74	1.18
Connecticut	2.24	-0.04	0.85	1.43	2.42	-0.21	0.85	1.75
DC	-7.24	-9.44	0.96	1.24	4.78	3.51	-0.50	1.77
Delaware	16.13	13.04	1.59	1.51	10.39	7.85	0.89	1.64
Florida	20.77	14.15	3.26	3.36	10.81	6.07	1.57	3.14
Georgia	24.62	19.26	3.39	1.98	10.08	7.08	1.13	1.85
Hawaii	6.74	2.90	1.45	2.40	11.59	8.93	0.27	2.35
Idaho	28.01	25.05	2.20	0.76	14.42	13.14	0.49	0.80
Illinois	9.04	4.37	2.76	1.91	-0.14	-1.29	-0.18	1.29
Indiana	10.06	8.62	0.94	0.49	-0.26	-1.37	0.55	0.54
Iowa	7.93	6.45	1.05	0.43	0.03	-1.10	0.59	0.52
Kansas	9.65	7.06	1.98	0.62	2.33	0.80	0.56	0.96
Kentucky	11.51	10.45	0.61	0.45	2.92	1.72	0.66	0.53
Louisiana	9.08	8.33	0.34	0.42	2.41	1.55	0.52	0.32
Maine	3.98	4.05	-0.34	0.29	0.72	0.12	0.06	0.54
Maryland	9.78	5.87	1.70	2.21	6.60	1.81	1.91	2.84
Massachusetts	4.63	1.73	0.83	2.08	0.64	-2.02	0.67	1.95
Michigan	8.79	7.18	0.69	0.92	-6.64	-6.79	-0.32	0.45
Minnesota	13.83	11.03	1.68	1.12	4.00	2.26	0.29	1.43
Mississippi	13.31	12.73	0.34	0.23	1.06	0.46	0.40	0.19
Missouri	10.03	8.85	0.58	0.59	1.96	0.95	0.51	0.50
Montana	13.10	12.69	0.10	0.31	8.51	8.12	0.03	0.32
Nebraska	9.31	6.84	1.91	0.56	2.29	0.94	0.57	0.77
Nevada	60.39	45.00	11.01	4.37	25.28	17.66	3.41	4.18
N. Hampshire	11.15	10.19	0.11	0.86	3.99	2.64	0.32	0.97
New Jersey	7.44	1.65	2.38	3.41	2.52	-1.21	0.79	2.89
New Mexico	19.46	15.76	2.73	0.98	8.41	6.47	0.80	1.14
New York	3.46	-1.10	1.90	2.66	1.35	-0.77	0.21	1.87
North Carolina	20.34	16.43	2.68	1.21	10.64	8.32	0.96	1.32
North Dakota	3.21	2.77	0.10	0.35	4.34	3.76	0.18	0.40
Ohio	5.90	5.17	0.20	0.53	-4.14	-4.82	0.16	0.51
Oklahoma	10.26	8.55	1.20	0.52	5.23	3.55	1.09	0.59
Oregon	19.41	14.82	3.02	1.55	5.85	4.19	0.53	1.13
Pennsylvania	3.06	2.02	0.33	0.71	0.72	-0.79	0.52	0.98
Rhode Island	1.85	0.01	0.84	0.99	-2.53	-3.09	-0.50	1.04
South Carolina	14.79	13.24	0.90	0.68	8.48	6.87	0.90	0.71
South Dakota	10.86	9.81	0.75	0.31	4.91	4.24	0.33	0.33
Tennessee	17.18	15.53	0.99	0.67	5.46	3.88	0.89	0.67
Texas	21.85	14.79	4.93	2.13	14.98	10.44	2.03	2.48
Utah	28.65	23.80	3.28	1.57	17.24	15.05	1.13	1.05

(Table 2 continued)

Vermont	8.74	7.76	0.21	0.78	-0.84	-1.16	-0.01	0.31
Virginia	14.11	10.31	1.79	2.03	10.26	5.97	1.52	2.75
Washington	19.86	14.69	2.70	2.46	9.78	6.02	1.30	2.42
West Virgina	2.60	2.42	0.06	0.12	1.00	1.07	-0.09	0.03
Wisconsin	10.72	9.27	0.86	0.60	1.02	0.14	0.41	0.45
Wyoming	7.61	6.86	0.26	0.50	13.91	13.34	0.05	0.53
Total	**12.50**	**8.55**	**2.16**	**1.79**	**5.42**	**3.00**	**0.72**	**1.68**

Table 3: Descriptive statistics for 50 U.S. states & DC (unweighted by population size)

Variable	Mean	Median	SD	Min	Max
Total Population, 1990 (T1)	4,733,281	3,202,122	5,290,323	441,783	28,958,004
Total Population, 2000 (T2)	5,370,520	3,885,684	6,012,887	479,541	33,112,112
Total Population, 2010 (T3)	5,912,515	4,216,236	6,689,039	550,725	36,594,457
HPR 1990	13.1	12.2	4.2	6.4	25.0
HPR 2000	12.1	11.5	3.3	6.4	20.1
HPR 2010	14.9	15.1	3.2	8.4	22.6
1990-2000					
ΔHPR	-1.0	-1.4	1.7	-5.0	2.7
NPPG	13.2	10.6	10.6	-7.2	60.4
$NPPG^{NB}$	10.2	9.3	8.7	-9.4	45.0
$NPPG^{FB\text{-}LS}$	1.7	1.1	1.9	-0.3	11.0
$NPPG^{FB\text{-}HS}$	1.3	0.9	1.0	0.1	4.4
2000-2010					
ΔHPR	2.8	2.9	1.7	-0.9	6.3
NPPG	5.7	4.4	6.0	-6.6	25.3
$NPPG^{NB}$	3.8	2.8	5.2	-6.8	17.7
$NPPG^{FB\text{-}LS}$	0.6	0.5	0.7	-0.5	3.4
$NPPG^{FB\text{-}HS}$	1.2	1.0	0.9	0.0	4.2

Table 4: Correlation matrix (unweighted by population size)

	HPR 1990	HPR 2000	HPR 2010	1990-2000					2000-2010				
				ΔHPR	**NPPG**	**$NPPG^{NB}$**	**$NPPG^{FB-LS}$**	**$NPPG^{FB-HS}$**	**ΔHPR**	**NPPG**	**$NPPG^{NB}$**	**$NPPG^{FB-LS}$**	**$NPPG^{FB-HS}$**
HPR 1990	1.00												
HPR 2000	**0.92**	1.00											
HPR 2010	**0.88**	**0.86**	1.00										
1990-2000													
ΔHPR	**-0.67**	**-0.33**	**-0.50**	1.00									
NPPG	0.03	-0.08	0.17	-0.24	1.00								
$NPPG^{NB}$	0.11	-0.05	0.21	**-0.36**	**0.98**	1.00							
$NPPG^{FB-LS}$	-0.09	-0.08	0.10	0.08	**0.85**	**0.73**	1.00						
$NPPG^{FB-HS}$	**-0.37**	-0.21	-0.19	**0.50**	**0.47**	**0.29**	**0.76**	1.00					
2000-2010													
ΔHPR	-0.13	**-0.32**	0.21	**-0.30**	**0.46**	**0.48**	**0.32**	0.05	1.00				
NPPG	-0.04	0.00	-0.01	0.09	**0.77**	**0.73**	**0.72**	**0.50**	-0.03	1.00			
$NPPG^{NB}$	0.03	0.06	0.02	0.02	**0.73**	**0.71**	**0.61**	**0.34**	-0.06	**0.98**	1.00		
$NPPG^{FB-LS}$	-0.03	-0.11	0.04	-0.12	**0.69**	**0.63**	**0.67**	**0.51**	0.28	**0.62**	**0.48**	1.00	
$NPPG^{FB-HS}$	**-0.39**	-0.22	-0.24	**0.54**	**0.41**	0.24	**0.71**	**0.94**	-0.01	**0.53**	**0.36**	**0.61**	1.00

* Shaded correlations are significant at two-tailed 0.05 level.

Table 5: Additional Correlations (unweighted by population size)

	NPPG1990-2000	NPPG2000-2010	NPPG_fb-ls1990-2000	NPPG_fb-ls2000-2010	Min. Wage 1991	Min. Wage 2000	Min. Wage 2010	ΔWage2000-1991	ΔWage2010-2000	Median Home Value 1990	Median Home Value 2000	ΔHome Value 2000-1990	Pop. Density 1990	Pop. Density 2000
NPPG1990-2000	1.000													
NPPG2000-2010	0.773	1.000												
	0.000													
NPPG_fb-ls1990-2000	0.848	0.716	1.000											
	0.000	0.000												
NPPG_fb-ls2000-2010	0.689	0.619	0.673	1.000										
	0.000	0.000	0.000											
Min. Wage 1991	-0.215	-0.064	0.004	-0.259	1.000									
	0.130	0.654	0.976	0.067										
Min. Wage 2000	-0.162	-0.042	0.002	-0.121	0.757	1.000								
	0.255	0.769	0.989	0.397	0.000									
Min. Wage 2010	-0.110	-0.065	0.098	-0.119	0.685	0.899	1.000							
	0.442	0.648	0.492	0.404	0.000	0.000								
ΔWage2000-1991	0.029	0.018	-0.003	0.147	-0.132	0.548	0.485	1.000						
	0.841	0.899	0.986	0.302	0.355	0.000	0.000							
ΔWage2010-2000	0.169	-0.019	0.163	0.063	-0.496	-0.667	-0.273	-0.377	1.000					
	0.236	0.897	0.254	0.661	0.000	0.000	0.053	0.006						

Median Home Value 1990	-0.188	0.056	0.103	-0.063	0.267	0.409	0.374	0.280	-0.263	1.000				
	0.187	0.696	0.470	0.662	0.059	0.003	0.007	0.047	0.062					
Median Home Value 2000	0.029	0.219	0.270	-0.005	0.353	0.485	0.463	0.285	-0.278	0.899	1.000			
	0.839	0.122	0.056	0.970	0.011	0.000	0.001	0.043	0.048	0.000				
ΔHome Value 2000-1990	0.443	0.218	0.195	0.124	-0.023	-0.122	-0.080	-0.155	0.131	-0.739	-0.368	1.000		
	0.001	0.125	0.170	0.385	0.871	0.394	0.575	0.278	0.359	0.000	0.008			
Pop. Density 1990	-0.330	-0.075	-0.076	-0.247	0.565	0.370	0.351	-0.162	-0.216	0.230	0.204	-0.174	1.000	
	0.018	0.600	0.598	0.080	0.000	0.008	0.012	0.256	0.129	0.104	0.150	0.222		
Pop. Density 2000	-0.333	-0.078	-0.075	-0.244	0.563	0.373	0.351	-0.155	-0.222	0.243	0.214	-0.186	1.000	1.000
	0.017	0.585	0.603	0.085	0.000	0.007	0.012	0.278	0.117	0.086	0.133	0.190	0.000	

$p < 0.05$ (yellow)
$p < 0.10$ (green)
* p-value below correlation

Table 6: Results from OLS Linear Regression of Less Skilled, Foreign Born NPPG across U.S. States, 1990-2000

	Model A			**Model B**			**Model C**		
Variable	Coef.	Std. Coef.	p-value	Coef.	Std. Coef.	p-value	Coef.	Std. Coef.	p-value
ΔHome Value 2000-1990	-	-	-	0.016	0.742	0.000	0.017	0.791	0.000
Median Home Value 1990	-	-	-	0.007	0.714	0.000	0.008	0.803	0.000
Pop. Density 1990	0.000	-0.135	0.446	0.000	-0.081	0.526	0.000	-0.058	0.711
ΔMinimum Wage 2000-1991	0.016	0.007	0.964	-	-	-	-0.275	-0.116	0.398
Minimum Wage 1991	0.295	0.160	0.366	-	-	-	-0.176	-0.095	0.565
Intercept	- 0.596	-	0.710	-0.108	-	0.665	0.752		0.599
N	51			51			51		
R^2	0.020			0.278			0.293		

* Dependent variable transformed using $\log(NPPG^{FB-LS} + 1)$ in order to reduce skew in the dependent variable and heteroscedasticity in the error term.
* Home values in $1,000, adjusted to 2000 dollars
* 1991 minimum wage adjusted to 2000 dollars