

# Poverty measurement for a binational population

ANITA ALVES PENA\*

## Abstract

Traditional poverty measures are inappropriate for migrant populations. Frequently cited poverty thresholds are calculated under assumptions that individuals and their families face only one set of prices annually. This study formulates (and contrasts to current thresholds) alternative measures for a population that spends substantial time in two (or more) countries. Specifically, weights are developed based on annual week allocations, income, family characteristics, and comparative price levels. As illustration, an example demonstrating how alternative thresholds can be generated for those whose annual work spans international boundaries is drawn from the Mexico-US migration context using survey data, official thresholds, and these weights. Despite caveats due to data limitations for the case study, illustrations should be of interest academically and to those involved in ground-level statistical calculations pertaining to demographic trends and the welfare state.

**Keywords:** poverty measurement, immigration, transnational population, cost-of-living

## Introduction

Mexican migrants are often among the poorest members of the working class in the United States. Traditional poverty measures, however, are inappropriate for analysing this population and others with similar characteristics. Frequently cited poverty measures include thresholds and lines that are functions of family size, but are calculated under the assumption that individuals and their families face a common price level set throughout the year. Those participating in migrant streams spanning borders, however, split annual time between source and receiving countries and face different costs of living domestically and abroad. This may apply to single individuals, to entire families who migrate together, or only to select members of a family unit (e.g., a parent who alone participates in seasonal or other temporary work in a foreign country). In addition to substantial differences across international borders, relevant prices may further differ across regions within a country.

A primary aim of this paper is to examine the appropriateness of current, and hypothetical alternative, poverty measures for the case of a population that spends substantial time in two (or more) locations. Much of the academic literature pertaining to immigration and poverty has focused either on poverty among settled immigrants within a receiving country, or on the effects of transfers (often remittances) on poverty for family (or community) left behind in a source country as migrants work internationally. This study addresses a gap in the academic literature by examining outcomes among migrants themselves and their immediate family members while adjusting for time spent abroad and therefore for different living costs faced. Furthermore, public aid

---

\* Dr Anita Alves Pena, 1771 Campus Delivery, Department of Economics, Colorado State University, Fort Collins, CO 80523-1771, USA. E-mail: [anita.pena@colostate.edu](mailto:anita.pena@colostate.edu).



program eligibility is often a function of poverty status and therefore this paper is of policy significance beyond the goal of improving statistical calculations for demographic study purposes.

The methodology involves calculating alternative poverty rates that account for relative time spent in various locations and examining whether variation between these alternatives and official US poverty thresholds is statistically and economically significant. In addition to formalizing these theoretical specifications, an empirical example is calculated for the case of Mexico-US migrant streams. Given cost of living differences, US wages that put a worker's total family income below US thresholds often do not put the same worker's family below Mexico's poverty guidelines. Furthermore, once adjustments are made for time spent in various locations, wages that put a worker's total family income below US thresholds may not put the same worker under adjusted thresholds. Additional differences may exist once within-country regional variation is taken into consideration.

This paper contributes to literatures on the statistical measurement of poverty and of the demographics of border populations. Results have applications to interregional migration within a country in addition to the international context. Specifically, the paper demonstrates how alternative poverty measures can be practically calculated for populations engaging in short-term and often seasonal work across boundaries, as well as for more frequent border commuters. While these measurements are not prescriptive of specific public policies by themselves, they should offer additional inputs into informed policy decision making in the areas of immigration, more general population movements, and poverty alleviation. This is of interest to both academic researchers, and to those directly involved in ground-level statistical calculation pertaining to demographic trends and the welfare state regionally, nationally, and internationally. Although the primary application in this paper relies of national level threshold differences, the general criticism of frequently used poverty calculations and the adjustment technique presented here equally applies to variation in cost of living across cities and areas within one country.<sup>1</sup> An illustration of how the model can be extended to capture regional variation therefore also is included. This paper is organized as follows. Section 2 discusses theoretical considerations for adjustment of poverty measures for the binational population and formalizes a framework. Section 3 explores a case study example pertaining to Mexico-US migrant streams. Section 4 discusses policy significance and concludes.

### **Literature and theoretical considerations**

Domestic and international measures of poverty are highly contested in both academic literature and public policy applications. Kakwani and Silber (2008)

---

<sup>1</sup> In addition to general regional cost of living differences related to prices, border regions particularly present their own differences. Earning differentials, for example, are particularly well documented along the Mexico-US border (e.g., Smith and Newman (1977), Dávila (1982), Dávila and Mattila (1985), Dávila and Mora (2008)).

in the introduction to their volume, for example, note the distinction between unidimensional and multidimensional measurements of poverty. Unidimensional measures such as poverty lines and thresholds base poverty classification on income alone. Multidimensional measurements, however, incorporate additional aspects. Sen (1997) summarizes his primary argument that economic inequality and income inequality are separate and not equal concepts. Beyond income, it is important in his perspective to “deal with all the relevant variations in the relationship between resources and functionings.” Namely, capabilities to create value out of resources depend on “personal heterogeneities, environmental diversities, variations in social climate, and differences in relational perspective.” Sen’s notion therefore corresponds to the fundamentals of the multidimensional poverty idea noted in the literature. Carvalho and White (1997) further distinguish between quantitative and qualitative measures of poverty and argue that there are complementarities between these approaches that can and should be exploited by researchers and practitioners. The authors describe qualitative approaches as inclusive of judgments of deprivation as opposed to quantitative reliance on formal income and consumption statistics. The qualitative approach therefore interrelates with Sen’s ideas of capabilities and is a more normative take on the multidimensional poverty perspective. The analysis here is based on taking unidimensional poverty measures, namely official US poverty thresholds, and creating weighting factors for multidimensional considerations relevant to migrant populations. The measurement therefore can be thought of as a practical compromise between the unidimensional and multidimensional concepts applicable to cases of migration and immigration.

Academic literature on the interrelationships between immigration and poverty has focused on poverty among settled immigrants within a receiving country, and on the effects of transfers on family or community poverty left behind. Lesser work has been done on poverty measurement itself in an international context.

As noted, poverty thresholds and lines generally are calculated under the assumption that a family faces one set of prices throughout the year. Therefore, US wages that put a worker below US thresholds may not put him/her below thresholds adjusted for binationality or below source country thresholds. Furthermore, definitions of “thresholds” may differ substantially depending on context. In the United States, for example, official thresholds are based on 1963-1964 US Department of Agriculture “food budgets” and are updated annually using the Consumer Price Index for All Urban Consumers (CPI-U). Official US poverty thresholds for year 2009 are presented in Table 1 for illustration. Values vary by family size.

As a comparison to the US case, Mexico circulates separate statistics from two poverty measure frameworks. The first, like the US computation, is food-based. The second is asset-based. Other countries offer different formulas, and international organizations calculate poverty statistics independently as well. The World Bank, for example, uses reference lines set at \$1.25 and \$2

per day in purchasing power parity terms.

**Table 1.** US poverty thresholds, 2011

<u>Number persons</u>	<u>Threshold (\$)</u>	<u>Number persons</u>	<u>Threshold (\$)</u>
1	11,702	5	27,979
2	15,063	6	32,181
3	17,595	7	37,029
4	23,201	8	41,414
		9+	49,818

*Source: US Census Bureau. Note: Thresholds for family sizes of 1 and 2 are based on household heads that are less than 65 years of age since the population weighted average over ages for 2011 was not available at the time of this writing.*

Several considerations enter a discussion of how to appropriately re-weight poverty measures to account for transnationality. Particularly, consider a formula such as:

$$\text{New Threshold} = \frac{\text{US Weeks}}{\text{Total Weeks}} * (\text{US Threshold}) + \frac{\text{Abroad Weeks}}{\text{Total Weeks}} * (\text{Abroad Threshold}) \quad (1)$$

where *US Threshold* and *Abroad Threshold* are functions of family size and of year. An idea then might be to compare total annual family income to this value. This type of formula, while representing a starting point, has several caveats. Perhaps the most important of these is that the formula is only valid if US and international-specific thresholds follow like methodology. In general, however, this is not true and instead, more wealthy nations are seen to have more generous poverty standards and further differences exist depending on political philosophies.

An ideal index for the purpose of international comparison would be based on pricing a common bundle of commodities used by migrants separately for each country of interest. This bundle may differ from that of an average consumer in any country to the extent that migratory persons are atypical. Furthermore, migrants face transaction costs associated with international work and travel, consume different items in origin and destination countries, and often remit portions of income across international boundaries. Data requirements to generate such an index are large and impractical for practice. A simpler comparison poverty threshold therefore is examined here using purchasing power parity (PPP) indices and time spent in the US versus abroad as adjustment factors.<sup>2</sup> The OECD, on its website, defines PPP indices as the “rates of currency conversion that equalise the purchasing power of different currencies by eliminating the differences in price levels between countries” and further notes that “In their simplest form, PPPs are simply price relatives which show the ratio of the prices in national currencies of the same good or service in different countries.”

<sup>2</sup> Deaton (2010), however, discusses imperfections in the use of PPP numbers for analysing cross-country poverty especially under circumstances where cross-country consumption patterns differ. Still, this is used here as a best approximation to currency differences across borders.

Consider instead the revised formulation:

$$\text{Threshold} = \frac{\text{US Weeks}}{\text{Total Weeks}} * (\text{US Threshold}) + \frac{\text{Abroad Weeks}}{\text{Total Weeks}} * (\text{PPP Ratio}) * (\text{US Threshold}) \quad (2)$$

where *PPP Ratio* represents the ratio of per capita PPP indices between the second country of interest and the US. Comparative poverty rates calculated by this formula for those of varying family sizes are presented in the case study illustration below. Figure 1 presents per capita purchasing power parity ratios for the Mexico-US example over time.<sup>3</sup> The figure illustrates a small but increasing trend in the per capita PPP ratio between Mexico and the US especially in the most recent part of the series.

**Figure 1.** Purchasing power parity (PPP) ratio, Mexico-US example



Source: World Bank, *World Development Indicators & Global Development Finance database* and author's calculations based on GDP per capita, PPP (current international \$) series.

Note: The PPP ratio gives relative prices between Mexico and the US over the time period of study.

**Case study illustration: Mexico-US migration**

The Mexico-US migrant stream has been well-documented in the literature and popular press. Particularly, the cost of living in Mexico and the US varies substantially as indicated in Figure 1 with US prices being at levels roughly three to four times higher during recent history. Maskovsky and Kingfisher (2001), for example, argue that the relationship between Mexican-US migration and poverty is bidirectional and that this migration is the consequence of “economic polarisation” and has resulted in “vulnerability among all workers at the bottom end of the US labour market.” The example therefore is arguably appropriate for a case study illustration of the binationality adjustments to poverty thresholds developed here.

The National Agricultural Workers Survey (NAWS) is a representative

<sup>3</sup> World Bank current year values of per capita purchasing power parity are used to calculate the PPP ratio. Values from the International Monetary Fund (IMF) and the Central Intelligence Agency (CIA) are generally within rounding.

survey of employed farmworkers in the United States.<sup>4</sup> The public use data have been taken over fiscal years 1989 through 2009 based on a survey design which samples three times a year following the agricultural seasons of fall, winter/spring, and summer. The survey is representative nationally for the US, for 12 agricultural regions within the US (only six of which are available in the public use set) and for each year and season. Sampling is from work sites as opposed to houses to mute undersampling of both the undocumented population and workers living in nonstandard housing situations. Due to survey question modifications early in the dataset, this case study uses the sample from 1993 through 2009. The total sample size of the public use data over these years is 43,339. In aggregate, 23.16% of workers report being US born (survey weighted) and 71.32% report origins in Mexico, with the small remainder of other international origins. The sample forming the basis of the case study therefore can be characterized as being representative of a very specific population and as having very detailed information on legal status and migrant behaviour.<sup>5</sup>

Survey respondents are asked for the numbers of weeks that they spend in farm work, in nonfarm work, and abroad. On average, Mexican workers report 11.40 weeks per year spent outside of the country. Using US official poverty thresholds, family poverty in this population is 46.02%.<sup>6</sup> For Mexican undocumented workers, average weeks abroad are higher at 15.15 per year but poverty is lower at a rate of 44.34%. Mexican undocumented workers report an average of 2.96 family members living with them within the US. In contrast, documented Mexican workers report 3.77 family members in residence on average, and this dynamic drives the difference in poverty rates. For documented Mexican workers, family poverty is 49% in this sample and weeks abroad are 4.74. US born workers report only 0.30 weeks per year spent out of the country, 2.54 family members on average, and incomes consistent with a family poverty rate of 28.37% overall.

---

<sup>4</sup> It should be noted that that the survey allows differential values pertaining to inside and outside the US, and therefore that any complexities raised by household structure and information for this particular migrant population are minimized.

<sup>5</sup> Pena (2010) presents a study of poverty within this population. That study, however, uses US official poverty definitions.

<sup>6</sup> There is measurement error in the construction of the poverty rate variable based on the NAWS data that should be noted. The total family income question is originally asked in a categorical format based on the following bins: under \$500, 500-999, 1,000-2,499, 2,500-4,999, 5,000-7,499, 7,500-9,999, 10,000-12,499, 12,500-14,999, 15,000-17,499, 17,500-19,999, 20,000-24,999, 25,000-29,999, 30,000-34,999, 35,000-39,999, and 40,000 and higher. The administrators of the survey then take the midpoint of these ranges and set that number as the family income value. For the category of \$40,000 and higher, the value of 50,000 is used. These values are used in comparison to the poverty thresholds as reported by the US Census Bureau for the primary construction in this paper. Official governmental reports based on NAWS data that report poverty rates typically base the construction on the entire income range falling below the relevant poverty threshold cut offs and therefore are more conservative, erring on the side of undercount.

**Table 2.** Family structure in the NAWS, restriction to Mexican workers

Family Size	Freq.	Percent	Weeks		<i>Native</i>
			Abroad	Poverty	<i>Poverty</i>
1	7,541	23.63	15.18	30.97	31.97
2	4,588	14.37	11.08	37.09	17.68
3	5,866	18.38	10.96	44.06	25.14
4	5,562	17.43	9.38	50.90	29.25
5	4,292	13.45	8.21	57.91	31.57
6	2,235	7.00	10.11	66.44	48.14
7	1,065	3.34	9.83	75.81	59.89
8-15	770	2.40	13.61	75.91	72.41

Source: *National Agricultural Workers Survey, public use version, 1993-2009.*

Notes: The final column corresponds to US born poverty rates for purpose of comparison. Weeks abroad and poverty statistics are calculated using sampling weights.

Complete family composition data are only available in 1993 waves of the survey onward.<sup>7</sup> Table 2 presents statistics conditional on family size for survey data collected from 1993 to 2009 for Mexican (pooled across legal status groups) and US born workers as comparison. For Mexican workers, weeks spent abroad are generally decreasing with family size and poverty (by the standard official US definition) is generally increasing. Poverty rates by family size are more constant for US born workers with increases happening later in the series. Poverty rate calculations as reported are based on total family income and therefore do not directly account for remittances.

Census Bureau poverty thresholds for various years and family sizes corresponding to NAWS worker observations are combined with the PPP adjustment formula as given in equation (2) as well as with particular reported weeks abroad for individual workers. Per capita PPP ratios calculated from the World Bank, World Development Indicators, for years matched to the survey data as presented in Figure 1, are used.

Adjusted poverty rates are presented in Table 3. Differences in poverty rates are found to be statistically significant for most family sizes though differences decrease for larger families. Results from paired two-sample mean-comparison tests are presented in the table with asterisks denoting statistical significance. For the Mexico-US case, official US poverty rates are shown to be overstated for agricultural workers in the case study example. In other country contexts where the PPP ratio is greater than 1, official poverty rates will be understated following this reasoning. Misclassifications under Mexican poverty guidelines are not presented for comparison due to incomplete threshold data availability for Mexico.

While statistically these differences are significant, it is worth considering the economic magnitudes of these differences as well. Particularly, the differ-

<sup>7</sup> While respondents are asked about spouses and children, they are not asked about other dependent family members in the household. For the Mexico-US migrant case, this omission is important given cultural norms pertaining to extended family. Household sizes as reported refer to household members within the US.

ences generated by the alternative formula here suggest a total of 899 misclassifications in the case study example. This corresponds to 2.82% of the sample. Kandel (2008) estimates that there were 1.01 million hired farmworkers in the United States in 2006. NAWS weighted summary statistics suggest that 71.32% are of Mexican origin. Back of the envelope calculations based on this information suggest approximately 20,313 poverty misclassifications among Mexican agricultural workers. This is notable especially given that the formula should continue to overcount poverty if positive remittances (for which source country cost-of-living figures are relevant and which are not adjusted for here due to data limitations) are present.

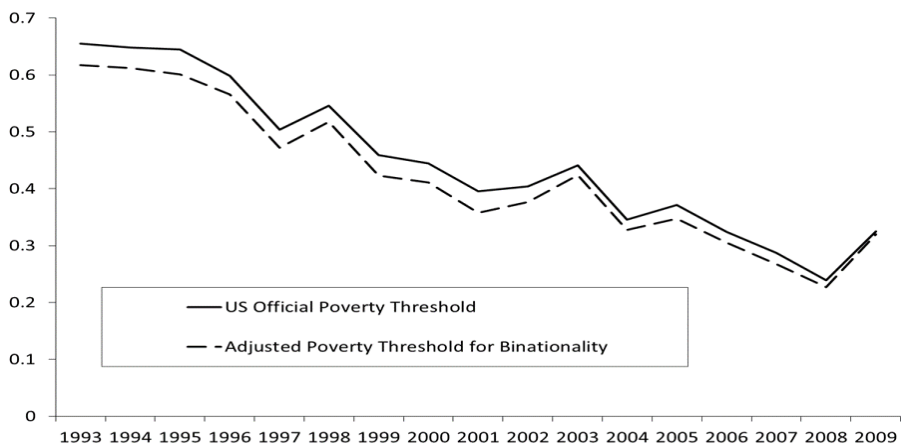
**Table 3.** Revised US poverty rates by family structure

Family Size	Weeks		Adjusted		Number Misclassified
	Abroad	Poverty	Poverty	Difference	
1	15.18	30.97	28.31	***	201
2	11.08	37.09	32.24	***	223
3	10.96	44.06	40.19	***	227
4	9.38	50.90	48.67	***	124
5	8.21	57.91	56.19	***	74
6	10.11	66.44	64.96	***	33
7	9.83	75.81	74.30	***	16
8-15	13.61	75.91	75.72		1
TOTAL					899

Source: Author's calculations using sources above.

Note: \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$  for paired two-sample mean-comparison tests.

**Figure 2.** Fraction of Mexican farmworkers under current and adjusted poverty thresholds



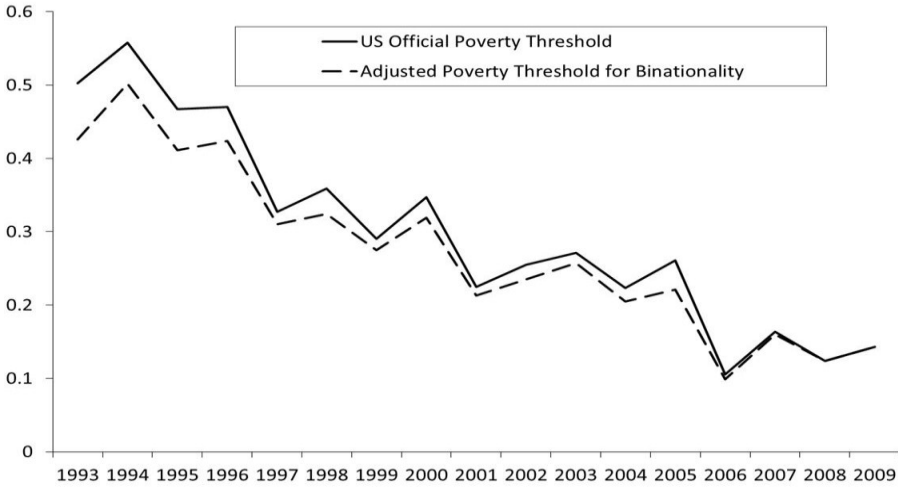
Source: National Agricultural Workers Survey, pooled cross sections 1993-2009 and author's calculations using sources above.

The fraction of Mexican farmworkers under both current and adjusted poverty thresholds is illustrated in Figure 2. Both current and adjusted series



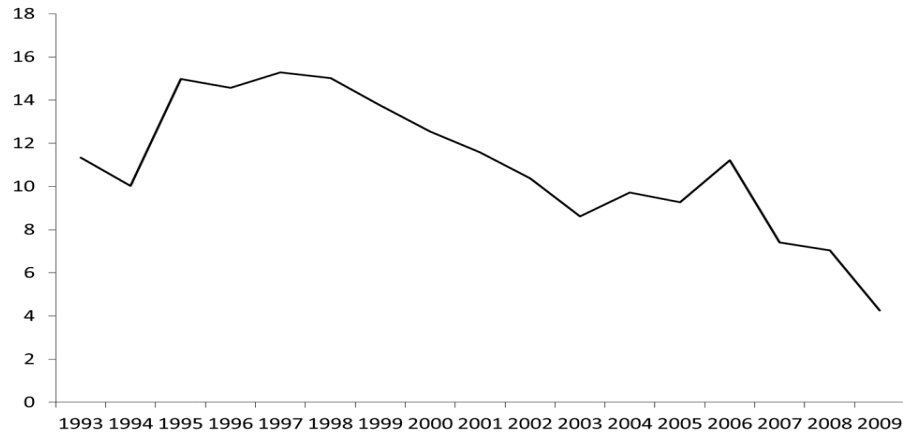
are found to be generally decreasing for Mexican workers. As evident in Table 2, adjusted Mexican agricultural worker rates, while lower than current rates, overall do not approximate native rates. This finding may be related, however, to differences in family structures across these populations. In contrast to Figure 2, Figure 3 presents poverty rate comparisons between Mexican and native farmworkers restricting to a family size of 1 and rates are shown to be lower.

**Figure 3.** Fraction of Mexican farmworkers under current and adjusted poverty thresholds, restriction to family size of 1



Source: National Agricultural Workers Survey, pooled cross sections 1993-2009 and author's calculations using sources above.

**Figure 4.** Weeks spent abroad



Source: National Agricultural Workers Survey, pooled cross sections 1993-2009.

Notably, the adjustments for binationality decrease over the course of the

time series in these figures. As evident in Figure 1, PPP adjustments have increased over time as prices in Mexico have risen relative to the US. Figure 4 illustrates how average annual time allocations have varied over time. Weeks spent abroad by the typical Mexican worker have decreased over time. Changes in weeks spent abroad can be attributable to changes in border patrol intensity (and therefore the costs of international travel for a population that is highly undocumented) and to selection of workers with greater ties to US labour markets and therefore permanence in US agriculture. The combination of these two effects therefore acts to shrink the gap between the official and adjusted poverty threshold values over time.

**Table 4.** Demographic and work-related characteristics of those who maintain and switch poverty classifications

	Same poverty classification	Switches poverty classification	Difference
Female (%)	18.34	12.38	
Age (years)	32.17	33.53	*
Education (years)	6.22	5.87	**
Farm Experience (years)	8.91	10.80	***
Tenure (years)	3.79	4.00	
Has Spouse (%)	35.78	21.58	***
Children (number)	0.77	0.26	***
Naturalized Citizen (%)	3.32	1.16	***
Green Card (%)	29.76	43.22	***
Other Authorization (%)	1.88	2.09	
Illegal (%)	65.04	53.54	***
Speaks English (%)	12.32	12.85	
Reads English (%)	9.51	5.06	***
Field Crops (%)	13.67	15.90	
Fruit (%)	40.62	40.96	
Horticulture (%)	11.40	16.01	
Vegetables (%)	29.03	21.63	***
Misc. (%)	5.23	5.50	
Pre-harvest (%)	19.30	15.47	**
Harvest (%)	35.32	39.07	
Post-harvest (%)	11.34	6.47	***
Semi-skill (%)	21.50	21.21	
Supervisor (%)	0.14	0.12	
Other Task (%)	12.41	17.65	
California (%)	42.41	42.42	
East (%)	13.58	14.35	
Southeast (%)	11.24	11.32	
Midwest (%)	12.26	13.17	
Southwest (%)	7.45	7.77	
Northwest (%)	13.06	10.98	

Source: National Agricultural Workers Survey, pooled cross sections 1993-2009.

Note: \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$

## The misclassified

A question might be what we can learn about the 899 misclassifications in the sample beyond documenting the magnitude. Particularly, Table 4 tabulates demographic and work-related characteristics of those on the margin who switch classifications as result of the poverty threshold adjustment relative to those who maintain their current poverty classification after the binationality adjustments to the poverty threshold. Significant differences in characteristics are seen across several categories. Notably, the marginal changers are approximately a year older on average and are more likely to be of lower formal education but of higher farm-work experience. They are less likely to have spouses and/or children present in the US. In terms of legal status, those who switch poverty classifications are less likely to be naturalized and less likely to be undocumented. In contrast, they are more likely to be green card holders. They are less likely to report reading English well, but are of similar English language speaking ability to those who remain in their official poverty classifications after the adjustment for binationality. The marginal changers also are less likely to work in vegetable crops or in pre-harvest or post-harvest tasks. Other crop and task categories have more similar representation. Whether members of this group should remain classified as poor (as under the official definition) or should be declared non-poor (as by the adjustment) for the purpose of public aid program eligibility is a normative question.

A final consideration, however, pertains to the extent to which misclassification might affect government accounts if it were deemed relevant to program availability. The NAWS dataset allows back of the envelope calculations to estimate hypothetical overspending on public aid programs for illustration.<sup>8</sup>

Table 5 presents public aid program usage rates by marginal (switcher when the binationality adjustment is applied) and non-marginal (non-switcher) respondents in the dataset based on their poverty classifications. Particularly, it is notable that more than 3% of those who would be classified as poor based on official poverty thresholds but who would not be classified as poor if their binationality was taken into account reported use of the US food stamp program. Furthermore, almost 27% reported using unemployment insurance, 12% used Medicaid, and 11% used the Women, Infants, and Children (WIC) program. These numbers therefore correspond to approximately 646 food stamp recipients, 5,472 unemployment insurance recipients, 2,397 Medicaid recipients, and 2,273 WIC recipients in the US agricultural worker population alone. While unemployment insurance is typically offered to both poor and non-poor, the other categories with economically significant usage rates are generally reserved for the poor. The numbers therefore for the larger population of persons who spend significant annual time abroad may be substantial.

---

<sup>8</sup> Note that this is at best an approximation since public aid program availability and annual week allocations across countries may be endogenously determined.

**Table 5.** Public aid program usage by those who maintain and switch poverty classifications

	<u>Same poverty classification</u>	<u>Switches poverty classification</u>	<u>Difference</u>
Food stamps	7.44	3.18	***
Disability insurance	0.83	0.08	***
Unemployment insurance	17.73	26.94	**
Social Security	0.81	0.21	***
Veteran's pay	0.15	0.11	
General assistance/welfare	0.30	0.00	***
Low income housing	0.77	0.44	
Government health clinic	1.70	0.48	***
Medicaid	21.31	11.80	
WIC	15.64	11.19	
Disaster relief	0.10	0.00	***
Legal services	0.02	0.00	*
Other social programs	1.68	0.48	***
TANF	0.36	0.00	**

*Source: National Agricultural Workers Survey, pooled cross sections 1993-2009.*

*Note: \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$*

### Regional considerations

The analysis above proceeds under the assumption that a common price level is relevant for all regions of the US and for Mexico, just not across international borders. To continue the illustration and point out how similar changes also may be relevant for persons who spend time in different domestic areas during the year, further adjustments can be made by exploiting survey information on current location within the US. The NAWS public use data used here includes information on the regional location of survey respondents in six categories based on US Department of Agriculture agricultural regions.

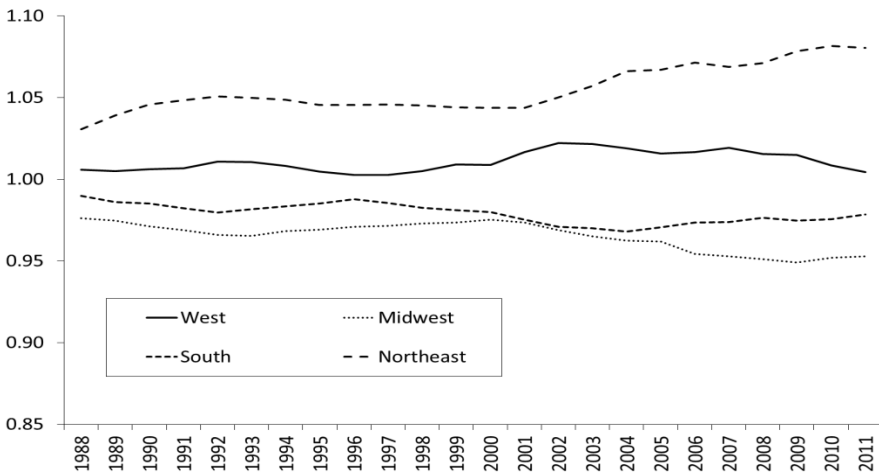
As rural Consumer Price Index (CPI) values are not readily available by region, the CPI Urban Wage Earners and Clerical Workers (Current Series) annual values from the Bureau of Labor Statistics are used for calculations examining regional differences. While wage earners may be a more relevant comparison group than all urban consumers, it is important to note as a caveat that expenditure patterns of agricultural workers still may be different from the general population. Still, this approximation is used here as the basis of a methodological illustration. The basic calculation is as follows:

$$\text{Threshold} = \left( \frac{\text{US Weeks}}{\text{Total Weeks}} * (\text{US Threshold}) + \frac{\text{Abroad Weeks}}{\text{Total Weeks}} * (\text{PPP Ratio}) * (\text{US Threshold}) \right) * \text{CPI Ratio} \quad (3)$$

where *CPI Ratio* is the ratio of national to regional CPI values. CPI values are available for west, midwest, south, and northeast categories. Figure 5 illustrates the CPI values for these regions respectively relative to the national CPI values. These four regions are the only ones readily available from the Bureau of Labor Statistics. Some variation is evident. Notably, prices are highest in the northeast followed by the west and lowest in the midwest followed by the

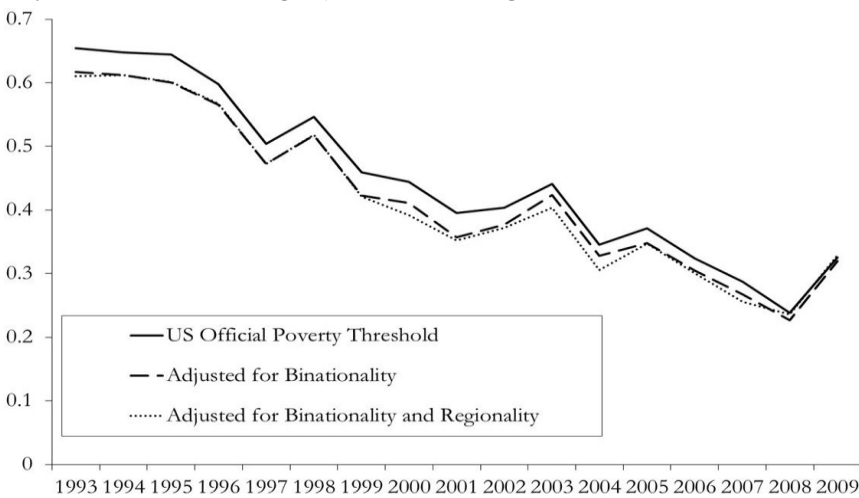
south as the second lowest. This ranking persists across the time period of study though relative differences vary by year.

**Figure 5.** Consumer price index (CPI) ratio, US example



Source: Bureau of Labor Statistics, Consumer Price Index, CPI Urban Wage Earners and Clerical Workers (Current Series).

**Figure 6.** Fraction of Mexican farmworkers under current and adjusted poverty thresholds, including adjustments for region within the US



Source: National Agricultural Workers Survey, pooled cross sections 1993-2009 and author's calculations using sources above.

For the illustration, the four regions are mapped to the regions available in the NAWS dataset. Specifically, east in the NAWS is matched to the northeast CPI ratio. Similarly, southeast is matched to south, midwest is matched to midwest, and southwest, northwest, and California are matched to the west

category from the CPI values. Unfortunately, the NAWS does not include information on interregional movements and therefore it is impossible to adjust for week allocations in various US destinations.<sup>9</sup> Therefore, the CPI ratio as indicated in equation (3) is applied to the full calculation as opposed to weeks in particular US locations.

Figure 6 incorporates the adjustment for region of observation using the formula noted in equation (3). Notably, adjustments for cost of living differences across the US to the extent that these are captured in CPI statistics are minor in comparison to adjustments for binationality. This, however, should not be overly surprising given that price differentials across the US and Mexico are much more pronounced than between the northeast and the midwest within the US. Note for example that the CPI ratios as illustrated in Figure 4 vary within the range of less than 10% in most years.

### Discussion and conclusions

In March 2010, the Obama administration announced a new poverty measurement technique (Supplemental Poverty Measure (SPM)) for presentation alongside existing measures. Specifically and unlike existing measures, the new measure was scheduled to make allowances for decreases to family resources such as tax payments, work and child care expenses, and out of pocket medical expenses and for increases in resources due to supplemental sources such as in-kind benefits. Likewise, new thresholds were set to rise proportionally to average American living standards and were based on a definition of poverty status below the 33rd percentile. The new measure therefore is designed to be related to comparative, as opposed to absolute, purchasing power. Like the ideas of optimal poverty measurement indicated in the literature, SPM is controversial despite announcements that it will not be used for benefits determination and is currently just a comparative exercise.<sup>10</sup> In a recent policy brief from the US Census Bureau, Short (2011) reports some of the initial SPM findings. Specifically, the SPM as first constructed takes into account family-level in-kind benefits and nondiscretionary expenses such as food, clothing, shelter, and utilities. Though the SPM does not adjust for binationality, it does incorporate geographic adjustments for differences in housing costs and therefore shares similar spirit to the adjustments presented here. This results in higher SPM rates than official measures in most cases. For two adult, two children households in 2010, for example, the official threshold was \$22,113. The SPM in contrast is reported at \$25,018 for homeowners with a mortgage, \$20,590 for owners without a mortgage, and \$24,391 for renters for that year.

<sup>9</sup> The NAWS does include information on whether respondents are migratory or not, but not information on particular time allocations within the US.

<sup>10</sup> See "Census Bureau to Develop Supplemental Poverty Measure" [www.commerce.gov/news/press-releases/2010/03/02/census-bureau-develop-supplemental-poverty-measure](http://www.commerce.gov/news/press-releases/2010/03/02/census-bureau-develop-supplemental-poverty-measure). Of further interest, the administration is interested in methods and data sources used to geographically adjust poverty thresholds (Federal Register, Vol. 75, No. 101, Wed., May 26, 2010).

Similar to what is being done with the SPM in policy circles, poverty definition improvement also is a theme of this paper. While SPM focuses on many important dimensions of poverty measurement and is an exciting movement away from unidimensional calculation to one that is multidimensional, this paper addresses an additional issue that could be incorporated in the future. Particularly, this paper introduces the idea of adjustments to the poverty definition for internationally comparative purchasing power. If purchasing power differences exist across borders, then those partaking in migrant streams spanning borders may be inappropriately classified either as poor or non-poor depending on the direction of these differences and this ultimately may be relevant for some benefits determination.

“Poverty” has traditionally been defined relative to one country’s prices. Here the relevance of comparative purchasing power figures has been argued. The adjustments suggested in this work could hypothetically be applied to either old official or new (absolute or relative) poverty measures for comparison purposes and statistical analysis of the impoverished population and therefore have the potential to be included alongside other improvements for domestic poverty analysis.<sup>11</sup> For the case study example, adjustments suggest that fewer Mexican migrants should be considered poor by US standards than what is found using current formulas. A parallel argument, however, may be made regarding native border residents who also may have access to lower prices (or those spending substantial annual leisure time in a second country). This suggests that poverty rates for some non-immigrant households also could be reconsidered.

The formulas presented here have the caveat that they will continue to overstate poverty to the degree that there are positive remittances from the US to other countries and understate poverty if the reverse is true. Furthermore, the fraction of time spent in the US versus abroad may differ across family members and therefore the presentation is at best an approximation.<sup>12,13</sup> Despite these caveats, the extent of misclassification in the current poverty measures related to the transnationality consideration is found to be significant. Of further interest is the extent to which misclassification due to binational population movements occurs from the source country perspective

---

<sup>11</sup> While adjusting a relative poverty measure based on weeks abroad is straightforward involving substituting current threshold levels into a formula like (2) in place of absolute thresholds, comparisons over time are complicated as income inequality is endogenous.

<sup>12</sup> More sophisticated allowances could be made for reported activity of family members other than the migrant him/herself. The current calculation assumes that all reported household members in the US spend the same time within the US as the interviewee. Particularly, adjustments could be designed for total annual incomes and composition of family that partakes in the migrant stream using equivalence scales from development and family economics to account for differences in relative household consumption by age and gender. This was not completed in this paper but should be considered for future work in this area.

<sup>13</sup> A third consideration is that not directly taking into account extra costs faced by a binational population (in terms of extra travel, risk, and so on) may bias the adjusted poverty rate downward and therefore further adjustments may be warranted.

in which case the formulas could be used with the source threshold substituted and PPP ratio inverted. This was not completed for the case study example because of limited threshold data availability for Mexico.

This paper points out just some of the issues surrounding poverty measurement for a binational population. In their survey of the poverty measurement literature, Addison, Hulme, and Kanbur (2009) distinguish between static and dynamic measures where static measures involve one point in time and dynamic measures are taken over the life cycle and/or across generations. The authors argue that much of the recent work on poverty, like what is presented here, has multidimensional aspects but is static in nature. Further work therefore could be done to consider how the measures here could be extended into a dynamic framework and incorporated into the SPM measures recently introduced by the US Census Bureau.

## References

- Addison, T., Hulme, D. and Kanbur, R. (2009). "Poverty Dynamics: Measurement and Understanding from an Interdisciplinary Perspective," in *Poverty Dynamics: Interdisciplinary Perspectives*, Oxford: Oxford University Press.
- Carvalho, S. and White, H. (1997). "Combining the Quantitative and Qualitative Approaches to Poverty Measurement and Analysis: The Practice and the Potential," *World Bank Technical Paper No. 366*.
- Dávila, A. (1982). "Sources of Depressed Earnings along the Texas-Mexico Border," *Federal Reserve Bank of Dallas Economic Review*, (November), 13–19.
- Dávila, A. and Mattila, J. P. (1985). "Do Workers Earn Less along the US-Mexico Border?," *Social Science Quarterly*, 66: 310–318.
- Dávila, A. and Mora M. T. (2008). "Changes in the Relative Earnings Gap between Natives and Immigrants along the US-Mexico Border," *Journal of Regional Science*, 48(3): 525–545.
- Deaton, A. (2010). "Price Indexes, Inequality, and the Measurement of World Poverty," *American Economic Review*, 100(1): 5–34.
- Kandel, W. (2008). *Profile of Hired Farmworkers, A 2008 Update*. Washington D.C.: US Department of Agriculture, Economic Research Service.
- Kakwani, N. and J. Silber (eds.) (2008). *Many Dimensions of Poverty*. New York: Palgrave Macmillan.
- Maskovsky, J. and Kingfisher C. (2001). "Introduction," *Urban Anthropology and Studies of Cultural Systems and World Economic Development*, 30(2/3): 105–121.
- Pena, A. A. (2010). "Poverty, Legal Status, and Pay Basis: The Case of US Agriculture," *Industrial Relations*, 49(3): 429–456.
- Sen, A. K. (1997). "From Income Inequality to Economic Inequality," *Southern Economic Journal*, 64(2): 383–401.
- Smith, B. and Newman R. (1977). "Depressed Wages along the US-Mexico Border," *Economic Inquiry*, 15, 51–66.
- Short, K. S. (2011). "The Research Supplemental Poverty Measure: 2010," US Census Bureau.