Borderplex Migration Modeling
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Introduction

There have been numerous studies that examine international migratory trends (Borjas, 1994). A combination of relatively high unemployment plus lagging income performance is usually sufficient to trigger migratory outflows from low earnings regions to higher income markets (Harris and Todaro, 1970). Many of these studies have analyzed migratory flows from Mexico to the United States (Durand, Massey, and Zenteno, 2001). Uneven economic performance in Mexico served as a strong “push factor” for multiple waves of northbound workers throughout the past 100 years (Orrenius, 2001; Fullerton and Sprinkle, 2003).

A substantial body of work has also looked at the various ways in which border region demographics differ from those associated with the nations that lie adjacent to each other. Many of these efforts focus on Mexico and the United States and how income differentials affect conditions on either side of the international boundary (Peach and Williams, 1994). Regional economic performance differentials that are influenced by direct foreign investment patterns have also been shown to lead to domestic migratory responses that, in turn, impact upon international border metropolitan economies (Young and Fort, 1994). Labor and capital flows of this nature generally lead to important regional wage, income, and productivity impacts (Corden and Findlay, 1975; Calderón and Mendoza Cota, 2000).

While the research to date is very useful, one problem that currently hampers analyses of border region population economics between Mexico and the United States is the general absence of time series data on the breakdowns between international and domestic migration flows at the metropolitan level. Limited time series data are available for border counties in the United States from 1991 forward. At present, however, the same level of coverage is not available for municipalities on the Mexican side of the border. While cross sectional studies can be designed to shed light on different aspects on the interplay between demographics and the economy (Robertson, 2000; Hanson, 2001), in-depth case studies of border metropolitan migration patterns are more difficult to engage. The latter include time series analyses involving studies of the interplay of cross-border business cycles between the two national economies. Development of those data sets will complement ongoing demographic studies regarding metropolitan area fertility patterns in border areas (Anguiano Téllez, 1999).

The research proposed herein is designed to partially overcome this gap by developing new migration data estimates for Ciudad Juárez. It will further review how cross border metropolitan area migratory flows can potentially be jointly modeled. The latter will utilize the 200-equation University of Texas at El Paso (UTEP) borderplex econometric forecasting model as the basic framework for developing such a system (Fullerton, 2001).

Modeling Overview

The diagram presented in Figure 1 provides a basic flowchart of the El Paso – Ciudad Juárez borderplex model initially developed at UTEP in 1996 (Fullerton and Tinajero, 2005).
For the demographic equation block in the El Paso portion of the model, data limitations are less severe than those for Ciudad Juárez. Current year population in El Paso is modeled as the sum of its own lag, natural increase, and net migration. Net migration is the sum of net domestic migration and net international migration. Unfortunately, data for the latter two series cannot be broken into their component parts and have to be modeled directly.

In addition to series decomposition constraints, the number of annual observations for domestic and international migratory flows to and from El Paso is very limited. At present, the data for these two series go back only to 1984. That represents an improvement from a year ago when historical estimates were available only back to 1991. Although the birth and death components of natural increase have been modeled with some success, reliable specifications for the two El Paso migration series remain elusive.

For Ciudad Juárez, total population is modeled directly instead of being calculated using an identity. Cyclical migratory factors in that equation are approximated by total maquiladora employment. Births and deaths are also modeled stochastically. The output from those equations is used to estimate natural increase. Natural increase is then subtracted from population to obtain annual net migration.

Estimates for net domestic migration to and from Ciudad Juárez do not presently exist. That gap in the regional economic profile for this large city will probably be addressed at some
point using a combination of Mexican social security, census, and State of Chihuahua civil registry data. For now, it represents a significant obstacle with respect to accurate modeling and simulation analysis for the entire borderplex economy.

To attempt to overcome that barrier, a simplifying assumption has been made. Namely, annual net international migration to and from Ciudad Juárez is set equal to the negative of what is calculated for El Paso. That figure is then subtracted from net migration to provide an estimate of annual domestic net migration to and from Ciudad Juárez. Whether that assumption is reasonable is not known. Regional sociologists and demographers familiar with the borderplex are evenly divided about what percentage of international migrants from Ciudad Juárez immediately bypass El Paso for other destinations within the United States.

Conclusion

El Paso domestic and international migration flows have only recently been added to the UTEP borderplex model. Similarly, Ciudad Juárez natural increase components will be utilized in a forecasting context for the first time in September 2006. Due to those factors, it is not yet possible to assess the accuracy of this modeling approach. Eventually, the calculation of domestic migration estimates for Ciudad Juárez will eliminate the need for this admittedly unsatisfactory construct. Until such time, however, this artifice is potentially the best alternative available to border region analysts.

References


