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## The Long Run and the Energy Sector in the Border Region

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### ABSTRACT

The environmental and energy future of the U.S.-Mexican border region will be determined largely by long-run national trends in population growth and per capita income. Per capita electricity consumption in the United States is roughly five times as high as the corresponding figure in Mexico and these national figures are reflected in border region electricity and non-electric energy consumption patterns. Per capita energy consumption in Mexico, including the border region, is lower than in the United States because per capita income in Mexico is lower than in the United States.

All projections of border region energy demand, cited in the following chapters, depend critically on projected population size and per capita income. Border region population growth and per capita income, in turn, depend mainly on the corresponding national trends of these two variables. The main focus of this chapter is these long-run trends and how they might be influenced by national policies, but two short digressions are necessary.

First, the three main ways in which national economies affect regional economies such as the border region are discussed. Interregional trade flows are important because the smaller the

region, the less likely it is to produce all of the goods and services its population consumes. The region must import these goods and services from elsewhere and the region must export something to pay for the imports. The maquiladora industry is a good example of the importance of interregional trade. Capital and labor mobility are also important determinants of regional economic conditions. Workers will often migrate based on regional economic conditions and capital may be attracted to capital-short regions. Finally, there are regional differences in the impact of national policies. For example, trade policy and immigration policy affect some regions more than others.

The second digression is a brief tour of short-run macroeconomic conditions in Mexico and the United States. Short-run economic conditions can have lasting effects, both nationally and in the border region. A classic example is the creation of the Bracero Program in 1942 in response to labor shortages in the United States. But there is another reason for examining the short run. All too often, we have a tendency to think that current economic conditions will continue indefinitely. Many observers felt that the U.S. economic expansion of the late 1990s was so strong that the United States had entered a fundamentally new economic era. Mexico's economic expansion of the late 1990s has been remarkable as well. But it is possible that both expansions are coming to an end. Because Mexico's expansion is so closely tied to U.S. economic conditions, it is important not to consider current economic conditions as a lasting feature shaping the regional economies.

A major task of this chapter is to examine long-run national trends in population and suggest what these trends might mean for the border region. The population history of the United States and Mexico is a study in contrasts and variability. During the 19<sup>th</sup> century, the U.S. population increased much more rapidly than Mexico's. By 1900, the U.S. population of 75 million people was more than five times as large as Mexico's population of 13.6 million. Since about 1930, however, Mexico's population has been growing at a much higher rate than the U.S. population. Since the mid-1970s, Mexico's population growth rate has fallen dramatically in response to deliberate policy actions. In short, even a quick examination of population trends in the two nations leads to the conclusions that

population growth rates vary considerably from decade to decade, national policies (e.g., immigration) matter, and future population growth in the two nations are not independent.

Major urban areas along both sides of the border have been growing rapidly for decades, but there is no reason to adopt a Malthusian gloom-and-doom scenario for the border region. The Malthusian assumption of (constant) exponential population growth rates is not warranted by the population histories of either Mexico or the United States. Malthusianism is simply not meaningful in the regional context. Rather, what should be planned for in the border region is a great deal of variation in population growth rates.

A second critical variable in the context of the border region energy sector is per capita income. Per capita income on the U.S. side of the border (in 25 border counties) is low relative to the U.S. average and has been falling relative to the national figure in recent years. On the Mexican side of the border, per capita income (as measured by Gross State Product per person) is considerably higher than the Mexican national average. Still, differences in income on the two sides of the border are substantial and largely reflect national averages.

U.S. Gross Domestic Product (GDP) per person in 2000 was \$36,000 while in Mexico it was \$4,500. There is no realistic possibility of income convergence between the two nations in the next few decades. Mexico's real (inflation adjusted) GDP per capita in 2000 barely exceeded its previous peak, which was recorded in 1981. The simple arithmetic of compound annual growth rates effectively prohibits income convergence anytime soon. If Mexico's real GDP per capita could increase by 2% per year, it would take 108 years for Mexico's real GDP per person to reach the current level of U.S. GDP per person. Indeed, at a 2% per year growth rate it would take 36 years for Mexico's real GDP per person to reach \$9,000. A 2% per year increase in real GDP per person reflects the U.S. growth rate over the past century. No one would question Mexico's economic success if it were able to accomplish such a feat.

Income convergence between the United States and Mexico is not an impossibility, but current national policies in the two nations will not produce that result. The North American Free Trade Agreement (NAFTA) and Mexico's adoption of an export-led growth

model will not produce income convergence. U.S.-Mexican trade has increased dramatically since NAFTA was adopted, but that trade was already increasing in the five years before NAFTA was implemented. In any case, it is clear that exports must grow continuously at very high rates in order for export-led growth to substantially narrow the U.S.-Mexican income gap. The maquiladora industry, often described as Mexico's most dynamic economic sector, is far too small and pays wages that are generally far too low to close the income gap. Greater reliance on the private sector in Mexico and the United States may indeed produce gains in efficiency in some sectors in both nations, but will not result in U.S.-Mexican income convergence. Greater sophistication among central bankers and the possibility of monetary policy stability in the two nations also will not result in income convergence.

A number of policies could be effective in narrowing the U.S.-Mexican income gap. The United States, Mexico, and Canada could agree to complete labor mobility among the three nations as an extension of NAFTA. Such a labor mobility pact would go a long way toward eliminating wage and income differences among the three nations. Another possibility would be for the three nations to agree on a common North American minimum wage, set at the currently highest minimum wage, that of the United States. A North American minimum wage would not affect many workers in either the United States or Canada, but would boost the incomes of a large portion of Mexico's labor force. It would also increase (domestic) aggregate demand in Mexico considerably, offering expanded markets and many new business possibilities. Labor mobility and a common minimum wage could also be implemented gradually and together.

Another interesting policy possibility is the North American Common Market (NACM) proposed by Mexico's President Vicente Fox. A Free Trade Agreement (FTA) such as NAFTA is a weak form of economic integration, requiring only the elimination of trade barriers among participating nations. A common market, such as the proposed NACM or the European Union, is a much stronger form of economic integration. A common market requires the elimination of trade barriers, a common trade (tariff) policy toward non-members, and the removal of barriers to the cross-border movement of capital and labor among member nations. The proposed NACM could

result in more rapid income convergence.

There are several reasons why the proposed NACM may be given serious consideration:

- Major political figures and parties in the United States and Mexico are openly receptive to the idea that markets promote economic efficiency.
- There is historical precedent. The United States may be viewed as a giant common market. The European Union provides another reasonably successful example.
- A common market consisting of the three NAFTA nations, by eliminating the remaining trade barriers, offers a much larger market size.
- NACM offers at least a partial solution to the immigration problem.
- Long-run demographic and economic trends imply the need for greater economic integration. For example, the United States faces a potential labor shortage in the coming decades due to the aging of the population, while job creation for a growing labor force is a major problem in Mexico.

NACM and other policy options offering the potential to reduce the U.S.-Mexican income gap may appear to be politically impossible, however, keep in mind that a decade ago NAFTA was not even being discussed. Perhaps NACM will never exist. The basic point is that without a major policy shift, large differences in per capita income will persist at the national level and in the U.S.-Mexican borderlands.

Without major policy changes, the most probable description of the border region in the year 2020 is a region in which per capita incomes on both sides of the border have grown substantially in real terms; per capita incomes on the Mexican side of the border will remain higher than in other parts of Mexico; per capita incomes on the U.S. side of the border will remain substantially lower than for the United States as a whole; and there will be no significant binational income convergence. As a result, border energy issues in 2020 will be confronted in an economic context that is not significantly different from what is seen today in the border region.

## El Largo Plazo y el Sector Energético en la Región Fronteriza

*James Peach*

### RESUMEN

El futuro de la energía y del medio ambiente de la región fronteriza entre México y los Estados Unidos será determinado en gran medida por las tendencias nacionales a largo plazo del crecimiento poblacional y el ingreso per cápita. El consumo per cápita de electricidad en los Estados Unidos es cerca de cinco veces más que el consumo estimado en México y estas cifras se distinguen claramente en los patrones de consumo de energía eléctrica y no eléctrica en la región fronteriza. El consumo per cápita de energía en México, incluyendo la región fronteriza, es menor a la de Estados Unidos simplemente porque el ingreso en México es menor al de Estados Unidos.

Todas las proyecciones de demanda de energía en la región fronteriza, citadas en investigaciones del Instituto Fronterizo, dependen en gran medida del tamaño de la población e ingreso per cápita. El crecimiento en la región fronteriza y el ingreso per cápita, dependen principalmente de las tendencias nacionales correspondientes a estas dos variables. El enfoque principal de este trabajo está en estas tendencias a largo plazo y como estas tendencias pueden ser influenciadas por las políticas nacionales, pero dos pequeñas disgresiones son necesarias.

Primero se debe de discutir los conceptos de las tres principales vías en que las economías nacionales afectan las economías regionales, como la región fronteriza. El flujo de *comercio interregional* es importante debido a que entre más pequeña sea la región, hay menos posibilidades de que pueda producir todos los bienes y servicios que su población consume. Dicha región debe importar estos bienes y servicios de otra parte además de exportar sus productos para poder pagar lo que se importó. La industria maquiladora es un buen ejemplo del significado del comercio interregional. *Movilidad de capital y mano de obra* son también factores determi-

nantes del bienestar económico de una región. Los trabajadores por lo general emigran de acuerdo con las condiciones económicas y el capital puede ser concentrado en regiones de poco capital. Para terminar, se muestra también diferencias regionales en el impacto de las *políticas nacionales*. Por ejemplo, la política de comercio y la política de inmigración se acentúan más en unas regiones que en otras.

La segunda disgresión es un breve recorrido por las condiciones macroeconómicas de México y Estados Unidos. Las condiciones económicas a corto plazo pueden tener efectos duraderos, en el ámbito nacional y en la región fronteriza. Un ejemplo clásico fue la creación del programa Bracero en 1942 en respuesta a la escasez de mano de obra en Estados Unidos. Pero además hay otra razón para examinar el corto plazo. Frecuentemente, tenemos una tendencia a pensar que las condiciones económicas actuales continuarán indefinidamente. Muchos observadores sienten que la expansión económica de los Estados Unidos, a finales de los años noventas era tan fuerte que se había entrado en una nueva era. También la expansión económica de México fue remarcable. Es muy posible que estas expansiones económicas ya hayan terminado. Debido a que las expansiones de México están altamente relacionadas con aquellas de los Estados Unidos, es importante que no se consideren las condiciones económicas actuales como una última posición de agudeza para la economía regional.

Una de las tareas principales de este trabajo es examinar las tendencias nacionales de largo plazo en cuanto a población se refiere y lo que estas tendencias puedan significar para la región fronteriza. La historia de la población de los Estados Unidos y México es un estudio de contraste y versatilidad. Durante el siglo 19, la población de Estados Unidos incrementó a un nivel más acelerado que el de México. Para 1900, la población en los Estados Unidos era de 75 millones de personas; esto significaba cinco veces la población de México, el cual era de 13.6 millones de gentes. Sin embargo, para 1930, la población de México había crecido a una tasa más grande que la de Estados Unidos. Desde la mitad de la década de los setentas, la población mexicana había caído a niveles dramáticos debido a acciones de políticas deliberadas. Una evaluación de las tendencias poblacionales en las dos naciones da como conclusión que: El crec-

imiento poblacional varia de década en década, las políticas nacionales sí cuentan, y el crecimiento poblacional de las dos naciones no son independientes.

Las principales áreas urbanas en las dos fronteras han crecido en una forma acelerada por muchas décadas, pero no hay necesidad de montar un escenario Malthusiano para la región fronteriza. El razonamiento Malthusiano de tasa de crecimiento exponencial (constante) no es garantizado por la historia poblacional ni de México ni de Estados Unidos, el Malthusianismo simplemente no tiene ningún sentido en el contexto regional. En vez, lo que debemos de esperar en la región fronteriza es una gran variación en las tasas de crecimiento poblacional.

La segunda variable crítica en el contexto del sector energético en la región fronteriza es el ingreso per cápita. El ingreso per cápita en la región fronteriza de Estados Unidos es bajo comparado al promedio de Estados Unidos y ha caído en los últimos años de acuerdo con las más recientes estadísticas nacionales. Por parte de la región fronteriza mexicana, el ingreso per cápita (medido como Producto Interno Bruto Estatal por persona) es considerablemente alto comparado con el promedio del ingreso en el país. Pero aún hay diferencias en el ingreso en los dos lados de la frontera que son sustanciales y se reflejan en gran medida en las estadísticas nacionales.

El producto interno bruto estadounidense por persona en el año 2000 fue de \$36,000 mientras que en México fue de \$4,500, por lo que no hay una real convergencia en el ingreso entre las dos naciones en las próximas décadas. El PIB real per cápita (ajustado a la inflación) en el 2000 excedió su máxima cantidad registrada en 1981. La simple aritmética de tasa de crecimiento anual compuesta, efectivamente prohíbe la convergencia del ingreso en un tiempo muy corto. Si el PIB per cápita en México pudiera incrementarse a 2% por año, se tomaría 108 años para igualar el PIB real por persona de Estados Unidos del 2000. De hecho tomaría 36 años para alcanzar los \$9,000 tomando en cuenta un crecimiento de 2% en el PIB real per cápita en México. Un incremento del dos por ciento por año en el PIB real por persona, refleja el crecimiento de Estados Unidos en el siglo pasado. Nadie podría cuestionar el éxito económico de México si se llegara a estas cifras.

La convergencia del ingreso entre los Estados Unidos y México no

es un imposible, pero debido a las políticas nacionales actuales en las dos naciones, no se permitirá realizar tal resultado. El Tratado de Libre Comercio (TLC) y la adopción de un modelo de crecimiento guiado a la exportación, no producirá la convergencia del que el TLC se implementara. En todo caso, es claro que las exportaciones deben de crecer para cerrar el vacío del ingreso entre las dos naciones. La industria maquiladora, por lo general descrita como el sector económico más dinámico, es demasiado pequeña y paga salarios demasiado bajos para que se pueda cerrar el vacío del ingreso entre las dos naciones. Una mayor confianza en el sector privado en México y Estados Unidos podría tener una mayor eficiencia en algunos sectores en ambas naciones, pero no resultaría en la convergencia del ingreso de México-Estados Unidos. Una mayor sofisticación de los bancos centrales y la estabilización de la política monetaria tampoco resultaría en la ya mencionada convergencia del ingreso.

Hay un gran número de políticas que podrían cerrar el espacio del ingreso, con gran efectividad, entre México y Estados Unidos. Los Estados Unidos, Canadá y México podrían acordar una “movilidad de la mano de obra” entre los tres países como una extensión del Tratado de Libre Comercio. Tal pacto de movilidad en la mano de obra, llevaría a la eliminación de las diferencias en cuanto a ingresos y salarios entre las tres naciones. Otra posibilidad sería el acuerdo de un salario mínimo estándar para las tres naciones—puesto al máximo salario mínimo entre las tres naciones. Un salario mínimo estándar entre las tres naciones no afectaría a la mayoría de los trabajadores en los Estados Unidos o Canadá, pero sí se incrementarían los ingresos de la mayor parte de la fuerza laboral mexicana. Esto también incrementaría la demanda agregada (doméstica) en México considerablemente, ofreciendo mercados en expansión y la posibilidad de nuevas fuentes de negocios. La movilidad de mano de obra y el acuerdo del salario mínimo se podrían implementar juntas y gradualmente también.

Otra de las posibles políticas interesantes es la del Mercado Común de Norteamérica (NACM, por sus siglas en inglés) propuesta por el presidente de México Vicente Fox. Un acuerdo comercial, como el TLC, es una forma débil de integración económica, que requiere de la eliminación de barreras comerciales entre las naciones

participantes. Un mercado común como el ya propuesto NACM o como el de la Unión Europea sería una integración económica mucho más fuerte. Un mercado común requiere de la eliminación de barreras comerciales, una política de mercado común (a través de tarifas) hacia las naciones que no sean miembros del mercado común y la remoción de barreras que pudieran limitar la movilidad del capital y mano de obra entre las naciones participantes (en este caso México, Estados Unidos y Canadá). El ya mencionado NACM pudiera resultar en una vía más rápida de convergencia del ingreso.

Hay una serie de razones por las cuales el NACM podría ser tomado en cuenta seriamente.

- Los personajes y partidos políticos en los Estados Unidos y México están convencidos abiertamente de la idea de que los mercados promueven una mejor eficiencia económica.
- Hay un precedente histórico. Los Estados Unidos puede ser visto como un mercado común y el Mercado Común Europeo es un ejemplo de lo que aquí se dice.
- Un mercado común consistente en los participantes del TLC, pero con la eliminación de las barreras comerciales existentes, ofrece un mercado más grande y efectivo.
- El NACM ofrece una solución viable, pero parcial al problema de la inmigración.
- Las tendencias demográficas y económicas a largo plazo demuestran que debe haber una integración económica más fuerte. Por ejemplo, los Estados Unidos enfrentará una escasez de mano de obra en las próximas décadas debido a la desaceleración en el crecimiento de la población mientras que la creación de empleos para una gran fuerza laboral es un problema importante en México.

NACM y otras políticas que ofrecen reducir el espacio de ingreso entre México y Estados Unidos pueden parecer potencialmente imposibles, pero recordemos que en la pasada década el TLC ni se discutía. Posiblemente el NACM nunca exista. El punto básico es que sin un cambio significativo en las políticas, la diferencia del ingreso per cápita persistirá en el ámbito nacional y entre los dos países.

Sin un cambio mayor en las políticas, la descripción más obvia en la región fronteriza en el año 2020 es una región en que: (a) El

ingreso per cápita en ambos lados de la frontera crecerá en términos reales, (b) El ingreso per cápita en la región fronteriza por parte de México será mayor a la del interior del país, (c) El ingreso per cápita en la región fronteriza de Estados Unidos se mantendrá por abajo del promedio del resto del país, (d) No habrá una convergencia significativa binacional. Como resultado, los temas de la energía en la región fronteriza en el 2020 serán confrontados en el contexto económico de una región fronteriza que no es significativamente diferente a la actual.

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## INTRODUCTION

The participants at Border Institute I produced a “shared vision for the border environment in the year 2020” (Ganster 1999). This vision called for “a healthy sustainable natural environment ... as a basis for a secure and adequate quality of life for all border inhabitants.” Whether or not such a vision can or will be achieved requires us to look far beyond the narrow geographic confines of the border region. The environmental future of the U.S.-Mexican border region, including the energy issues that were the focus of Border Institute III, will be determined mainly by long-term economic and demographic trends in Mexico and the United States. These binational trends are not independent of each other. Economic and demographic conditions in one nation directly affect conditions in the other nation.

California’s recent electricity crisis is a stark reminder that energy issues can be region-specific. But regional energy issues occur within a national and international context. There is, for example, no meaningful sense in which border region energy supply and demand determine national or international prices for oil, natural gas, or other energy sources. Indeed, regional energy prices and supplies depend mainly upon national and international trends and events. Long-term planning for the energy needs of the border region is important, but successful regional planning must take into account a larger national and binational context.

Per capita consumption of electricity in the United States (11,763 kilowatt-hours [kWh] per capita in 1999) is five times as high as the

corresponding figure in Mexico (1,757kWh per capita) and these national figures are reflected in border region electricity and non-electric energy consumption patterns (U.S. Department of Energy [DOE] Energy Information Agency [EIA] 2001). Elegant models are not needed to explain the binational differences in energy consumption. Energy consumption per capita in Mexico, including the border region, is lower than in the United States because per capita income in Mexico is lower than in the United States. All projections of border region energy demand, cited in the following chapters, depend critically on population size and economic conditions such as per capita income and industry mix. The possibility of U.S.-Mexican income convergence and the growth of total population are the critical border region energy issues. Both population growth and income trends are powerfully influenced by national policies that are often only remotely related to the energy sector.

This chapter examines long-run economic and demographic trends and their potential effects on future energy conditions in the U.S.-Mexican border region.

## NATIONAL AND REGIONAL INTERACTION

Within a single nation-state, economists recognize three main ways in which regional economies are affected by the national economy and other regions:

- Interregional trade flows
- Labor and capital mobility
- The differential regional impacts of national policies

In a binational border region, these patterns of national-regional interaction become more complex. In large regions, the possibility of regional-to-national influences should also be considered.

Interregional trade flows are particularly important determinants of regional economic conditions. The smaller the region, the less likely it is to produce all the goods and services its population consumes. Thus, smaller regions are said to have a higher propensity to import than larger regions. In turn, it is often argued that regional exports to the rest of the nation or to international markets are essential to pay for imports and provide regional employment and

income. The national and international demand for regionally produced goods and services is thus critical to regional economic well-being. Consider, for example, the maquiladora industry that now employs more than 1 million people in 3,500 plants located mainly along the Mexican side of the border. This industry depends almost entirely on national market conditions in the United States and would probably not exist except for the U.S. market. In addition, the border region serves as a transportation conduit through which much of the international trade between the United States and Mexico flows.

Capital and labor mobility within a nation-state suggest a different set of national-regional links. In highly simplified form, economic theory suggests that workers will migrate from areas of high unemployment and low income to areas of low unemployment and high income. Out-migrants decrease the supply of labor in high unemployment regions and increase the supply of labor in the low-unemployment destination region. Theoretically, such migration will continue until regional differences in unemployment and real income are eliminated.

In a similar fashion, investors seeking the highest possible rate of return would be expected to invest in low-wage regions in which the marginal return to capital is presumably higher. In short, standard theory implies that the mobility of capital and labor will tend to result in a regional-national equilibrium in which regional differentials disappear. Again, the border region appears more complex. Many counties on the U.S. side of the border have experienced high rates of in-migration simultaneously with high unemployment rates and low per capita incomes for decades. On the Mexican side of the border, high rates of in-migration have been associated with relatively low unemployment rates and higher incomes as is suggested by standard regional theory.

Regional variations in the impact of national economic policies constitute the third major form of national-regional interaction. Some national policies that have particular significance in the borderlands are rather obvious. Trade policies established nationally, binationally, or multi-laterally (NAFTA, for example), exchange rate regimes, and immigration law are felt keenly in the borderlands. The geographic distribution of federal expenditures is far from uniform

in either Mexico or the United States.

Other national policies that have regional impacts are less obvious. A change in monetary policy that increases interest rates may increase regional income inequality because those receiving substantial interest income are unlikely to be concentrated in low-income regions like the borderlands. In contrast, an increase in the legally mandated minimum wage may affect a greater portion of employees in a low-income region than in high-income regions. A reduction in federal expenditures on public welfare will likewise have differing regional effects. Similarly, increases or decreases in Social Security retirement benefits may have disproportionate regional impacts depending on region-specific age and sex distributions, labor force participation rates, and industry mix.

While it is difficult to imagine a regionally neutral national policy action in either Mexico or the United States, the important thing is to try to identify national policy trends that will have a particularly strong impact in the border region. Two other features of the national policy context should be mentioned. First, the United States has very little that can be properly called regional policy, and Mexico's regional policies, while more explicit than those of the United States, can hardly be deemed a success story. Second, as borderlanders in both nations have known for decades, the national policies that set the context for border region growth are not determined in the borderlands.

## A DIGRESSION ON THE SHORT RUN

The short run is also important. Keynes (1971) reminded us: "In the long run, we are all dead." Sometimes, short-run economic conditions can have lasting effects. A classic example with direct relevance to the border region was the tight labor market in the United States in 1942 that led to the creation of the Bracero Program, which allowed Mexican laborers to enter the United States to work in agricultural fields and lasted for more than two decades. It is not an exaggeration to suggest that the abolishment of the Bracero Program in 1964 by then U.S. President Lyndon Johnson, in combination with seldom used provisions of the U.S. tariff laws, led directly to the creation of the maquiladora industry. A more recent example of

the long-term consequences of short-term economic conditions was the passage of the hotly debated NAFTA in 1993. NAFTA was passed the U.S. House of Representatives by a very narrow vote. If the U.S. economy had been in a serious downturn in 1993, it is not likely NAFTA would have been approved.

There is a tendency to think current economic conditions will continue indefinitely. However, economic conditions do change. During the 1970s and 1980s in the United States, there was a common presumption that the U.S. economy had somehow fallen behind other nations and the country could no longer be “competitive” in international markets. Japan was the example of an economic success story. Japan’s economy during the 1970s and 1980s was often described as invincible because that nation had found the keys to successful economic management and was also rapidly becoming one of the world’s most technologically advanced nations. By 1990 the Japanese bubble had burst and for the remainder of that decade it was the U.S. economy that was the envy of the world. While examining the borderlands, it should not be assumed U.S. economic dominance and invincibility will continue forever.

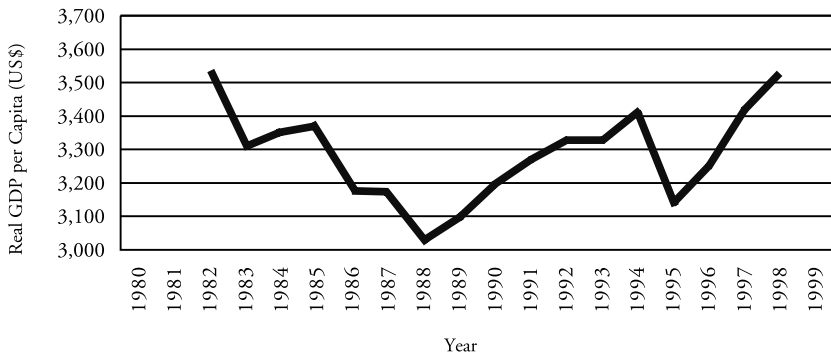
The remarkable U.S. economic expansion during the 1990s, particularly 1995 to 2000, needs little comment. Never before in U.S. history has there been such a long expansion. The U.S. unemployment rate fell to 3.9% in August 2000 from 7.8% at the beginning of the expansion in June 1991. U.S. Gross Domestic Product (GDP) grew at very high rates and by 2000, it had reached \$10 trillion. The expansion was also associated with such high rates of growth of investment in new technology and productivity per worker that many otherwise-sane and seemingly rational people began to speak of something called “the new economy.” In the new economy, the business cycle had been conquered and with careful economic management (monetary policy) rapid economic growth could presumably go on indefinitely (McTeer 2000).

What a difference a few months can make. According to the National Bureau of Economic Research, the private nonprofit agency charged with establishing business cycle reference dates, there were 20 complete business cycles during the 20<sup>th</sup> century in the United States. In Mexico, there is no agency charged with the task of establishing dates for business cycles, but GDP data for

Mexico suggests a comparable number of cycles there. There is no reason to expect that the business cycle has been eliminated as a permanent feature of the U.S. or Mexican economic landscape.

The last few years have been remarkable economic years in Mexico as well. By 2000 Mexico was in the sixth year of an economic expansion that began during the summer or fall of 1995. Until the current expansion, Mexico had not seen six consecutive years of economic growth since the energy-led boom from 1976 to 1981. Depending on how it is calculated, in late 1999 or early 2000 Mexico's real GDP per capita exceeded the previous peak that occurred in 1981 (Figure 1). This achievement may signal the end of two decades of economic instability and stagnation in real income per person. The current expansion in Mexico is remarkable, too, because inflation as measured by the consumer price index (CPI) has decreased each year since 1995. Six years of GDP growth without rapid increases in the CPI has not occurred in Mexico since the 1960s. Finally, the current expansion in Mexico is remarkable because the cycle of presidential election year economic crises has apparently been broken for the first time in 25 years. Mexico experienced economic crises in 1976, 1982, 1988, and 1994-95. Each of these was a presidential election year.

Figure 1. Mexico's Real GDP Per Capita (1990, in US\$)



Source: Interamerican Development Bank

Mexico's current expansion is, however, closely tied to U.S. expansion. When U.S. expansion ends, so too will Mexico's. Mexico now exports approximately one-third of its GDP and more than 85% of its exports go to the United States. Traditionally, U.S. imports increase during expansions and decrease during contractions. There is no way of avoiding economic difficulties in Mexico if U.S. demand for Mexican goods and services declines.

Whatever the short-term economic future, the environmental issues of the U.S.-Mexican border region will not receive high priority without prosperous national economies. The policy decisions made under what may be adverse economic conditions may have a considerable impact on the possibility of achieving the vision of Border Institute I.

## LONG-TERM DEMOGRAPHIC TRENDS IN MEXICO AND THE UNITED STATES

The population of the United States is currently more than two-and-a-half times larger than the population of Mexico and the demographic characteristics of the two nations are very different. But that has not always been the case. In 1790, just after U.S. independence from Britain but a generation before Mexico's independence from Spain, population censuses were conducted in both nations. Despite the possibility of large errors in both censuses, some broad comparisons are worthwhile. The 1790 population of Mexico (then New Spain) of 4.68 million people (Instituto Nacional de Estadística, Geografía e Informática [INEGI] 1990) was about 20% larger than the census-reported figure of 3.92 million people for the United States (U.S. Bureau of the Census 1998).

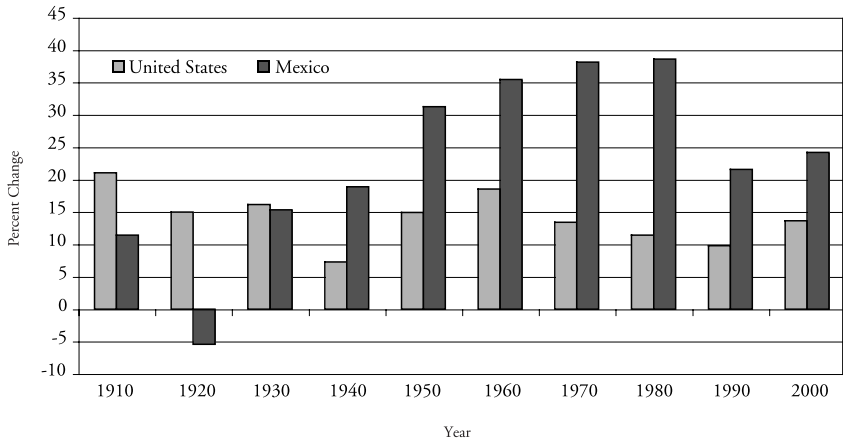
During the 19<sup>th</sup> century, Mexico's population increased three-fold to roughly 14 million in 1900. Meanwhile the U.S. population increased by 15 times to about 75 million in 1900. Some perspective on these numbers is needed. Mexico's 19<sup>th</sup> century population growth occurred at approximately the same rate as U.S. population growth during the 20<sup>th</sup> century. In sharp contrast, if the U.S. population had grown at the same rate in the 20<sup>th</sup> century as it did in the 19<sup>th</sup>, the United States would now have a population of 1.07 billion, greater than India's 1.01 billion and slightly smaller than China's

1.26 billion populations.

Although the data are sketchy, 19<sup>th</sup> century birth and death rates in Mexico and the United States were about the same. In both nations, family size was large by modern standards and death rates were high. Life expectancy at birth in 1800 did not exceed 30 years in either nation. What happened? The major difference in population trends in the two nations during the 19<sup>th</sup> century was that the United States experienced a great deal of immigration, mainly but not exclusively, from Europe. It is true that Mexico lost a good deal of its territory to the United States during the 19<sup>th</sup> century, but this was not the main cause of the vastly different population growth rates. The territory lost to the United States after Texas independence and the Mexican-American War was not densely populated even by the standards of the time.

In 1900, the U.S. population of 75 million was nearly six times as large as Mexico's 13.6 million. As shown in Figure 2, 20<sup>th</sup> century population growth rates by decade varied considerably in the United States and Mexico. In Mexico, the 1921 census recorded 825,000 fewer people than the 1910 census. This decrease of 5.4% of Mexico's total population in a single decade was not entirely the result of battle-related deaths during the Mexican revolution (1911-1920). The migration of Mexicans to the United States during the revolution was certainly a large number. There were also fewer births during the revolution than in the previous decade and large numbers of deaths can be attributed to a severe influenza epidemic in 1918 and 1919. The usual estimates of about 2 million deaths during the revolution far understate the deaths from natural causes that could be expected from a population with a life expectancy of only 30 years.

Figure 2. Decade-to-Decade Percent Change in Population in the United States and Mexico



Arguably the most important demographic impact of the Mexican revolution was the official endorsement and adoption of a pro-natalist population policy, not increased mortality (Loyo 1931 and 1935, Cardoso 1978, Alba 1986, González Navarro 1974). There were two goals of the new policy: first, to increase Mexico's total population, and second, to increase the population of Mexico's northern border states. The logic underlying the program was simple (Alba 1986). An under-populated Mexico presented an attractive target for the aggressive tendencies of the United States; conversely, a more densely populated Mexico with a larger GDP would be a less-attractive target. A secondary consideration was that rapid population growth might produce higher rates of economic growth. Further, higher rates of population growth might induce greater government concern with providing adequate social services and infrastructure.

Mexico's post-revolutionary population policy was a far greater success than could have been anticipated. As shown in Figure 2, population growth rates were higher in Mexico than in the United States from the 1930s to the 1990s. In the early 1970s Mexico reversed its population policy and introduced a serious family planning effort to reduce population growth rates. Again, this policy (along with increasing income and declining infant mortality) was effective, and Mexican population growth rates declined to about

2.1% in the 1990s from more than 3% per year in the 1960s. The decline in Mexico's population growth rates was in sharp contrast to most contemporary (1970s and 1980s) projections (Looney 1978, United Nations 1954) that implied Mexico's population would reach 135 million people by the year 2000. Mexico conducted a mid-decade census in 1995 and recorded a population of 92 million, a figure well below projected trends for the year 2000. Preliminary results from Mexico's 2000 census indicate a total population of 97.2 million, a figure likely to be adjusted upward by 2% or 3% when final figures are available. Remarkably, the 100 million figure for the year 2000 is exactly the planning target Consejo Nacional de Población (CONAPO) and other government agencies established years ago.

The massive wave of European migration to the United States peaked during the 1920s, but by 1930 the U.S. population of 123 million was nearly eight times Mexico's population of 16 million. During the 1930s, the population of the United States increased by 7.2% to 132 million (from 123 million), the lowest decade-to-decade percentage increase during the century. In the late 1930s and early 1940s, U.S. economists and demographers alike predicted the U.S. population would stabilize by 1950 at about 140 million. The post World War II baby boom, perhaps the demographic surprise of the century, significantly altered U.S. population growth rates and fertility patterns. The U.S. population grew by 18.5% during the 1950s and 14.5% during the 1960s, but growth rates fell to 11.4% during the 1970s and fell again to 9.8% during the 1980s.

The first results of the latest U.S. census have been released. The U.S. population of 281 million reported by the U.S. Bureau of the Census was 6 million higher than the bureau's estimates for 2000. The U.S. population growth rate, which most observers had expected to remain constant, increased to 13.6% during the 1990s from 9.8% in the 1980s. Apparently the higher growth rate is due to higher than anticipated migration, much of it from Mexico.

Population projections (United Nations 1998) for the United States and Mexico to the year 2050 are presented in Table 1. The projections for both nations exhibit considerable variation. By 2050 the difference in the high and low projections for the United States is 127 million, while for Mexico the corresponding figure is 104

million. The U.N. high projection for Mexico of 223.5 million in 2050 is nearly 75% of the U.S. low projection of 292.8 million. All three population projections depend critically on migration flows, mainly from Mexico to the United States. For the United States, population flows from Mexico could provide a solution to a slow-growing and rapidly aging U.S. labor force, the so-called “social security problem,” and any number of other economic ills. For Mexico, significant out-migration provides one solution for absorbing more than a million new entrants into the labor market each year. Because migration is so important, the actual population of the two nations in the year 2050 will be influenced by national economic conditions and immigration policies.

Table 1. U.N. Population Projections for the United States and Mexico (in millions)

	2000	2020	2030	2040	2050
United States					
High	280	335.6	364	391	419
Medium	280	317.1	333	343	349
Low	280	301.5	306	302	292
Mexico					
High*	98.8	142.4	167	194	223
Medium	98.8	125.0	135	142	146
Low	98.8	117.9	122	123	119

\*Constant Variant

Source: United Nations

These national trends will directly affect border region population growth rates. For more than 50 years, population growth in the border region’s urban areas has been high by national standards. Projections of border region population to the year 2020 (Peach and Williams 2000) reflect these historically high growth rates and exhibit considerable variation. These projections imply a combined population of the 25 U.S. border counties and 38 border *municipios* ranging from 15 million to 24.4 million by the year 2020.

Such population projections, together with assumptions about

per capita income, are building blocks for border region energy projections. The increase in border region energy demand from these projections is genuinely large. But projections of future national or border region populations should not lead to a Malthusian gloom-and-doom scenario regarding border energy or other environmental issues.

Malthus became famous for his simplistic dictum that population would always grow faster than the food supply and that, as a result, the future would inevitably be clouded by starvation and other resource shortages. It is probably true there would be very little interest in border region environmental or energy issues if the border population were decreasing or even stable. However, there are many reasons to reject the Malthusian perspective. First, there is no justification, in the border region or elsewhere, to adopt the Malthusian assumption of exponential population growth rates. At the national and regional levels, there is a great deal of evidence to suggest population growth rates have been highly variable historically and are likely to be highly variable in the future. Rational energy sector planning in the border region should make the uncertainty of future population growth rates a fundamental axiom.

Second, the Malthusian perspective is not meaningful at the regional level. Other things remaining equal, a growing regional population does imply a greater demand for energy consumption. But, a growing regional population does not imply inevitable regional energy shortages. In economic terms, the concept of a shortage has meaning only in relation to a given price. Border region energy markets are not independent of national and international energy markets. The borderlands could experience region-specific energy problems such as those already occurring in California, but these will not occur primarily because of population growth.

Third, the Malthusian population perspective is unwarranted because national population growth rates are affected by national policies. In the 20<sup>th</sup> century, Mexico's national population policies were associated with rapid population growth from the 1930s to the mid-1970s and an equally dramatic decrease in population growth rates since the mid-1970s. While the United States has no explicit population policy, it does have immigration laws and various other policies (such as income tax deductions for dependents) that influ-

ence population growth.

Finally, the basic Malthusian proposition should not be applied to border region energy issues because it fails to account for other significant variables such as technological change, levels of per capita income, the regional structure of industry, and regional patterns of non-energy consumption.

## LONG-TERM ECONOMIC GROWTH IN MEXICO AND THE UNITED STATES

As suggested earlier, per capita income is a primary determinant of per capita energy consumption in the border region. Policy options for addressing border region energy and environmental issues are also constrained by relative income levels on the two sides of the border. On the Mexican side of the border, per capita income as measured by per capita GDP is higher in each of the six border states than the average for Mexico as a whole (Figure 3). Among U.S. border counties, per capita income is generally low compared to the United States as a whole (Figure 4). Nevertheless, large cross-border differences in border region per capita incomes largely reflect national averages. The best place to find indicators of future border region income patterns is to examine long-term economic growth trends at the national level.

Figure 3. Income Per Capita (1999 US\$)

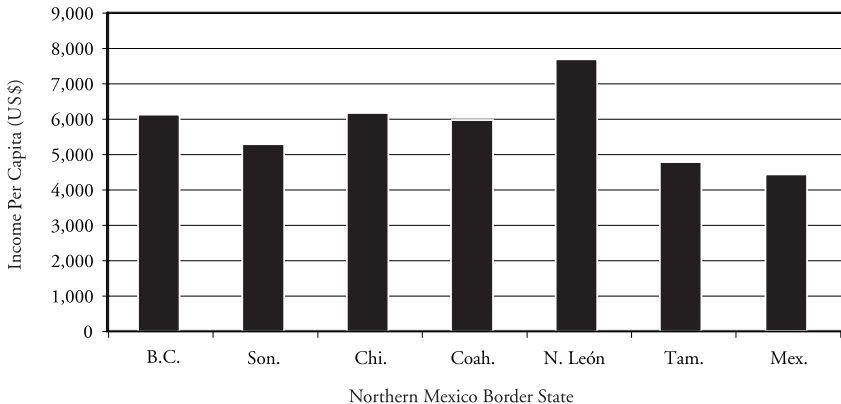
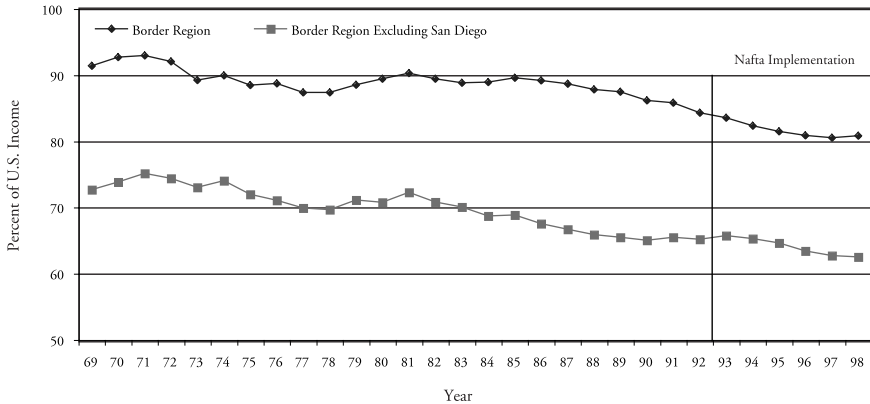


Figure 4. Border Region Per Capita Income as Percent of U.S. Income



During the 20<sup>th</sup> century, U.S. real (inflation adjusted) GDP per capita has increased by approximately 2.1% year (Economic Report of the President 2001). Over the course of a century this 2.1% per year growth rate meant that U.S. residents on average enjoyed an eight-fold increase in their standard of living. Only the Great Depression of the 1930s seriously interrupted the long-term growth of real GDP per person.

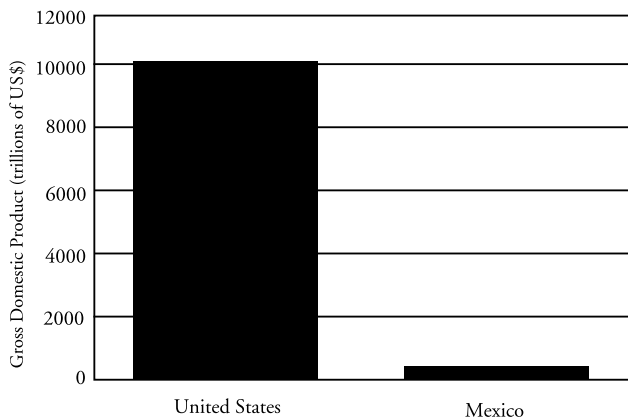
The Mexican economy also experienced periods of very rapid economic growth during the twentieth century. The four decades beginning in the early 1940s were justifiably known as the “Mexican Economic Miracle.” Yet, economic growth rates in Mexico, particularly over the last two decades, have also been highly variable. The result has been a widening income gap between Mexico and the U.S. GDP per person; in Mexico in 2000 it was \$4,500, or roughly one-eighth of the comparable U.S. figure. A century earlier Mexico’s GDP per capita was approximately one-fourth of the comparable U.S. figure (\$1,028 measured in 2000 dollars). The 1900 GDP per capita figures for both the United States and Mexico are very rough approximations. Neither nation had a system of national accounts in 1900. The U.S. estimate is consistent with figures cited in the 2001 Economic Report of the President. The 1900 figure for Mexico has been estimated from the GDP per capita figure of 2,529 (1970) pesos given in *Estadísticas Históricas de México* (INEGI 1991). This

figure is approximately the same as that found in Coatsworth (1981).

The relative sizes of the two economies help to shape economic and political relations between the two nations and affect the border economy in a variety of ways. First, the United States is a large market for Mexican exports. In 1999 the United States was the destination for 86% of Mexican exports. Fluctuations in the U.S. economy are transmitted rather quickly into changes in demand for Mexican products. Since many of these products enter the United States through ports of entry located in the borderlands, border region economic activity is also affected. In addition, labor market conditions in the U.S. portion of the border region are extremely sensitive to national economic conditions.

The U.S. GDP in the fourth quarter of 2000 was \$10.1 trillion compared to Mexico's GDP of \$450 billion (Figure 5). Even with the slowdown in growth during the fourth quarter of 1999, the U.S. GDP increased by \$663.5 billion from 1999 to 2000. Stated differently, the increase in U.S. GDP was approximately 50% greater than Mexico's entire GDP of \$450 billion. This is not unusual. In 15 of the last 20 years U.S. GDP growth has been greater than Mexico's entire GDP. In 1999 there were three U.S. states—California, New York, and Texas—with a larger GDP than Mexico's GDP (U.S. Department of Commerce 2000). California's GDP is more than double Mexico's total output.

Figure 5. Gross Domestic Product in the United States and Mexico (2000)



Closing the U.S.-Mexican income gap in per capita terms is a monumental task but one that is critical in the context of border environmental and energy issues. Yet, the simple arithmetic of compound annual growth rates effectively prohibits income convergence between the two nations during the next century. Using 2000 as a base year, U.S. GDP per capita was \$36,000 while Mexico's GDP per capita was \$4,500. Assuming no growth in U.S. GDP per capita and a 2% compound annual growth rate for Mexico's GDP per capita, it would take 108 years for Mexico to reach the current level of U.S. GDP per capita. Under these assumptions it would take 36 years for Mexico's GDP per capita to reach just \$9,000 per year. Obviously if U.S. GDP per capita were growing at the same time, it would take much longer for Mexico's GDP per capita to "catch-up" to U.S. levels.

The selection of a 2% growth rate for Mexico in this exercise is not entirely arbitrary. While the 2% per year growth rate in per capita GDP is lower than the Fox Administration's goal of 5% per year, it is a more plausible figure for long-term economic growth. The 2% figure corresponds very closely to the twentieth century performance of the U.S. economy. If Mexico were able to achieve such a per capita growth rate for an entire century, no one would argue about the success of its economic policies.

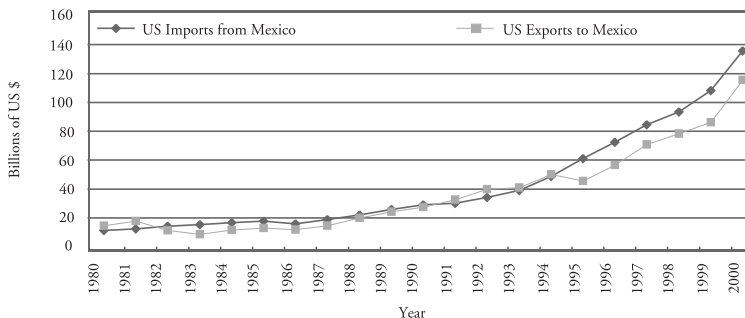
There is another reason to suspect Mexico's per capita income will not reach U.S. levels anytime soon. Starting in the mid-1980s, Mexico abandoned its traditional Import Substitution Industrialization (ISI) policy in favor of an export-led growth policy. Mexico joined General Agreement on Tariffs and Trade (GATT) in 1986 and has signed numerous trade agreements (such as NAFTA in December 1993) on a bilateral and multilateral basis since then. Adopting export-led growth may have been the right decision for Mexico at the time. Many would argue that the old ISI approach was failing and that Mexico had no choice.

Export-led growth is the currently fashionable formula for achieving long-run economic growth. Free trade, it is argued, increases the efficiency of domestic industries and reduces domestic inflationary pressures because local firms must compete with international sources of supply. Export-led growth also means domestic industries must adopt more modern technology, resulting in increased productivity per worker.

Export-led growth is not, however, without its dangers. For exports to lead the growth process, they must grow every year at a very high rate. Suppose the desired rate of GDP growth in Mexico is 4% per year. A 2% per year increase in population would produce a growth rate of 2% per year per capita GDP. Assume also that exports constitute one-third of GDP, as is currently the case in Mexico. If the non-export sector were not growing, this situation would require exports to grow at the rate of 12% per year every year. For any long time period this is a most unlikely scenario. Could a U.S. economy growing 3% per year sustain increases in imports of 10% to 12% per year from Mexico?

Second, export-led growth means dependence on foreign markets. For Mexico this means dependence on the U.S. market. A downturn in foreign economies that translates into a decrease in the demand for Mexican products means exports cannot “lead” the domestic economy. Dependence on export-led growth also leaves the domestic economy vulnerable to changes in the exchange rate and to changes in the structure of international demand. Further, dependence on international markets may imply a loss of domestic macroeconomic policy independence. In the long run, as many Mexican policymakers realize, export-led growth is merely a stopgap measure. Long-run economic growth in Mexico must depend on significant increases in domestic demand. Nevertheless, the growth of U.S.-Mexican trade and Mexican trade with other nations is impressive. Mexican exports to the United States doubled in the five years preceding NAFTA’s implementation and doubled again in the first five years after NAFTA (Figure 6).

Figure 6. U.S. Imports from and Exports to Mexico



## POLICY SPECULATION AND CONCLUSIONS

Income convergence between the United States and Mexico is not impossible, but current national policies in the two nations will not produce that result. Income convergence is not a zero-sum game in which the gains of one nation must be accompanied by losses in the other nation. What is needed most is a permanent increase in the rate of growth of Mexico's per capita GDP, a goal heartily endorsed on both sides of the border.

NAFTA and Mexico's adoption of an export-led growth model will not produce income convergence. U.S.-Mexican trade has increased dramatically since NAFTA was adopted, but that trade was already increasing in the five years before NAFTA was implemented. In any case, it is clear exports must grow continuously at very high rates for export-led growth to narrow the U.S.-Mexican income gap substantially. The maquiladora industry, often described as Mexico's most dynamic economic sector, is far too small and pays wages that are generally far too low to close the income gap. Greater reliance on the private sector in Mexico and the United States may produce gains in efficiency in some sectors in both nations, but will not result in U.S.-Mexican income convergence. Greater sophistication among central bankers and the possibility of monetary policy stability in the two nations will not result in income convergence.

There are a number of policies that could be effective in narrowing the U.S.-Mexican income gap. The United States, Mexico, and Canada could agree to complete labor mobility among the three nations as an extension of NAFTA. Such a labor mobility pact would go a long way toward eliminating wage and income differences among the three nations. Another possibility could be for the three nations to agree on a common North American minimum wage set at the highest minimum wage, that of the United States. A North American minimum wage would not affect many workers in either the United States or Canada, but would boost the incomes of a large portion of Mexico's labor force. It would also increase (domestic) aggregate demand in Mexico considerably, offering expanded markets and many new business possibilities. Labor mobility and a common minimum wage could also be implemented gradually.

Another interesting policy possibility is the North American

Common Market (NACM) proposed by Mexico's President Fox. A free trade agreement such as NAFTA is a weak form of economic integration, requiring only the elimination of trade barriers among participating nations. A common market, such as the proposed NACM or the European Union, is a much stronger form of economic integration. A common market requires the elimination of trade barriers, a common trade (tariff) policy toward non-members, and the removal of barriers to the cross-border movement of capital and labor among member nations. The proposed NACM could result in more rapid income convergence.

There are a number of reasons why the proposed NACM may be given serious consideration. First, major political figures and parties in the United States and Mexico are openly receptive to the idea that markets promote economic efficiency. Second, there is historical precedent. The United States may be viewed as a giant common market. The European Union provides another reasonably successful example. Third, a common market consisting of the three NAFTA nations offers a much larger market size. Fourth, NACM offers at least a partial solution to the immigration problem. Fifth, long-run demographic and economic trends imply the need for greater economic integration. For example, the United States faces a potential labor shortage in coming decades due to its aging population, while job creation for a growing labor force is a major problem in Mexico.

NACM and other policy options offering the potential to reduce the U.S.-Mexican income gap may appear to be politically impossible. However, a decade ago NAFTA was not even being discussed. Perhaps NACM will never exist. But without a major policy shift, large differences in per capita income will persist at the national level and in the U.S.-Mexican borderlands.

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