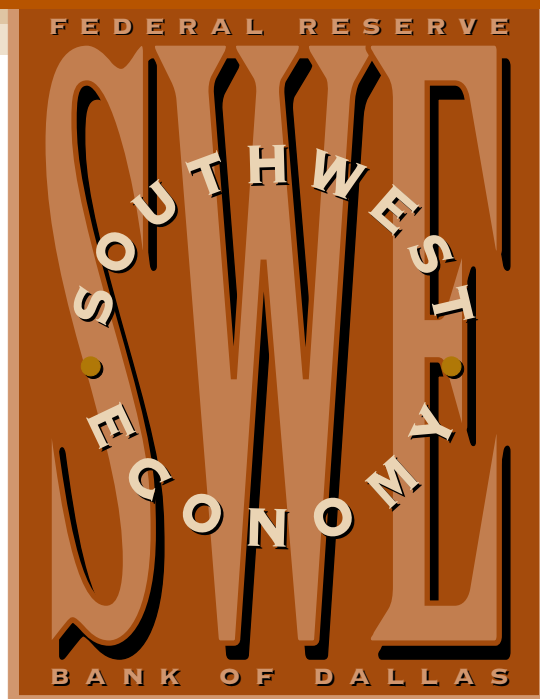


ISSUE 5



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IMMIGRATION AND THE ECONOMY—PART II

ONE OF THE difficult questions that arises in the ongoing public debate on immigration is whether immigrants to the United States represent an overall cost or benefit to the U.S. economy. The answer to this question centers in part on the extent to which immigrants contribute to the labor force, compete for jobs with native workers and provide goods and services that otherwise would not be produced. The answer also centers on the fiscal impact of immigration—the amount of taxes immigrants pay relative to the amount of government services they receive.

This final article of a two-part series on immigration addresses these issues, drawing on the research and ideas presented at “Immigration and the Economy,” a conference sponsored by the El Paso Branch of the Federal Reserve Bank of Dallas.¹



INSIDE

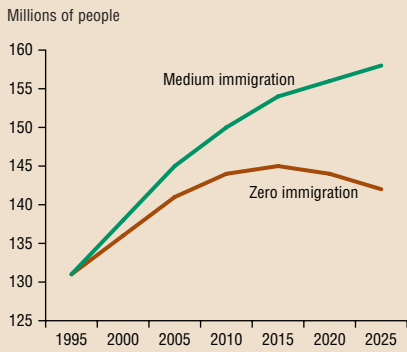
*Grading TIPS—An “I”
for “Incomplete”*

*Border Bottlenecks
Hamper Trade*

Immigration’s Place in Population and Labor Force Growth

The most basic impact of immigration in any country is on its population growth and, therefore, the size of its labor force. Assuming current levels of immigration, a little more than half the growth in the U.S. population between 1995 and 2025 will come from new immigrants and their descendants. Similarly, more than half of the growth in the U.S. labor force—16.5 million people—will be attributed to

CHART 1
LABOR FORCE DECLINES
WITHOUT IMMIGRATION



NOTE: Medium immigration assumes 1,040,000 immigrants per year.

SOURCE: Jeffrey S. Passel and Barry Edmonston, "Immigration and the Future American Work Force," The Urban Institute, 1998.

post-1995 immigrants and their descendants.² Without immigration, however, the U.S. labor force would begin to decline after 2015 (*Chart 1*).

A 1997 Congressional Research Service study on the education and skill distribution of jobs for 1994–2005 estimates that the highest job growth over this 10-year period will occur in jobs that have high-skill requirements (requiring some postsecondary education at a minimum). However, many occupations with limited skill requirements—such as personal service workers, cleaning and building service occupations, and retail sales clerks—will also show above-average job growth. Thus, though the economy in 2005 will demand growing numbers of workers with high education and skill levels (reflecting technology's increasing importance), about half of all jobs available then will require only a high school education or less.³

A look at the skill profile of immigrants shows that immigrants will fill employers' projected labor needs. Immigrants to the United States are disproportionately included in both some very low-skilled occupations—waiters, housekeepers, agricultural and textile workers—and some very high-skilled occupations—physicians, chemists, engineers and physics professors. Also, immigrants are represented in occupations that require little education but much skill, such as tailors, dressmakers and jewelers.⁴ This is concomitant with immigrants' overrepresentation at both

ends of the education spectrum—relative to natives, more immigrants have less than a high school education and more have college degrees.⁵ However, because immigrants are more predominantly found at the low end of the education distribution, they are more largely concentrated in the low-education, low-skill occupations.⁶

Because native workers are becoming increasingly more educated,⁷ they will be commanding more of the high-skilled positions in the labor market and continuously fewer of the low-skilled positions. The skills of most immigrants are suited to the low-skilled occupations, and, therefore, immigrants can be expected to fill this niche in the labor market.

Immigration's Impact on U.S. Residents

Immigration creates both winners and losers in the U.S. economy. Aside from immigrants themselves, those who gain from immigration are those who complement immigrant labor—in general, domestic high-skilled workers and capital owners. Those who lose from immigration are U.S. residents who compete with immigrants for jobs, such as less-skilled domestic workers with low levels of education.

A comprehensive study on immigration by the National Research Council (NRC) published last year describes immigration's impact on different groups of U.S. workers.⁸ The study reports that immigration during the 1980s increased the labor supply of all workers by about 4 percent, thus reducing the wages of all low-skilled native-born workers by about 1 percent to 2 percent. On the other hand, wages for high-skilled workers rose, given that immigrants, on net, represent a source of increased demand for the services of these high-skilled workers.

The NRC study reports that immigration has caused a 15 percent increase in the supply of workers with less than a high school education. This competition has reduced the wages of this group of workers by about 5 percent. Stated differently, between 1980 and 1994 about 44 percent of the total decline in wages of workers with less than a high school education was because of immigration. Fortunately, work-

ers in this category represent less than 10 percent of the U.S. workforce.

Though immigration would be expected to have a larger impact in geographic areas that receive large numbers of immigrants, the NRC study reports an insignificant relationship between native wages and the number of immigrants in a particular location. This relationship holds across all types of native workers—skilled and unskilled, male and female, minority and nonminority. Thus, areas where immigrants are concentrated do not suffer disproportionate losses when it comes to wages, even for unskilled workers. According to the NRC study, this suggests that native workers either find other jobs with similar pay or move to other areas.

Interestingly, those who face the greatest loss from immigration are prior waves of immigrants, because newly arrived immigrants are their close substitutes. A 10 percent increase in the supply of immigrants, for example, reduces the immigrant wage by at least 2 percent to 4 percent.

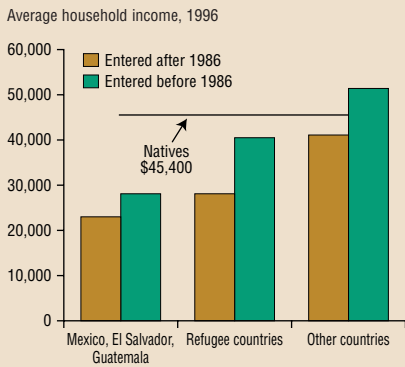
Aside from high-skilled native workers, immigration's winners also include those who buy goods and services produced by immigrant labor. Moreover, to the extent that some immigrants may specialize in activities that otherwise would not have existed domestically, all consumers benefit from the availability of new goods and services and their lower prices.

In measuring the magnitude of immigration's overall impact on the U.S. economy, the NRC study concludes that "the most plausible magnitudes of the impact of immigration on the economy are modest for those who benefit from immigration, for those who lose from immigration, and for total GDP." The net gain for the economy may run between \$1 billion and \$10 billion a year, which is a modest contribution in a \$7.6 trillion economy but a positive and significant one in absolute terms.

The Federal, State and Local Fiscal Impacts of Immigration

The fiscal impact of immigration varies across regions and different lev-

CHART 2
IMMIGRANT-HEADED HOUSEHOLDS
GENERALLY HAVE LOWER INCOME



SOURCE: The Urban Institute.

els of government. Overall, immigrants have been found to produce a net fiscal gain (that is, they pay more in taxes than they receive in services) at the federal level, but they impose a net burden on the states and local communities where they are concentrated. Thus, though immigrants do not represent a fiscal burden to the nation as a whole, high immigrant-receiving states such as California, New York, Florida, Texas, New Jersey and Illinois absorb a net fiscal cost from their immigrant populations.⁹

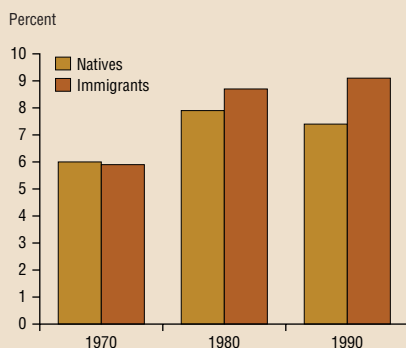
A recent study of California—the state with the nation’s largest concentration of immigrants—arrived at estimates of the net fiscal cost immigrants impose on the state for a given year. For the 1994–95 fiscal year, it was estimated that immigrant households incurred a combined state and local negative fiscal balance of \$3,178 (in 1996 dollars) per household. Native California households, on the other hand, recorded a positive fiscal balance of \$1,178 per household.¹⁰

Several characteristics of the average immigrant-headed household as compared with native households can explain why immigrants impose a net fiscal burden (receive more in services than they pay in taxes) on state and local communities where immigrants are concentrated: (1) immigrant-headed households have more school-age children than native households and therefore consume more educational services; (2) the education provided to immigrants at times is more expensive

because of additional bilingual education classes that may be incorporated into the system specifically for them;¹¹ (3) immigrant-headed households have lower incomes (*Chart 2*) and own less property than native households, and hence their state and local tax payments are lower; and (4) immigrant-headed households are poorer than native households and thus qualify for more income transfers, even at the state and local levels.¹²

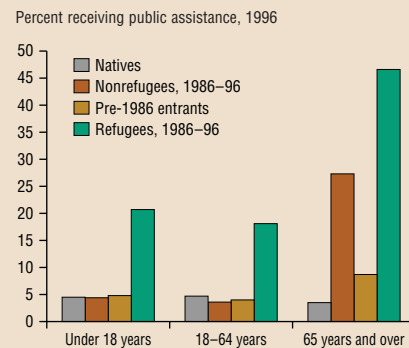
Although state and local communities “lose” from immigration when the fiscal impact of immigrant households is considered for a given year, annual estimates do not capture the full fiscal impact of immigration for the following reasons. First, annual estimates represent only one year’s taxes and one year’s expenditures, whereas immigration is a dynamic process. Immigrants’ incomes, and therefore tax payments, tend to rise with time in the United States, while their use of social services declines. (Once immigrants age and retire, however, they, like natives, will use more in services than they pay in taxes.) Second, annual estimates include those U.S.-born children of immigrants who remain in their parents’ households during their school-age years, when they represent a cost to the system, yet exclude them (because they are treated as natives) once they are of working age, have moved out of the immigrant household and become contributors to the system.¹³

CHART 3
IMMIGRANT WELFARE
PARTICIPATION HAS INCREASED



SOURCE: George Borjas, Harvard University, from remarks presented at the economic forum “Immigration and the Economy.”

CHART 4
PUBLIC ASSISTANCE IS
CONCENTRATED AMONG
REFUGEES AND THE ELDERLY



SOURCE: The Urban Institute.

Immigrant Welfare Use

Another factor used to gauge whether immigration is good or bad for the economy is the incidence of welfare use among immigrants. Welfare participation rates among immigrants from 1970 through 1990 reveal a rising trend. As Chart 3 illustrates, the welfare participation rate among immigrants rose from 5.9 percent in 1970 to 9.1 percent in 1990. Moreover, while welfare participation rates were virtually identical among immigrants and natives in 1970 (at 6 percent), immigrants’ use of welfare in 1990 had surpassed the rate of natives by almost 2 percentage points.¹⁴ The lower incomes of immigrants relative to natives explains this trend. However, distinguishing among immigrant types is also important.

Studies show that welfare use among immigrants is mostly concentrated among refugees—who are automatically entitled to welfare assistance upon their arrival in the United States—and the elderly.¹⁵ Duration of residence and age also impact welfare use among immigrants. As Chart 4 shows, when these factors are taken into account, working-age nonrefugee immigrants are less likely than natives to receive welfare. Working-age refugees, on the other hand, have a much higher welfare participation rate.¹⁶

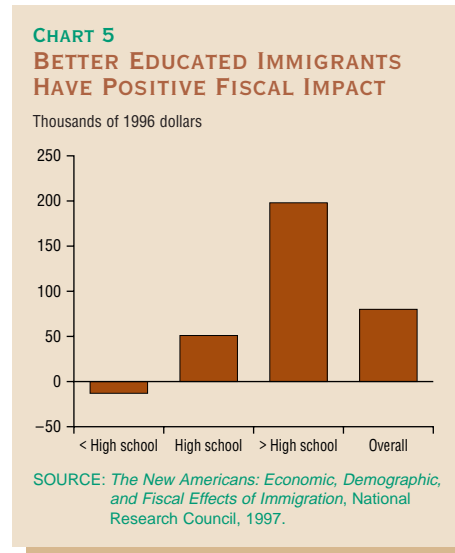
As Chart 4 also shows, elderly immigrants have higher rates of welfare participation than natives. Welfare use among recently arrived elderly immigrants is very

high, at 27.3 percent for nonrefugees and 46.6 percent for refugees. This contrasts dramatically with the 3.5 percent welfare participation rate of elderly natives. Such high welfare use by elderly immigrants—particularly in the form of Supplemental Security Income (SSI)—suggests that welfare for this group not only provides income but also access to medical care through Medicaid since many of these immigrants are not eligible for Social Security and Medicare. Thus, SSI use among elderly immigrants may be a substitute for Social Security and Medicare.¹⁷ Conversely, welfare participation among elderly natives may be low because this group does have access to Social Security and Medicare and therefore is less likely to need additional assistance through supplementary programs.¹⁸

Welfare and immigration laws passed in 1996 should ameliorate the use of welfare among (nonrefugee) immigrants, because the new regulations basically bar immigrants from receiving federal welfare until attaining citizenship, which occurs about seven years after arrival. Also, the law now imposes income requirements for sponsors of immigrants,¹⁹ and the sponsors' obligation to support immigrants is made legally enforceable.²⁰ For example, sponsors petitioning an immigrant—whether a family member or prospective employee—must prove income equal to 125 percent of the poverty line.²¹

Long-Term Measures of Fiscal Impact

As mentioned above, annual estimates of the fiscal impact of immigrants do not capture the full picture of immigration's effect on public finance. Long-term measures of immigration's impact consider several factors that are absent in the annual estimates. One factor that matters, for example, is the age of the immigrant upon arrival in the United States. Immigrants (like natives) are costly during childhood and old age but are net taxpayers during their working years. Thus, the long-term fiscal impact of an immigrant varies by the age of arrival. Immigrants arriving at ages 10 to 25 usually represent a net long-term fiscal benefit to natives, while immi-



grants arriving in their late 60s impose a fiscal burden. Yet, because most immigrants arrive at working ages, the long-term net fiscal impact of immigrants as a whole is usually positive.²²

Education also bears on the long-term fiscal impact of immigrants. As would be expected, the more education an immigrant embodies, the more positive his or her long-term fiscal impact on the economy. For example, estimates show that immigrants with less than a high school education impose a long-term fiscal burden, while immigrants with a high school education or more contribute a substantial fiscal gain (*Chart 5*).

Comparing immigrants and natives in their participation in public programs also yields interesting long-term conclusions. For programs such as Social Security and Medicare, immigrants receive proportionately lower benefits than natives do. For programs such as SSI, Aid to Families with Dependent Children and food stamps, immigrants receive proportionately more. When the cost of all programs is combined, there is little difference between immigrants and natives. And although immigrants are costlier during childhood than natives (if the cost of bilingual education is assumed), they tend to be less expensive than natives in old age. These differences, over a lifetime, tend to balance out.

Finally, though a long-run assessment of immigration's fiscal impact yields a strongly positive picture at the federal level, the impact at the state and local levels remains negative. Yet, while the

positive federal impact is shared evenly across the nation, the negative state and local impacts apply only to the few locations that receive the most immigrants.

Conclusion

Sizing up immigration's overall impact on the economy is not a straightforward process, given the many factors at play, some of which cannot be easily measured. Immigration is often only evaluated in the context of its fiscal implications for the economy or through the impact immigrants exert on the employment and wages of low-skilled native workers. Factors often left out of the analysis of whether immigrants provide a net gain or loss to the economy include the increase in consumption generated by immigrant spending, the tax contributions and job creation (and associated employment tax streams) of immigrant-owned businesses,²³ the impact on productivity of highly skilled immigrants and even the impact of immigrants on urban renewal and its associated fiscal implications.²⁴

The evidence suggests that immigrants produce a fiscal gain for the nation as a whole but impose a burden on those states and communities where they are concentrated. This is the case whether immigrant costs and benefits are evaluated in a single year or over the long run. However, over a lifetime, immigrants' fiscal impact at the federal level is much more positive than annual estimates show. Studies also conclude that while most immigrants complement the higher skilled labor force, they impose downward pressure on the wages of the lower skilled. Finally, immigrants play an important role in the continued growth of the labor force. Although immigration's distributional effects may be nontrivial, the overall effects of immigration are relatively small and are dwarfed by many other, more significant factors (such as national saving and investment rates) that more directly impact the performance of the \$7.6 trillion U.S. economy.

—Lucinda Vargas
Beverly Fox Kellam

(Continued on page 12)

GRADING TIPS—AN “I” FOR “INCOMPLETE”

INVESTORS HAVE LONG recognized the protection that indexed debt contracts offer against unexpected inflation, eliminating the capricious transfers from lenders to borrowers. The inflation-tax problem is a special concern when the government is the borrower; in this setting, inflation is under the debtor's purview. In addition, some economists argue that there is useful information contained in the yields of non-indexed and indexed government bonds. The difference in the two yields is a market-based signal of expected inflation. Central bankers could use the yield spread as an indicator of monetary policy.¹

In February 1997, the U.S. Treasury began auctioning Treasury Inflation Protection Securities, or TIPS. U.S. Treasury Secretary Robert Rubin explained that TIPS would index both the semiannual coupon payments and the security's face value to movements in the Consumer Price Index (CPI).

To illustrate how indexation works, Table 1 presents a hypothetical example in which a pair of 2-year securities are auctioned: one is a TIPS and the other

is a non-indexed security. Both securities sell for \$1,000. Suppose the coupon rate on the TIPS is 4 percent.² Assume that buyers have perfect foresight, knowing that the inflation rate will be constant and equal to 6 percent for the next two years. The buyer is indifferent between the two securities, provided the coupon rate on the non-indexed Treasury security is 10.03 percent.³ Note that the coupon rate for the non-indexed security is a combination of the real return and the expected inflation rate. Every six months, the TIPS' face value is recomputed to take into account price-level increases. In Table 1, the face value of the TIPS is updated to take the price increases into account. Formally, the TIPS' face value is calculated as the product of the initial face value and the ratio of the current CPI to the CPI's value when the security was issued. The semiannual coupon payment is then one-half the coupon rate times the most recent face value. In contrast, neither the semiannual coupon payment nor the face value changes for the non-indexed security. As Table 1 shows, the person holding the non-

indexed bond receives a larger semiannual coupon payment than the one holding the TIPS, but at the cost of eroding purchasing power.⁴

The purpose of this article is to grade TIPS' performance. In 1997 and 1998, the inflation rate has been relatively low. While low inflation is desirable for many reasons, it renders less meaningful the distinction between indexed and non-indexed government debt. Low inflation notwithstanding, TIPS are judged by two criteria. First, do indexed government bonds make people better off? Recent research indicates the answer is yes, but the gain is small. Second, has yield spread served as a useful indicator? The U.S. Treasury has been auctioning a relatively small quantity of TIPS, and these have maturity dates exceeding five years. Arguably, this term is not short enough for the central bank, which focuses on horizons up to two years. In sum, the TIPS' "grade" is "incomplete."

The Economics of Indexation

In the example above, the bondholder ensures against the erosion of purchasing power over time by bidding up the coupon rate on the non-indexed security. The higher coupon payment is necessary to compensate the bondholder for receiving such payments in cheaper dollars. Indeed, the bondholder is indifferent between holding the non-indexed security and the TIPS because the present values of goods and services are equal.⁵ Economist Irving Fisher (1911) recognized this, stating the coupon rate on the non-indexed Treasury security will be equal to

$$(1 + \pi)(1 + r) - 1,$$

where π is the inflation rate and r is the real return.

The hypothetical example, however, is unrealistically simple in one impor-

TABLE 1
EXAMPLE OF INDEXATION

Consider two U.S. Treasury securities, each selling for \$1,000 at initial auction on January 1, 1998. Suppose Bond A is a non-indexed security and the other a TIPS. Further, suppose the CPI increases at a 6 percent annual rate known with certainty at the time of the auction. Both bonds mature in two years.

	Bond A		TIPS	
	Face value	Coupon payment	Face value	Coupon payment
July 1, 1998	\$1,000	\$50.15	\$1,029.56	\$20.59
Jan. 1, 1999	\$1,000	\$50.15	\$1,060.00	\$21.20
July 1, 1999	\$1,000	\$50.15	\$1,091.34	\$21.83
Jan. 1, 2000 (at redemption)	\$1,000	\$50.15	\$1,123.60	\$22.47

NOTE: To compute the coupon payments for the non-indexed bond, the following formula is used: $c/2 * FV$, where c is the coupon rate on the non-indexed bond and FV denotes its face value.

The bottom line is that an inflation-indexed security creates a market for inflation insurance.

tant way: The future price level cannot be known with certainty; it can only be estimated. Thus, an unavoidable risk is inherent to the non-indexed security. Consider the example in Table 1, modified so the average inflation rate is 6 percent over the security's two-year life. Suppose the bondholder is risk neutral, caring only about the average return. With a risk-neutral bondholder, the coupon rate on the non-indexed security will be 10.03 percent, same as in the perfect-foresight scenario. Suppose, however, that the bondholder is risk averse, disliking uncertainty. In this case, a coupon rate greater than 10.03 percent is necessary to entice the risk-averse person to hold the non-indexed security. The risk-averse person must be compensated for expected inflation, plus receive a risk premium to compensate for uncertain price-level movements over the next two years. Hence, the coupon rate will consist of three parts: the real return, the expected inflation rate and the risk premium.

The Gains from TIPS

To see why economists believe that the existence of TIPS will make people better off, it is necessary to take the government's income and expense statement into account. Indeed, the risk premium plays an important role in government finance and, hence, in identifying the gains from introducing indexed government bonds.

In a simple view, the U.S. Treasury's expenses consist of goods and services and debt payments, both paying interest and redeeming securities that have matured. Income is earned from taxes, new bond sales and money creation. The argument hinges on the interest payments with TIPS versus non-indexed government debt. The U.S. Treasury's interest payments, on average, will be lower with a TIPS than with a non-indexed Treasury security.⁶ Provided these savings are passed on in the form of lower taxes, the typical person will be better off.

For instance, suppose the U.S. Treasury auctions one TIPS and one non-indexed security, both maturing in one year. Following the hypothetical exam-

ple, suppose the TIPS offers a 4 percent coupon rate while the non-indexed Treasury security offers a 12 percent coupon rate. Further, suppose that the realized inflation rate is 6 percent, equal to what people expected when the security was sold. Note that a risk-neutral bondholder would accept a coupon rate of 10.03 percent. Hence, the risk premium is 1.97 percent. (The sole difference in government's real interest expenses is due to risk aversion.) Compare real interest expenses with TIPS and with the non-indexed security. Because the coupon rate on the non-indexed bond is greater than the sum of the coupon payment and the actual inflation rate, the government's real interest expenses are lower with the TIPS than with the non-indexed security. Next, suppose that the lower real interest expenses translate to a cut in taxes. For a given level of income, the typical risk-averse citizen will be better off because the tax cut means the person can acquire either more consumer goods or more capital.

The bottom line is that an inflation-indexed security creates a market for inflation insurance. Without the presence of TIPS, for example, inflation insurance works if the person accurately forecasted inflation. With TIPS, forecast accuracy is no longer needed. The additional market means that another good can be traded, improving consumer satisfaction.⁷

A government offering TIPS would have less incentive to use the inflation tax. Note that all non-indexed government paper is subject to the inflation tax. At the end of 1997, the United States had nearly \$6 trillion of non-indexed government paper—U.S. Treasury securities plus base money—outstanding. U.S. Treasury securities accounted for more than 90 percent—\$5.5 trillion—of that quantity. Suppose the U.S. Treasury replaced all the non-indexed government securities with TIPS. The tax base would shrink to about \$500 billion. Correspondingly, the amount of money raised by a given increase in the inflation rate would decline. After taking into account the costs associated with higher inflation, the smaller payoff means there is less incentive to use inflation to raise government revenue.

TIPS Role as Expected Inflation Indicator

Should the U.S. substitute TIPS for all the non-indexed government securities outstanding? Although there is practically no threat of this happening, the answer is no. The coexistence of TIPS and non-indexed Treasury securities creates a potential indicator for central bankers.

The value of the potential indicator stems from the difference in yields on non-indexed securities and TIPS. Recall that the difference between the rates on these two securities is the expected in-

flation rate and the risk premium. Hetzel (1991) argued that central bankers would like an indicator of the inflation expectations. Subtract the yield on TIPS from the yield on a non-indexed Treasury security, controlling for maturity, to obtain a market-based signal of expected inflation rate. Unfortunately, the yield differential is a noisy signal; there is no definitive way to identify what part of the yield differential is the expected inflation rate and what part is the risk premium. Still, movements in the yield differential represent an improvement compared with what policymakers currently have—survey data that are not subject to any market-performance criterion. Hence, economists recommend that indexed and non-indexed securities coexist.

It is time to look at how TIPS have performed.

TIPS: A Brief History

On February 6, 1997, the U.S. Treasury introduced 10-year TIPS notes.⁸ In July 1997, the Treasury auctioned 5-year TIPS notes for the first time, followed by an auction of 30-year TIPS bonds in April 1998. Plans have been announced to auction 2-year TIPS notes and inflation-protected savings bonds. Overall, the Treasury has offered TIPS at six separate auctions, including two dates in 1998.

Table 2 displays the dates on which 5-, 10- and 30-year securities were auctioned and the value of securities auctioned on those dates. Since 1997, the Treasury has auctioned 5- or 10-year notes on 28 occasions. TIPS were auctioned on five of those dates: 5-year notes twice and 10-year notes on three occasions. Of the past four auctions at which 30-year bonds were sold, indexed bonds were sold only once.⁹

Not only are the TIPS auctions relatively infrequent, but, on a maturity-by-maturity basis, the Treasury sells fewer TIPS at auction than it does non-indexed securities. Cumulatively, in 1997 the Treasury auctioned slightly more than \$16 billion worth of 5-year indexed notes, slightly more than \$15 billion worth of 10-year indexed notes and \$8 billion worth of 30-year indexed

bonds. Over the same period, the Treasury auctioned more than \$201 billion worth of 5-year non-indexed notes, more than \$63 billion worth of 10-year non-indexed notes and more than \$22 billion worth of 30-year non-indexed Treasury bonds. The size of a TIPS auction was roughly 75 percent the size of auctions for non-indexed Treasury securities. On a cumulative basis, TIPS accounted for less than 14 percent of the total amount of 5-, 10- and 30-year securities auctioned during the past 18 months.

Based on Table 2, three facts stand out. First, TIPS auctions are held less frequently than auctions at which non-indexed securities are sold. Second, the quantity of TIPS auctioned is smaller than the quantity of non-indexed government securities being auctioned. Third, and perhaps most telling, TIPS were never auctioned on the same day as non-indexed securities.

Together, these facts suggest something about the economic value of indexation. The evidence intimates that the U.S. Treasury was attempting to protect TIPS in their infancy. This claim begs the following question: Why would the TIPS market need protection?

One answer is that the gains from TIPS are quantitatively small, as Viard (1993) found. If the gains are small, a typical bondholder is virtually indifferent between the two securities. Such an attitude could inhibit the development of a market for TIPS, potentially leading to undersubscribed auctions for TIPS. Such indifference is observationally equivalent to the notion that the Treasury was protecting TIPS. Small gains may also account for why only five countries—Australia, Canada, New Zealand, Great Britain and the United States—issue indexed bonds.

Assessing the Information Value of TIPS

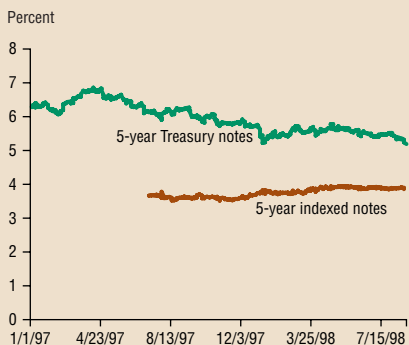
The other criterion for grading TIPS is the value of the information present in the yield spread between indexed and non-indexed securities. The yields for 5-year and 10-year U.S. Treasury securities are plotted in Charts 1 and 2, re-

TABLE 2
TREASURY NOTES AUCTIONED
SINCE JANUARY 1997

	Auction date	Quantity auctioned (par value)
5-year	1-31-97	12,503
	2-28-97	12,518
	3-31-97	12,516
	4-30-97	12,554
	6-02-97	12,029
	6-30-97	11,520
	7-15-97	8,004(l)
	7-31-97	11,526
	9-02-97	11,527
	10-15-97	8,012(l)
	10-31-97	11,021
	12-01-97	11,021
	12-31-97	11,018
	2-28-98	11,043
	3-31-98	11,012
	4-30-98	11,495
	5-31-98	11,216
	6-30-98	11,157
	8-15-98	16,001
	10-year	2-06-97
2-18-97		12,014
4-15-97		8,005(l)
5-15-97		12,008
8-15-97		12,006
11-17-97		11,003
1-15-98		8,009(l)
2-15-98		13,554
5-15-98		12,414
30-year		11-17-97
	2-17-98	11,182
	4-15-98	8,002(l)
	8-15-98	10,003

NOTE: (l) denotes an auction of TIPS.

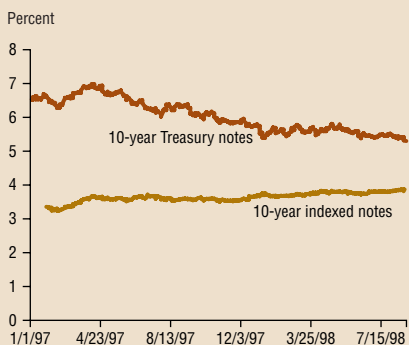
CHART 1
5-YEAR TREASURY NOTES AND
5-YEAR INFLATION-INDEXED
TREASURY NOTES



spectively.¹⁰ In each chart, the yield is plotted for both a non-indexed security and a TIPS. Note that the spread between the two alternative securities has narrowed slightly since the inception of TIPS. More precisely, the spread on 10-year notes declined slightly more than 100 basis points, while the spread on 5-year notes fell about 70 basis points.

Before it can be claimed that expected inflation has fallen about 0.75 percentage point, two problems emerge. One is the basic identification issue. There is no way of knowing how much of the decline in the yield spread is due to falling expected inflation rate and how much to falling risk premium. A much more accurate, but far weaker, statement is that 1998 data are consistent with some decline in the expected inflation rate compared with early 1997.

CHART 2
10-YEAR TREASURY NOTES AND
10-YEAR INFLATION-INDEXED
TREASURY NOTES



The second problem is that the U.S. Treasury auctioned 5- and 10-year notes. Even if the identification problem were eliminated, the data relate to the average expected inflation rate over the next five years, which may not be that useful for central bankers. If the planning horizon is two years, movement in the average expected inflation rate over the next five years is not the most useful indicator to the central banker. Until TIPS with shorter maturities are sold, the central banker is left waiting until the time left on outstanding TIPS matches with the central bankers' planning horizon.

Concluding Remarks

So what grade does TIPS deserve? An "incomplete" seems appropriate at this stage. The early evidence supports the claim that people do benefit, albeit not greatly, from indexed bonds. This is especially true in a low-inflation environment, like the one the United States has enjoyed over the past couple of years. Unfortunately, the expected inflation rate that could possibly be inferred from TIPS and non-indexed securities does not provide the information most useful to the Federal Reserve. It is noteworthy that the "Monetary Policy Report to the Congress" (Federal Reserve Board, 1998) did not refer to the yield differential between TIPS and non-indexed Treasury securities when it discussed the inflation outlook for 1998 and 1999. When shorter maturities, such as the 2-year TIPS, are offered, it will be easier to judge whether Federal Reserve officials find the market-based signal of expected inflation useful.

—Joseph H. Haslag

Notes

- ¹ This argument is articulated in a *Wall Street Journal* op-ed article by Robert Hetzel (1991).
- ² The coupon rate is computed as a year's worth of interest payments divided by the bond's face value. At auctions, bids are ranked from the lowest coupon rate to the highest. Those offering the lowest coupon rates are awarded the securities. The Treasury accepts bids so that the security's price ranges from 99.875 percent to 100.125 percent of its face value.
- ³ Here, indifference requires that the inflation-adjusted present values

of the two streams of dollar payments are identical. The arbitrage condition is formally represented as

$$FV \left[c^T \left(\sum_{i=1}^4 d^{i/2} \right) + d^2 \right] = FV \left\{ c \left[\sum_{i=1}^4 \left(\frac{d}{1+\pi} \right)^{i/2} \right] + \left[\frac{d}{1+\pi} \right]^2 \right\}$$

where FV denotes the face value of the security, c^T is the coupon rate on the TIPS, d is the discount rate applied against future payments, c is the coupon rate on the non-indexed security and π is the inflation rate. The left side of the expression is the real present value of payments from the TIPS, and the right side is the real present value of payments from the non-indexed bond. Note that payments from the TIPS security are indexed by $(1 + \pi)$. Hence, deflating by $(1 + \pi)$ and indexing by $(1 + \pi)$ result in this term canceling out on the left side of the arbitrage condition.

- ⁴ In practice, the CPI value used is called the reference value. The Bureau of Labor Statistics does not publish CPI values each day. To get around this, the Treasury chooses a reference value that lags the issue date by 2.5 months. The Treasury computes the reference value as a weighted sum, where the weight corresponds to the time of the month when the security is issued. For example, a note issued on January 15 will have reference date CPI equal to 16/31 times April's CPI value plus 15/31 times May's CPI. The first coupon payment is due July 15. The reference value for that date is 16/31 times October's CPI plus 15/31 times November's CPI. Then, $1 + \pi$ in footnote 3 is calculated as the ratio of July 15's reference value to January 15's reference value.
- ⁵ With coupon payments and with inflation that varies over time, it is more difficult to ensure against inflation.
- ⁶ Note here that the par value of government securities is held fixed.
- ⁷ This article ignores the risk associated with holding periods that differ from the securities' time to maturity. See Shen (1998) for a discussion of market risk as it applies to the TIPS and non-indexed Treasury securities.
- ⁸ This is not to say that the February 1997 auction was the first time that indexed bonds were auctioned in the United States. See Viard (1993) for a complete history of indexed bonds in the United States.
- ⁹ Some of the TIPS auctions were reopened. The U.S. Treasury often reopens some issues when bids are insufficient to sell all the notes or bonds.
- ¹⁰ There is not enough data on the yields for the 30-year securities to merit a separate figure.

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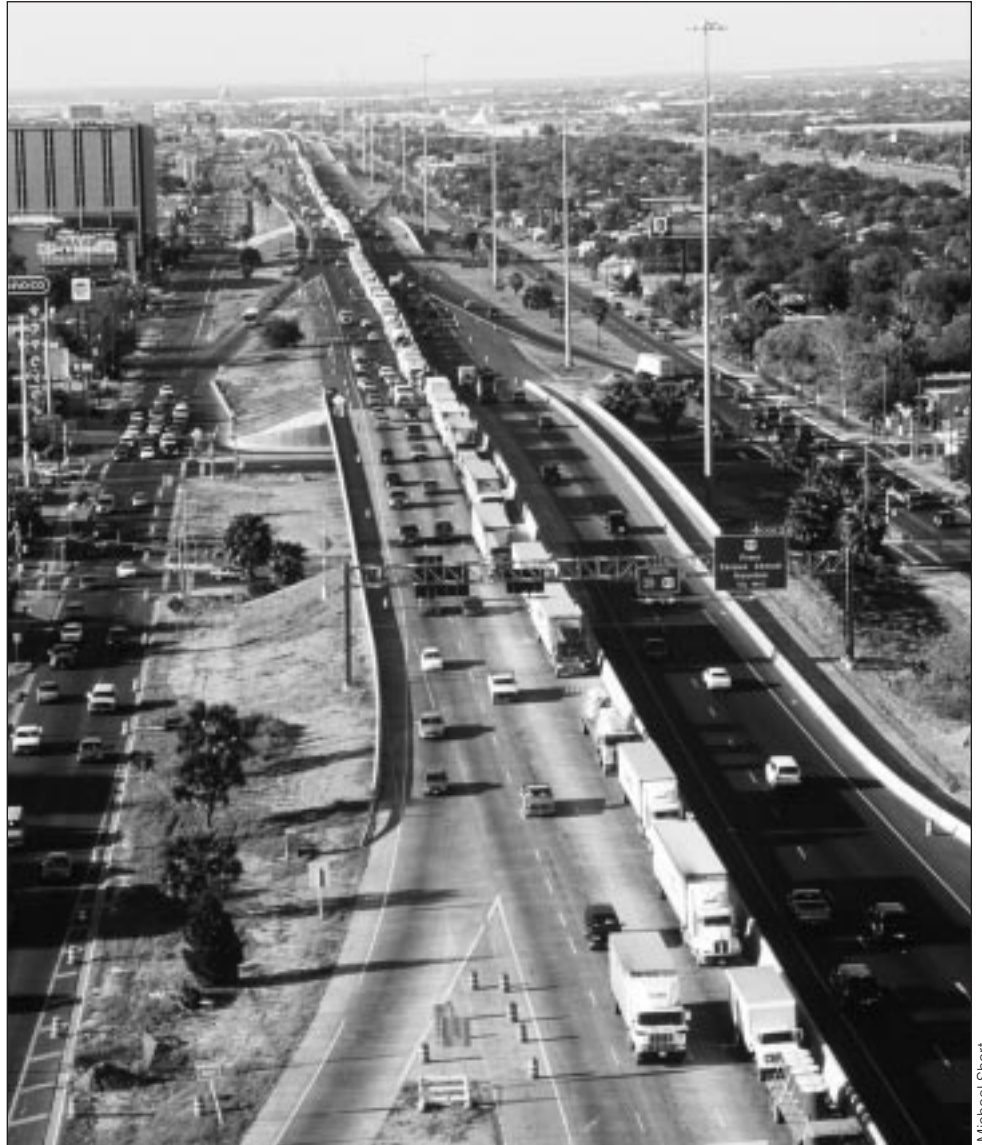
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Border Bottlenecks Hamper Trade

PAST ISSUES OF *Southwest Economy* have highlighted the positive impacts of free trade and the long-term potential benefits of the North American Free Trade Agreement (NAFTA). But free trade that exists only in theory helps no one. In reality many roadblocks other than tariffs can hamper the flow of goods and services across borders. For example, physical and structural problems at the Texas–Mexican border can impede the flow of goods and thus reduce the benefits of NAFTA.

Laredo is the busiest land port along the U.S.–Mexican border, representing 37 percent of the value of all traded goods shipped by land in 1997 and about one-third of total U.S.–Mexican trade. Last year \$50.5 billion in goods flowed north and south through the Laredo area, a 71 percent increase since 1994. Most of the goods were carried by 2.2 million trucks crossing on the Lincoln-Juarez Bridge in downtown Laredo and the Solidarity Bridge 20 miles to the north. While trade flow has boomed in this border port, so has congestion. Trucks lined up for miles heading both north and south are a common sight at the Lincoln-Juarez Bridge.

While rapid growth is partly responsible for the bottleneck, another cause is that Mexican customs agents preclear all truck cargo before it crosses into Mexico. U.S. long-haul carriers drop their cargo in Laredo, where Mexican customs brokers inspect the cargo, collect duties and arrange for other trucks to transport the load across the bridge. These trucks then return to the U.S. side, usually empty. Similarly, Mexican carriers usually deliver their cargo to Mexican customs on the Mexican side of the border. Another truck carries the load across to Laredo and then returns, often empty. As a result of this system, about 44 percent of the tractors crossing the bridge in 1997 had no trailer or an empty one. Reducing the number of



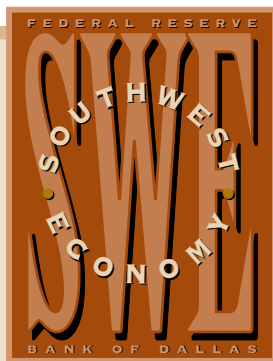
Michael Short

empty trucks would have a significant impact on border congestion.

Under NAFTA both north- and south-bound trucks should have been able to drive into border states beginning in December 1995 and throughout both countries by the year 2000. President Clinton, however, responding to perceived safety issues, delayed this provision indefinitely. Implementing the provision would pressure Mexican customs brokers to stop inspecting U.S. cargo on the U.S. side of the border

because many major U.S. manufacturers likely would seek direct shipment into important industrial areas such as Monterrey. Researchers at Texas A&M International University (TAMIU) in Laredo estimate that in 1995 the big three U.S. automakers spent \$2.8 million more shipping products southbound through Laredo than they would have if the NAFTA provision had taken hold and precertification of goods was no longer required.¹

Restrictive operating hours and bad



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BEYOND THE BORDER

roads also cause delays at the border. U.S. customs is open from 8 a.m. to midnight, while Mexican customs is open from 9 a.m. to 11 p.m. The agency that inspects agricultural products going into Mexico—Secretaría de Agricultura, Ganadería y Desarrollo Rural (SAGAR)—opens at 10 a.m. and closes at 5 p.m. Trucks carrying agricultural products into Mexico must first go through SAGAR inspection and then get in line to go through Mexican customs. Round-the-clock customs operations by all agencies would reduce congestion in downtown Laredo and increase bridge capacity. Bridge crossing fees could be structured to encourage use at off-peak times.

The state-of-the-art Solidarity Bridge was completed in 1991 but has just recently begun to relieve some of the truck congestion in Laredo and Nuevo Laredo. The bridge, however, continues to operate well below capacity. One reason is the poor condition of the connecting road in Mexico, which is only 8 feet wide and has no shoulders. On the U.S. side, the road connecting to Interstate 35 passes through busy residential areas. Improvements to roads on the Mexican side are in process, however, and a road connecting the bridge to a new Monterrey toll highway should be completed in a couple of years.

Enhanced drug enforcement activities have also added to the time and expense of border crossings. To increase traffic flow, U.S. Customs is looking toward technological and innovative resources. X-ray machines that can check an entire truckload for contraband in 20 minutes have been installed at four border ports, and four more machines are planned for installation in the next year.

Other types of technology have significant potential to reduce border congestion. The North American Trade Automation Prototype (NATAP), now in testing, would allow cargo at either the point of origin or an inland port to be electronically sealed, tracked and then transported straight across the border. Currently the system is installed at four test sites: Otay Mesa, California; Nogales,

Arizona; El Paso and Laredo. For complete implementation of the plan, however, current laws and agreements need to be changed to allow trucks to cross freely into border states.

One proposed solution to the congestion is to build another bridge in Laredo. But before millions more are spent on a new bridge, the current infrastructure should be utilized to its fullest extent. Almost 5,000 trucks cross the two commercial bridges in the Laredo region daily. If the empty trucks were eliminated, the same amount of goods could be transported in only 2,750 trucks. This is about one-fourth the capacity of the Solidarity Bridge, according to James Giermanski of TAMIU. Giermanski projects that, based on the average growth rate of truck traffic over the past four years, it would take until the year 2020 to reach the capacity of the Solidarity Bridge if all loaded truck traffic in Laredo went solely across that bridge.

In recent months the line of trucks heading south through Laredo has extended back as far as 5 miles. The time spent waiting to cross the border represents direct costs to shippers and to taxpayers, who must pay for the roads. There are also indirect costs such as increased air pollution and the opportunity costs of the resources that are idled. Improved technology and better roads should relieve some of the bottleneck. While a new bridge would help considerably, reducing the number of empty trucks and extending operating hours are other potential solutions.

—Keith Phillips
Jay Campbell

Note

¹ See "The Effects of the Drayage Industry on Trans-U.S.–Mexico Truck Shipments through the Port of Laredo, Texas," unpublished paper by Henry C. Smith and James Giermanski.

REGIONAL UPDATE

THE REGION'S ECONOMY continues to grow at a healthy pace. Although employment growth was a robust 4.1 percent annual rate in July, quarterly growth has been trending down since the fourth quarter of 1997, as can be seen in the chart below. The Texas Leading Index declined in July for the third month in a row. Most indicators were negative, as shown in the Net Contributions of Components to Change in Leading Index chart.

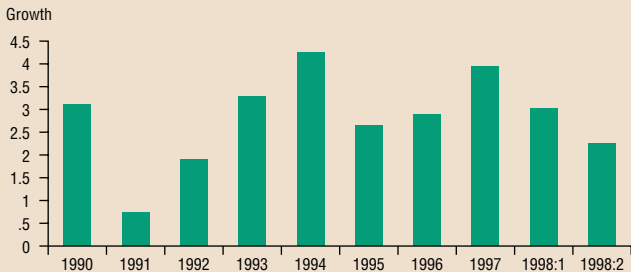
Despite the health of the regional economy, some industries have weakened recently. The hot, dry weather is taking its toll on the farming sector. The energy and high-tech industries continue to be weak, battered by low prices. High supply and low demand have kept oil prices near \$14 per barrel, leading to declines in the rig count and layoffs in the oil and gas extraction sector. The weakness in the high-tech in-

dustry led to falling earnings in the second quarter for many of the region's high-tech companies and caused some layoffs.

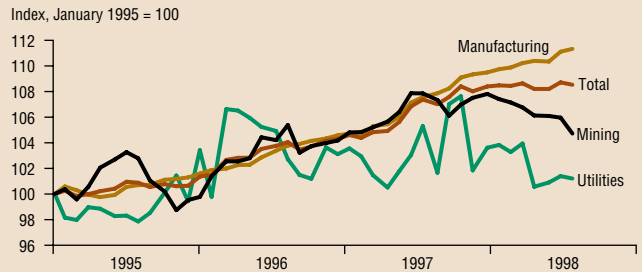
The construction and service industries continue to show strong growth. Construction industry activity was vigorous in the second quarter, buoyed by residential building. Despite much new construction, apartment occupancy rates are up in all major metro areas. The single-family housing market also remains hot in all major metro areas. The Texas Housing Price Index increased 4.6 percent in the first quarter (year over year). Employment in the private service-producing sector (which makes up 63 percent of total Texas employment) increased 4.1 percent in July (annual rate), led by growth in trucking and warehousing, communications, finance, insurance and real estate, business services and trade.

—Mine K. Yücel

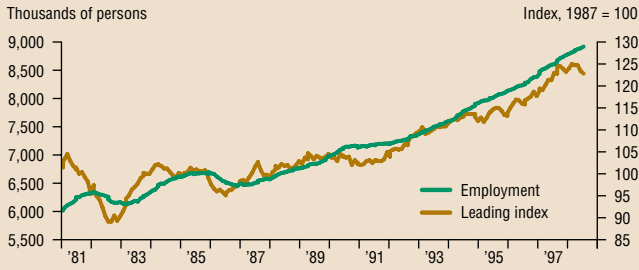
EMPLOYMENT GROWTH IN DISTRICT STATES



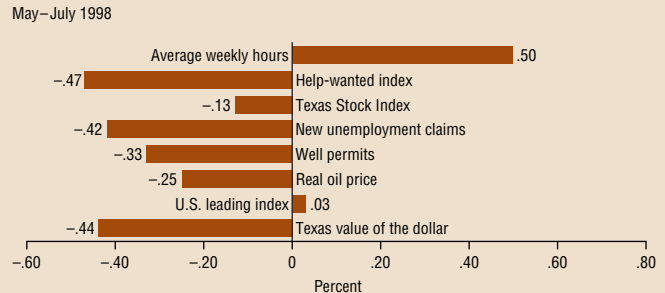
TEXAS INDUSTRIAL PRODUCTION INDEX



TEXAS LEADING INDEX AND NONFARM EMPLOYMENT



NET CONTRIBUTIONS OF COMPONENTS TO CHANGE IN LEADING INDEX



REGIONAL ECONOMIC INDICATORS

	Texas Leading Index	TIPI** total	Texas employment*				Total nonfarm employment*			
			Mining	Construction	Manufacturing	Government	Private service-producing	Texas	Louisiana	New Mexico
7/98	122.8	129.0	171.1	488.5	1,099.5	1,499.5	5,660.9	8,919.5	1,878.4	720.1
6/98	123.4	129.2	171.7	486.8	1,101.0	1,494.9	5,635.6	8,890.0	1,876.0	718.7
5/98	124.7	128.6	171.2	485.2	1,099.4	1,495.3	5,622.6	8,873.7	1,872.3	717.3
4/98	124.8	128.6	171.6	482.8	1,098.5	1,495.3	5,605.5	8,853.7	1,869.8	716.1
3/98	124.7	129.1	171.7	480.3	1,097.9	1,493.2	5,593.9	8,837.0	1,868.9	714.9
2/98	125.0	128.9	172.4	478.1	1,096.4	1,489.8	5,579.2	8,815.9	1,862.6	714.1
1/98	124.0	128.9	172.2	474.8	1,094.1	1,489.4	5,560.1	8,790.6	1,857.0	714.2
12/97	123.2	128.8	171.4	470.3	1,096.6	1,488.1	5,541.8	8,768.2	1,854.9	712.8
11/97	123.9	128.4	170.8	469.1	1,092.8	1,482.4	5,522.2	8,737.3	1,852.1	712.0
10/97	124.5	128.8	169.9	468.0	1,089.6	1,479.6	5,504.0	8,711.1	1,849.4	711.3
9/97	124.6	127.9	168.9	465.7	1,087.9	1,475.1	5,478.3	8,675.9	1,845.4	708.5
8/97	122.8	127.2	168.4	465.5	1,084.4	1,481.6	5,448.2	8,648.1	1,839.4	709.7

* in thousands
** Texas Industrial Production Index

FURTHER INFORMATION ON THE DATA

For more information on employment data, see "Reassessing Texas Employment Growth" (*Southwest Economy*, July/August 1993). For TIPI, see "The Texas Industrial Production Index" (Dallas Fed *Economic Review*, November 1989). For the Texas Leading Index and its components, see "The Texas Index of Leading Indicators: A Revision and Further Evaluation" (Dallas Fed *Economic Review*, July 1990).

Online economic data and articles are available on the Dallas Fed's Internet Web site, www.dallasfed.org.

IMMIGRATION AND THE ECONOMY

(Continued from page 4)

Notes

¹ "Immigration and the Economy," the Third Annual International Economic Forum sponsored by the Federal Reserve Bank of Dallas, El Paso Branch, was held November 14, 1997.

² Jeffrey S. Passel, The Urban Institute, Washington, D.C.; outline of remarks presented at the economic forum "Immigration and the Economy."

³ Linda Levine, "The Education/Skill Distribution of Jobs: How Is It Changing?" (Washington, D.C., Congressional Research Service, Library of Congress, August 8, 1997), pp. 5, 14.

⁴ James P. Smith and Barry Edmonston, eds., *The New Americans: Economic, Demographic, and Fiscal Effects of Immigration*, National Research Council (Washington, D.C.: National Academy Press, 1997), pp. 211–14.

⁵ Beverly Fox Kellam and Lucinda Vargas, "Immigration and the Economy—Part I," *Southwest Economy*, July/August, 1998, p. 6.

⁶ Smith and Edmonston, pp. 218–19.

⁷ In 1997, nearly 24 percent of people 25 years or older in the United States had completed four years or more of college. This figure was up from 17 percent in 1980.

⁸ Smith and Edmonston, pp. 5–7; 223, 225. Data presented in the remainder of this section rely on the National Research Council's findings.

⁹ Passel, economic forum.

¹⁰ Smith and Edmonston, p. 281. A similar study for New Jersey showed the same pattern. For the 1989–90 fiscal year, immigrant households in New Jersey incurred a negative balance of \$1,484 (also in 1996 dollars) per household, while native households showed a positive fiscal balance of \$232 (p. 276).

¹¹ Passel, economic forum.

¹² Smith and Edmonston, p. 9.

¹³ Passel, economic forum.

¹⁴ George Borjas, Harvard University, outline of remarks presented at "Immigration and the Economy."

¹⁵ Passel, economic forum. The Immigration and Naturalization Service defines refugees as those persons seeking asylum in the United States because they are unable or unwilling to return to their country of origin because of persecution based on their race, religion, nationality, membership in a particular social group or political opinion. Overall, there are no limits on the number of refugee immigrants allowed, though the president sets annual ceilings by geographic area after consultations with Congress.

¹⁶ Passel, economic forum.

¹⁷ Passel, economic forum.

¹⁸ Many economists believe that, to a large extent, Social Security payments to the elderly represent a form of welfare because current beneficiaries receive more in benefits than they contributed to the system.

¹⁹ The majority of legal immigrants enter the United States through a sponsor. Sponsors petition for entry of immigrants based on family or employment considerations. In 1996 nearly 78 percent of the immigrants who were admitted to the United States were sponsored by family members (65 percent) and employers (13 percent).

²⁰ Passel, economic forum. The Personal Responsibility and

Work Opportunity Reconciliation Act of 1996 (the Welfare Act) changed the welfare system and restricts the access of legal and illegal immigrants to a wide range of public benefits. The Illegal Immigration Reform and Immigrant Responsibility Act of 1996 added to and amended sections of the Welfare Act and includes stricter provisions on the financial status and financial responsibility of sponsors of immigrants. The legislation, however, gives states the option to provide or bar assistance to most qualified immigrants.

²¹ James L. Ward, U.S. Consul General, Ciudad Juárez, Chihuahua; outline of remarks presented at "Immigration and the Economy." The Department of Health and Human Services defines the poverty level on an annual basis. In 1996 the poverty line for a family of four was \$15,600. Thus, in that year, an immigrant wishing to bring his wife and two children to the United States had to show an annual income of \$19,500—an amount equal to 125 percent of the poverty level.

²² Smith and Edmonston, pp. 11–12. Data in the remainder of this section rely on the National Research Council's findings.

²³ See Stephen Moore, *A Fiscal Portrait of the Newest Americans*, National Immigration Forum and the Cato Institute, July 1998, pp. 17–19.

²⁴ Joel Millman, correspondent, *Wall Street Journal*, Mexico City Bureau, outline of remarks presented at "Immigration and the Economy." Millman's book, *The Other Americans: How Immigrants Renew Our Country, Our Economy, and Our Values*, includes a discussion of how some immigrants, by settling in previously abandoned inner-city areas, have helped revive local economies.

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