Shopping on the Border:
The Mexican Peso and U.S. Border Communities

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ABSTRACT: Changes in retail sales in eight counties on the U.S.-Mexico border are examined using quarterly data from 1980 through 1999. The eight counties comprise 77 percent of the U.S. population located in counties on the border with Mexico. The size of the impact on U.S. retail sales of the 1982 peso devaluation and the 1994-95 crisis is estimated with a simple compound growth model of retail sales. This is followed by a set of estimates that use seemingly unrelated regression (SUR) techniques to measure the size effect of changes in the value of the peso on total retail sales, and sales within eight separate subsectors. Results show that Webb County in Texas is most sensitive to changes in the peso, but all eight counties show significant responses. Retail outlets for nondurable goods are more sensitive than durable goods, with apparel stores and general merchandise stores the most affected.

1. Introduction

On July 21, 1998, the Mexican peso was valued at 8.8 to the dollar. By September 10, its value had fallen to 10.63 to the dollar. Pressure on the peso was part of a larger set of international financial problems set in motion by the Asian financial crisis that began in July, 1997. Currency depreciations hit many industrializing nations as international investors sold off large parts of their emerging market portfolios in an effort to reduce their exposure to financial market volatility. One side effect of the currency depreciation in Mexico and elsewhere was that many countries came under much closer international scrutiny of their national financial systems and their regulatory oversight.

More recent financial crises, such as the turmoil in Turkey and Argentina in 2001, have released similar shock waves across the international financial landscape and, as was true of prior crises, have focused world attention on the national and international implications of volatility in currency and financial markets. Exchange rate crises and their contagion effects spread easily from one country to another, creating disillusionment with market oriented reforms, and raising the specter of recession. Meanwhile, supporters and critics of multilateral arrangements look for new solutions to the problems of mobile capital, and the debate over the reorganization of the international financial architecture takes on new urgency.

Threats to the stability of the global economy naturally capture the attention of most analysts, while the secondary and localized effects of a crisis tend to be ignored. Nevertheless, along the U.S.-Mexico border, where different national currencies are widely circulated and where U.S. and Mexican citizens mix together in business, social, and family circles, a crisis on the other side of the border spreads quickly across the

international boundary. Historically, one of the most noted local effects is the impact of a change in the value of the peso on cross-border purchases by Mexican citizens. This effect is often noted in the local press because, depending on locale, cross-border purchases range from important to absolutely essential (San Diego Chamber of Commerce, 1979; Prock, 1983; Clark, 1994; San Diego Dialogue, 1994; Patrick and Renforth, 1996; San Diego Dialogue, et. al., 1998).

The focus of this paper is on the local retail sector effects of a macroeconomic shock to the value of the peso. The sample includes six Texas and two California counties which had a combined 1997 population of 6,010,243, and accounted for 77 percent of the U.S. population living in counties contiguous with the Mexican border.[1] These eight counties encompass the five metropolitan statistical areas that lie on the U.S.-Mexico border, and are the most important ports for land-based commerce between the United States and Mexico.[2] The eight counties that form the sample are heterogeneous in size, in the structure of their economies, and in their interaction with Mexico. For example, the city of San Diego makes up the majority of the population in San Diego county and is the seventh largest city in the United States and the largest U.S. city on the border with Mexico. Webb County in Texas includes Laredo, the busiest land-based commercial port for U.S.-Mexico commerce. El Paso County is adjacent to Ciudad Juarez, the largest Mexican city on the border. Val Verde and Maverick counties both have relatively small populations compared to the rest of the sample, but Val Verde's primary city, Del Rio, does not sit directly on the border and is connected to the interior

[1] Cameron, El Paso, Hidalgo, Maverick, Val Verde and Webb, in Texas, and Imperial and San Diego in California.
[2] Metropolitan statistical areas (MSAs) are Brownsville, McAllen, Laredo, and El Paso in Texas, and San Diego in California.

of Mexico by a less-improved highway, while Maverick County's Eagle Pass is directly on the border and is well connected to the interior of Mexico.

The next section reviews the economics literature on size of the impact of a sudden shift in the value of the peso and, in particular, looks at the episodes of sharp declines in 1982 and 1983. This is followed in Section 3 by a descriptive analysis of the movement of the peso during the last two decades, and a correlation of sudden shifts in the value of the peso with shifts in the growth of total retail sales on the U.S. side of the border. Section 4 presents a demand equation for total retail sales, and Section 5 uses the model to measure the impact of a shift in the value of the peso on total retail sales and several of its sub-components.

2. Size and relative importance of the cross-border shopping market

In the California region, two surveys in the 1990s (San Diego Dialogue, 1994; and San Diego Dialogue, et. al., 1998) show that a significant amount of northbound border crossing in both San Diego and Imperial Counties is motivated by the desire to make purchases in the United States. Table 1 shows the average monthly border crossings in the sample counties by pedestrians and non-commercial vehicles for the year 2000. The 1994 survey of border crossers in San Diego estimated that the five to six million northbound crossings per month (one crossing is defined as one person on foot or in a vehicle, so that two people in a car were defined as two crossings) represented about 521,000 unique individuals. A second survey in Imperial County, California, estimated that the 2.9 million northbound crossers in March, 1998, represented 700,000 individuals. In both studies, shopping was given as the single most common reason for crossing the border. The San Diego study estimated that 1.4 million northbound

crossings (per month) were for the primary purpose of shopping, while the Imperial county survey estimated that around 986,000 crossings per month for the primary purpose of shopping.

[Table 1: Average monthly border crossings]

Along the Texas border, large numbers cross daily, and their reasons for northbound border crossings are likely to parallel the survey responses in the California region. This is reflected in the more extensive literature from the Texas region on the impact of northbound cross-border shopping on the local economies. For example, Patrick and Renforth (1996) used a survey of 374 retailers in Brownsville, McAllen, Laredo, El Paso to estimate that retail sales to Mexican citizens comprise somewhere between 20 and 50 percent of total retail sales. In addition, they found that sales vary by city, by proximity to the border, by retailer, and by shopping district. They also estimated that the nearly 50 percent decline in the value of the peso between December, 1994, and the middle of 1995, caused an average fall in retail sales in the four cities of 41.8 percent. The largest effects were in retail outlets classified as sellers of general merchandise, jewelry, and clothing. In addition, the effects varied by city, with larger cities and cities farther from the border experiencing a smaller effect.

Prior to the study 1996 by Patrick and Renforth, analysts of the 1982-1983 devaluation found significant impacts in Texas border cities. Diehl (1983) estimated that sales fell 80 to 90 percent in some individual stores, while Prock (1983) notes that border cities experienced a sharp drop in sales taxes in 1983: Laredo was down 45.47 percent; Brownsville and McAllen both dropped 36 percent; and El Paso fell 8.2 percent. According to Prock, the impact of the peso devaluation on Texas border cities was

greater than the impact of the U.S. recession of 1981-1982. Prock also argued that the severest impacts were the result of exchange controls enacted in Mexico that made it more difficult for Mexican citizens to take money out of the country and had harmful effects on banking, construction, and real estate along the border. In addition, dollar denominated bank accounts in Mexico were converted to pesos at an unfavorable exchange rate which reduced the real wealth of Mexican citizens and caused a decline in cross-border shopping.

In the California region, the *Economic Bulletin* of the San Diego Chamber of Commerce noted that in both 1982 and 1983, the visitor industry was affected by the slowdown in border crossings brought on by the large devaluations of the peso in February and August of 1982. While the visitor industry rebounded with the end of the U.S. recession in 1983, the Chamber noted that 1983 was a second year of decline in border crossings because the "erosion of the currency during 1983 made visiting the U.S. much more expensive and served to deter many Mexican visitors." While the focus of the Chamber's comments were on the visitor industry, what was true for Mexican tourists must have been equally true for shoppers.

3. Comparative estimates of the impact of two devaluations

Changes in the value of the peso tend to be bunched together in time. During crisis periods, relatively large declines in its nominal value are the norm, while in other periods, the currency tends to maintain its value, or even appreciate in real terms. Figure 1 shows the quarterly percentage change in the nominal value of the peso, from 1980 through 1999. It is clear from Figure 1 that there are two separate episodes of instability. The first lasts from the first quarter of 1982 through the first quarter of 1988. For

example, the peso fell approximately 3.6 percent in nominal terms during the last quarter of 1981, compared to a 30.3 percent decline in the first quarter of 1982. The second episode is relatively shorter, stretching from the end of 1994 through the end of 1995.

[Figure 1: Changes in the Value of the Peso, 1980-1999]

The first of the two periods of high volatility and rapid depreciation make up 26 of the 80 quarters between 1980:1 and 1999:4. Between 1982:1 and 1988:1, Mexico experienced the collapse of oil prices, the rise of international interest rates, the onset of a world-wide recession, and the worst effects of the debt crisis. In the second period of high volatility and rapid depreciation, the country experienced a collapse in the value of the peso, an IMF bailout, ongoing structural adjustments brought on by the implementation of NAFTA, an ongoing rebellion in the state of Chiapas, and a deep year-long recession. Table 2 illustrates the statistical differences between these two episodes and the rest of the period, 1980 to 1999. The quarterly rates of change for the periods of instability are compared to the rest of the sample, both in nominal and real terms. As shown in the table, the average change and the standard deviation for both the real and the nominal rates are different in the two periods identified in Table 2. While it may be somewhat subjective to choose a specific date as the boundary between one period and the next, the table shows that on average, there is a striking difference in the descriptive statistics of the two periods.

Theoretically, a period of rapid decline in the value of the peso could have several types of impacts on cross-border shopping, and some of these impacts would cancel each other out. To begin with, a depreciation in the peso means that Mexican incomes fall in dollar terms. This will affect retail sales in the U.S. border areas for exactly the same

reasons as a decline in U.S. incomes. Income is not the only factor influencing cross-border shopping, however, and from the perspective of a Mexican shopper, a fall in the value of the peso is equivalent to a uniform increase in the prices of U.S. goods. Even if U.S. prices are constant, each peso buys less across the border, so that relative prices favor Mexican goods over those sold in the U.S. Consequently, the income and price effects of a fall in the value of the peso is a decline in the purchase of U.S. goods by Mexican citizens.

This is not the end of the story, however, and these price and income effects may be offset by three interrelated factors. First, a significant but unknown share of the border economy is already dollarized, so that changes in the value of the peso are less influential than they would be if all citizens of Mexico earned income in pesos instead of dollars, or if they held all their wealth in pesos instead of a combination of dollars and pesos.[3] Dollar denominated bank accounts in Mexico, U.S. bank accounts held by Mexican citizens, and the requirements of Mexican landlords and producers that payments be made in dollars are all relatively common strategies for coping with the uncertainties of a highly variable peso (Cano and Cappi, 1998). Second, there is a fairly quick feedback from a decline in the value of the peso to an increase in Mexican prices. In other words, it is expected that a depreciation causes Mexican goods to become relatively cheaper than U.S. goods in real terms, but prices quickly begin to rise in Mexico, offsetting some of the cost advantage of Mexican goods. Econometric estimates of this effect shows that over the period 1980 to 1999, a ten percent depreciation raised Mexican prices by over seven percent within one year (Table 3). And third, a final factor

that mitigates the effects of a peso depreciation is that the periods of most rapid depreciation are also periods of high variability in the rate of change of the peso. For example, Table 2 shows that the standard deviation of the quarterly change in the value of the peso was about four times higher during the two episodes of rapid depreciation. High variability increases consumer uncertainty about the future value of the peso, and may cause purchases to be moved forward in time in order to avoid negative surprises. Table 4 summarizes these effects.

[Table 3: The impact on Mexican prices of a 10 percent depreciation of the peso]

[Table 4: Impacts of a depreciation of the peso]

If, as expected, a depreciation of the peso has a net negative impact on cross-border shopping, it should be observable in the county sales data. If county sales have some positive natural rate of growth--which is a function of the state of the economy and other unspecified factors--then a depreciation of the peso should disrupt the normal growth rate. Figure 2 illustrates this comment, with a positive sloped revenue curve that is shifted down at two separate points in time. The first point is the first quarter of 1982, and the second point is the last quarter of 1994.

[Figure 2: Three periods of peso impacts]

Equation 1 differs from a simple compound growth equation for retail sales in one respect. Two dummy variables are included as a means of allowing the intercept to change at the start of each of the two periods of rapid depreciation:

$$(1) \qquad \text{Ln}(\text{Retail SalesRR}_t) = \beta_1 + \beta_2 t + \beta_3(\text{Crisis 1}) + \beta_4(\text{Crisis 2}) + \varepsilon_t,$$

[3] According to INEGI data, 40 percent of bank deposits in Baja California are in dollars. Other border states range from 4 (Nuevo Leon) to 16 percent (Chihuahua).

where Crisis 1 = {1 if time period is 1982.1 to 1994.3, and 0 otherwise}, Crisis 2 = {1 if time period is 1994.4 to 1999.4, and 0 otherwise}, and ε_t is a random error term. In this simple model, the rate of growth of sales, β_2, is constant over the entire period, while the intercept, β_1, is allowed to change during Crisis 1 and Crisis 2.[4] The values of β_3 and β_4 measure the natural log of the gap between the base period intercept and the intercepts of the two episodes of depreciation. In Figure 2, this is the size of the downward shift in the revenue curve at times t_1 and t_2. Table 5 shows the estimated growth rates on an annualized basis, along with the size of the impact of the depreciations, both in dollar and percentage terms.

[Table 5: Shifts in the revenue curve]

The first point is that the measurements in Table 5 are fairly close to the estimates given by Prock (1983) and Patrick and Renforth (1996) for the Texas regions in 1982-83 and 1995. Secondly, the dollar values and percentage changes during the second episode are much larger than during the first. This is consistent with the fact that in real terms, the average quarterly peso depreciation was less (1.9%) during the first period than the second (9.1%). One anomaly of the estimates in Table 5 is the peso's impact on San Diego during the first period. The coefficient on Crisis 1 is positive, implying a net gain in revenue. It is unclear why this occurred, although it may be related to the expectations of future depreciations, coupled with a much higher dollarization of the Tijuana-San Diego border region.

[4] Note that the intercept, β_1, is equal to the natural log of retail sales in the base period ($\ln(y_0)$), so that the interpretation of the coefficients of Crisis 1 and Crisis 2 are the difference in the natural logs of the intercepts.

While the estimates in Table 5 are useful as an econometric supplements to previous survey estimates of the impact of peso's depreciation, they provide only a limited view of the ongoing relationship between the peso's value and cross-border shopping. Hence, in the next section we turn to a more complete econometric framework to estimate the systematic effects of the peso on retail sales.

4. The county-level demand for goods and services

County-wide retail sales can be modeled within a simple demand equation. Let nominal demand be a function of nominal income and prices:

(2) $Q^d = g(Y,P),$

or in real terms:

(3) $(Q/P)^d = f(Y/P).$

This says that the real quantity of goods and services demanded depend on real incomes (Y/P). In the estimations that follow, prices are assumed to be exogenous to San Diego and Imperial Counties. This follows from the fact that they are relatively small regions within the national market and that it is consequently not unreasonable to assume that they are price takers.

Note, however, that regional income has two components, U.S. and Mexican. Given that there is a significant amount of cross-border shopping, changes in either the dollar value of the peso or in Mexican incomes will have a significant impact on retail activity in San Diego and Imperial Counties. The importance of these impacts depends on several factors: (1) the size of the change in the value of the peso; (2) the size of changes in real Mexican incomes; (3) the amount of cross-border shopping; (4) the speed at which changes in the value of the peso are passed through into higher prices in

Mexico; and (5) the general economic environment in Mexico accompanying the changes.

Assuming that real Mexican income and the value of the peso are likely to have significant effects on the dollar value of sales in U.S. border cities, it is reasonable to rewrite the demand curve as

(4) $(Q/P)^d = f(Y_U/P_U, Y_M/P_M, e)$, or

(5) $Q^d = f(Y_U, Y_M, e)$

where the subscript U refers to the U.S., M is Mexico, e is the real exchange rate, and italics are real variables.

Assuming a Cobb-Douglas form for the demand equation gives

(6) $$Q^d = \beta_0 Y_U^{\beta_1} Y_M^{\beta_2} e^{\beta_3} \varepsilon,$$

where ε is a random error term. Taking logs and letting lower case letters stand for the natural logarithm of a variable, the equation becomes

(7) $$q^d = \beta^* + \beta_1 y_u + \beta_2 y_m + \beta_3 e + \varepsilon^*$$

where $\beta^* = \ln(\beta_0)$ and $\varepsilon^* = \ln(\varepsilon)$.

5. Estimates of the Impact of a Peso Devaluation

The data used to estimate the above equation are quarterly observations from 1980 to the fourth quarter of 1999. The dependent variable retail sales, and cross-county restrictions are placed on the coefficients, so each county has a complete set of regressors and its own unique coefficients. Income in each of the U.S. counties is proxied by employment, while, in Mexico, quarterly changes in national GDP are used. While this proxy for economic activity in the Mexican border region is less desirable than a more

local indicator, it has the advantage of measuring the overall state of the Mexican economy. The exchange rate is the nominal rate, pesos per dollar. In order to control for price movements in the U.S. and in Mexico, both countries' CPIs are included. Finally, dummy variables are used to control for two periods of rapid depreciation and high variability. Given that expectations of a depreciation may cause purchases to take place now rather than later, it is necessary to try to separate the influence of expectations from the actual depreciation itself. This is the purpose of the dummy variable marking periods of high volatility.

Exchange rates and retail sales variables have trend components which require a test for nonstationary means and variances. Augmented Dickey-Fuller tests reported in Table 6 show that these variables are nonstationary in levels and the hypotheses of unit roots cannot be ruled out, implying that spurious correlation between the variables is a potential estimation problem. Tests on the first difference of (the log of) each variable shows that this eliminates the problem. In the estimates, then, all variables are measured in difference in logs form.

[Table 6: Augmented Dickey Fuller tests for nonstationarity]

Using first differences, the model becomes

$$\Delta q^d = \alpha + \beta_1 \Delta y_u + \beta_3 \Delta y_m + \beta_4 \Delta e + \beta_5 \Omega + \eta, \tag{8}$$

where Ω is a vector of relevant dummy variables, including quarterly effects, periods of high volatility, and U.S. recession, and η is a random error term with zero mean and constant variance. It is expected that the error terms for each county are correlated, so seemingly unrelated regression estimation is used. A check of the correlation of the error terms indicates that SUR techniques are warranted.

Table 7 shows the complete set of regressions for total sales in each of the eight counties. The impact of a change in the value of the peso varies across the counties, from nearly a zero effect in Val Verde, to a very large effect in Webb County. Since the continuous variables are measured as first differences in logs, the interpretation of the coefficients is as elasticities. In other words, the coefficient of -0.628 indicates that a 1 percent decrease in the value of the peso (increase in pesos per dollar) causes a 0.628 percent decline in total retail sales in Webb County. Webb County is most heavily affected of all the counties, followed by Maverick and Imperial Counties in a second tier, Cameron and Hidalgo in the third tier, and the largest counties, El Paso and San Diego, in the fourth tier. The coefficient for El Paso (-0.09) is similar to San Diego's (-0.085), although El Paso's is not significant.

[Table 7: SUR estimates of total retail sales]

Table 8 shows the same regressions for several subsectors of retail sales. Instead of reporting the whole regression for each county, only the exchange rate coefficients are reported. The complete regressions are available on request.

[Table 8: SUR estimates of retail subsectors]

Table 8 provides a rank ordering of the sectors, from most to least affected. Apparel and general merchandise rank numbers 1 and 2. The coefficients tend to be smaller in the larger cities, as expected, and even Val Verde County shows significant impacts. Webb County (Laredo) and Maverick County (Eagle Pass) have the largest coefficients for the apparel and general merchandise sectors, and are the only two counties with significant coefficients in the eating and drinking places sector.

Two of the three nondurables sectors of furniture, automotive, and building materials, experience relatively insignificant impacts. Furniture is the exception to this pattern. This may stem in part from the fact that items in this group tend to be more expensive, and limits on the value goods that can be carried back into Mexico on a duty-free basis may discourage cross-border shopping for these items. In addition, Mexico's comparative advantage in a range of building materials such as cement, glass, and clay, may lessen the need to cross the border. One can make a similar argument about food and eating and drinking places. Value and selection tends to be particularly good in Mexico for these culturally sensitive items, and the attraction of U.S. markets and restaurants is probably relatively limited, particularly by comparison to U.S. department and clothing stores.

6. Conclusion

Bi-national markets are sensitive to the relative value of currencies. Mexican shoppers that cross the border are responsible for a significant share of total sales, and, consequently, fluctuations in the value of the peso have a profound impact on U.S. border communities. This is not to say that the impact is uniform across the border, however, as the size of the impact varies in a number of dimensions. Smaller communities are likely to have a relatively larger share of their retail sales to residents of Mexico, although this effect varies by transportation networks and the size of the Mexican population in the border region. Impacts also vary by subsector, with apparel and general merchandise stores the most popular destination for cross-border shoppers.

This paper does not test the intra-county spatial variation in these effects, but it seems certain that some cities and shopping districts within a county will experience

much larger impacts than others. Cities and shopping districts closer to the border will be more heavily affected, while retail areas further from the border may be largely or even entirely free from cross-border influences. These impacts are economically and fiscally important since the retail sector generates a large number of jobs, and sales taxes form an important component of local government finance. In addition, the value of property for retail use is an important component of the determination of property taxes, another source of state and local finance.

The future of cross-border retailing is subject to several conflicting tendencies. On the one hand, as U.S.-Mexico economic integration moves forward, we could expect to see greater specialization in the cities and counties on the border. This may increase the relative and absolute importance of cross-border retailing, but it will also require a shift in the structure of the retail sector. On the other hand, all of the border communities have hypertrophied retail sectors (Gerber and Rey, 1999). This follows from the fact that their markets have been the U.S. population plus a significant share of the Mexican population. As Mexico's economy becomes more open, and as the value and selection of goods improves, it seems likely that the retail sector on the Mexican side will grow. This could reduce the relative importance of cross-border shopping for many border residents, and actually lead to a decline in the retail market on the U.S. side. Indeed, this may already have happened. Gerber and Rey (1999) have noted that between 1993 and 1997, the location quotients for retail employment declined in each of the five MSAs on the border. Whether this is a short run deviation from trend, or a long run change, is too early to tell.

Table 1

Average monthly crossings, 2000

Port City	*County*	*Pedestrians*	*Vehicles*
Brownsville	Cameron County, TX	484,283	1,212,379
Calexico	Imperial County, CA		
Del Rio	Val Verde County, TX	11,733	326,828
Eagle Pass	Maverick County, TX	117,092	513,108
El Paso	El Paso County, TX	1,042,138	1,222,190
Laredo	Webb County, TX	754,476	1,403,532
McAllen-Hidalgo	Hidalgo County, TX	236,863	968,943
San Diego	San Diego County, CA		

Source: Immigration and Naturalization Service

Figure 1: Quarterly changes in the value of the peso, 1980-1999

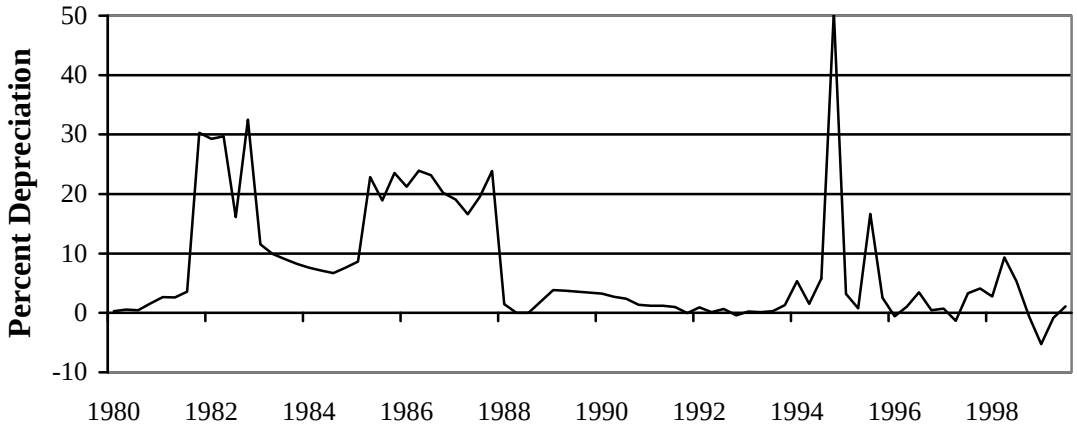


Table 2
Quarterly rates of change in the dollar value of the peso

	Nominal	*Real*
Crisis years		
1982:1 to 1988:1 and 1994:4 to 1995:4	μ = -15.19 percent σ = 8.83 percent	μ = -3.13 percent σ = 11.73 percent
Non-crisis years		
1980:2 to 1981:4 and 1988:2 to 1994:3 and 1996:1 to 1999:4	μ = -1.53 percent σ = 2.14 percent	μ = +1.12 percent σ = 3.12 percent

Source: Federal Reserve Board, JPMorgan, author's calculations.

Table 3:
Changes in Mexican prices
after a 10 percent depreciation of the peso

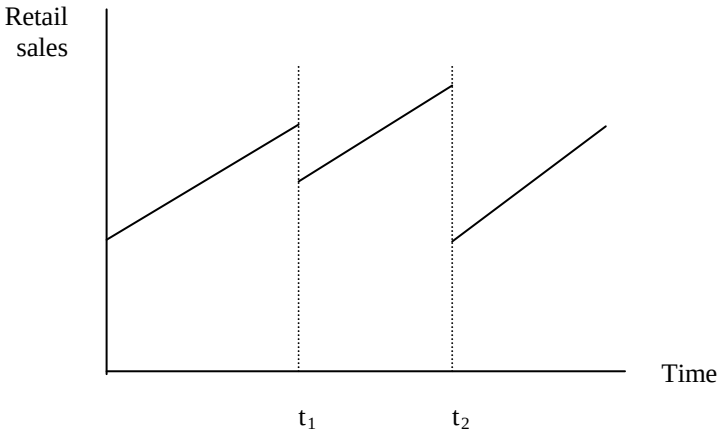
After:	*Increase in consumer prices*
1 quarter	3.34 percent
2 quarters	4.91 percent
3 quarters	5.90 percent
4 quarters	7.13 percent

Source: Federal Reserve Board, author's calculations.

Table 4
Impacts of a depreciation of the peso

Factors that discourage cross-border shopping	• Less income in dollar terms • Relative prices favor Mexican goods • Substitutability between U.S. and Mexican goods and services
Factors that encourage cross-border shopping	• Dollarization of the Mexican economy • Rapid inflation in Mexican prices • Expectations of a future depreciation

Figure 2:
Three periods of peso impacts



t_1 = 1982, Q1
t_2 = 1994, Q4

Table 5
Shifts in the revenue curve

County	*Largest City*	*Average annual growth of nominal retail sales, percent*	*Crisis 1: Shift in retail sales, millions*	*Crisis 2: Shift in retail sales, millions*
Cameron, TX	Brownsville	5.5	-$50.27***	-$61.74***
			(18.4%)	(22.7%)
El Paso, TX	El Paso	6.2	-$45.25*	-$73.04*
			(8.4%)	(13.6%)
Hidalgo, TX	McAllen	8.4	-$48.45***	-$89.12***
			(15.3%)	(28.1%)
Imperial, CA	El Centro	7.0	-$22.92***	-$44.04***
			(17.9%)	(34.4%)
Maverick, TX	Eagle Pass	8.4	-$14.03***	-$18.67***
			(38.6%)	(51.3%)
San Diego, CA	San Diego	6.5	+$248.30**	$-46.74
			(10.7%)	(2.0%)
Val Verde, TX	Del Rio	4.7	-$1.97	-$0.17
			(5.7%)	(0.5%)
Webb, TX	Laredo	10.2	-$75.67***	-$131.22***
			(36.5%)	(63.3%)

*, **, and ***, denote statistical significance at the 10%, 5% and 1% levels, respectively.
Estimated equation: $\text{Ln}(\text{Retail Sales}_t) = \beta_1 + \beta_2 t + \beta_3(\text{Crisis 1}) + \beta_4(\text{Crisis 2}) + \varepsilon_t$, where
Crisis 1 = {1 if time period is 1982.1 to 1994.3, and 0 otherwise} and
Crisis 2 = {1 if time period is 1994.4 to 1999.4, and 0 otherwise}

Table 6
Augmented Dickey Fuller tests for nonstationarity

Variable	*t value for unit root tests*	
	Levels	First differences
Total sales, San Diego County, CA	0.980	-13.85***
Total sales, Imperial County, CA	0.622	-5.75***
Total sales, Cameron County, TX	0.110	-12.79***
Total sales, El Paso County, TX	0.250	-30.23***
Total sales, Hidalgo County, TX	0.158	-17.89***
Total sales, Maverick County, TX	0.001	-9.44***
Total sales, Val Verde County, TX	0.515	-13.44***
Total Sales, Webb County, TX	1.101	-11.80***
Exchange rate: Pesos per dollar	-0.972	-3.36**

Significant t values at the 10 percent, 5 percent, and 1 percent level are 2.58, 2.89, and 3.52

*** and ** signify that the hypothesis of a unit root is rejected at the 1% and 5% levels.

Table 7
SUR estimates of total retail sales
Dependent Variable: First differences of the natural log of total retail sales

	Cameron County, TX			*El Paso County, TX*		
	Coefficient	t-Statistic	Prob.	Coefficient	t-Statistic	Prob.
Constant	-0.1440	-13.15	0.000	-0.2144	-12.44	0.000
Local employment	-0.0290	-0.14	0.892	0.1468	0.34	0.738
Pesos per dollar	-0.1584	-2.87	0.004	-0.0994	-1.27	0.204
Period of high volatility	-0.0040	-0.30	0.761	0.0016	0.09	0.931
U.S. CPI	2.6447	4.16	0.000	-0.7973	-0.89	0.375
Period of U.S. recession	-0.0585	-4.84	0.000	-0.0210	-1.20	0.232
Quarter 2	0.1575	12.98	0.000	0.3027	15.00	0.000
Quarter 3	0.1794	15.18	0.000	0.2435	10.68	0.000
Quarter 4	0.2423	13.87	0.000	0.3721	14.34	0.000
Mexico CPI	0.0503	0.26	0.798	-0.2063	-0.74	0.458
Mexico's GDP	0.0281	0.16	0.872	0.3428	1.39	0.165
Adjusted Rsq.	0.887			0.910		
N	79			79		
DW	2.04			2.38		

Table 7, continued

	Val Verde County, TX			*Hidalgo County, TX*		
	Coefficient	t-Statistic	Prob.	Coefficient	t-Statistic	Prob.
Constant	-0.1691	-10.65	0.000	-0.1493	-11.62	0.000
Local employment	0.1392	0.76	0.450	-0.1153	-1.00	0.316
Pesos per dollar	-0.0395	-0.50	0.620	-0.2180	-3.37	0.001
Period of high volatility	-0.0037	-0.19	0.848	-0.0095	-0.62	0.534
U.S. CPI	2.1058	2.32	0.021	2.2792	3.08	0.002
Period of U.S. recession	-0.0397	-2.32	0.021	-0.0503	-3.60	0.000
Quarter 2	0.2551	15.60	0.000	0.1166	8.58	0.000
Quarter 3	0.1491	8.86	0.000	0.1386	8.89	0.000
Quarter 4	0.3005	11.84	0.000	0.3304	15.04	0.000
Mexico CPI	-0.0201	-0.07	0.944	-0.1862	-0.81	0.419
Mexico's GDP	-0.0417	-0.16	0.869	0.4629	2.26	0.024
Adjusted Rsq.	0.853			0.918		
N	79			79		
DW	2.18			2.07		

	Maverick County, TX			*Webb County, TX*		
	Coefficient	t-Statistic	Prob.	Coefficient	t-Statistic	Prob.
Constant	-0.1940	-10.43	0.000	-0.2451	-10.13	0.000
Local employment	-0.0483	-0.26	0.793	0.6009	1.83	0.068
Pesos per dollar	-0.3463	-3.70	0.000	-0.6281	-5.08	0.000
Period of high volatility	-0.0103	-0.46	0.643	0.0161	0.56	0.576
U.S. CPI	3.5701	3.30	0.001	2.1255	1.49	0.136
Period of U.S. recession	-0.0939	-4.60	0.000	-0.0723	-2.68	0.008
Quarter 2	0.2351	11.97	0.000	0.2422	9.69	0.000
Quarter 3	0.1870	9.15	0.000	0.2789	10.57	0.000
Quarter 4	0.3477	11.29	0.000	0.3831	9.95	0.000
Mexico CPI	0.1731	0.52	0.604	-0.1460	-0.33	0.741
Mexico's GDP	0.0894	0.30	0.763	0.7699	1.95	0.052
Adjusted Rsq.	0.852			0.850		
N	79			79		
DW	2.36			2.20		

Table 7, continued

	San Diego County, CA			*Imperial County, CA*		
	Coefficient	t-Statistic	Prob.	Coefficient	t-Statistic	Prob.
Constant	-0.0962	-14.08	0.000	-0.1427	-6.97	0.000
Local employment	0.9798	3.16	0.002	0.3735	2.84	0.005
Pesos per dollar	-0.0852	-2.51	0.013	-0.2588	-2.65	0.008
Period of high volatility	0.0203	2.57	0.010	0.0022	0.10	0.920
U.S. CPI	0.7399	1.96	0.050	2.6188	1.50	0.135
Period of U.S. recession	-0.0215	-2.79	0.006	-0.0351	-1.17	0.243
Quarter 2	0.1521	16.98	0.000	0.2000	9.44	0.000
Quarter 3	0.1215	17.23	0.000	0.1112	3.16	0.002
Quarter 4	0.1310	10.60	0.000	0.2254	6.90	0.000
Mexico CPI	0.0141	0.12	0.905	0.5469	1.65	0.100
Mexico's GDP	-0.0282	-0.27	0.786	-0.2592	-0.89	0.374
Adjusted Rsq.	0.920			0.808		
N	79			67		
DW	2.36			2.39		

Note: All variables are first differences of natural logarithms.

Table 8
The effect of a 1% change in the value of the peso, by retail sector

County	*Apparel*	*General merchandise*	*Eating and drinking places*	*Miscellaneous and specialty stores*
Cameron	-0.8046***	-0.3540***	-0.0576	-0.245**
	(5.47)	(3.66)	(0.44)	(2.20)
El Paso	-0.3154**	-0.3804***	0.0807	0.2013
	(2.41)	(4.44)	(1.01)	(1.55)
Hidalgo	-0.8784***	-0.4188***	-0.0586	-0.1667
	(5.74)	(3.39)	(0.81)	(1.27)
Imperial	-0.8258***	-0.4515***	-0.1658	-0.3515**
	(3.63)	(3.55)	(1.32)	(2.32)
Maverick	-1.1512***	-0.8914***	-0.3174***	0.2878
	(6.74)	(7.04)	(2.72)	(0.67)
San Diego	-0.2104**	-0.0932	-0.0265	-0.0441
	(2.22)	(1.05)	(0.40)	(0.52)
Val Verde	-0.6351***	-0.3500***	-0.0804	0.2463
	(3.42)	(4.93)	(1.11)	(0.88)
Webb	-1.0456***	-0.9869***	-0.4890***	-0.5175**
	(4.77)	(6.10)	(3.14)	(2.12)

Absolute value of t-statistics in parentheses.
Significance at the 1%, 5%, and 10% levels denoted by ***, **, and *.

Table 8, continued.

County	*Automotive*	*Building materials*	*Furniture*	*Food stores*
Cameron	0.2234	-0.0516	-0.3380**	0.1310
	(1.13)	(0.31)	(2.37)	(0.16)
El Paso	-0.0166	0.0356	-0.1050	-0.1642
	(0.08)	(0.23)	(0.69)	(1.54)
Hidalgo	-0.1597	-0.0919	-0.3971*	-0.0133
	(1.45)	(3.39)	(1.66)	(0.15)
Imperial	-0.2063	0.2253	not estimated	not estimated
	(1.21)	(0.70)		
Maverick	0.1051	-0.0363	0.0869	-0.1912
	(0.60)	(0.18)	(0.39)	(1.46)
San Diego	-0.1591**	-0.1266	not estimated	not estimated
	(2.14)	(1.19)		
Val Verde	0.2406	0.0187	-0.1950	0.0591
	(1.41)	(0.08)	(1.39)	(0.41)
Webb	-0.2573	-0.0284	-1.3549***	-0.1172
	(1.02)	(0.16)	(3.51)	(1.05)

Absolute value of t-statistics in parentheses.
Significance at the 1%, 5%, and 10% levels denoted by ***, **, and *.

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