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Ciudad Juarez Exchange Rate Sell-Buy Spreads: 2009-2016

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UTEP BORDER REGION MODELING PROJECT

TECHNICAL REPORT TX21-2

CIUDAD JUAREZ
EXCHANGE RATE SELL-BUY SPREADS: 2009-2016
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Continued maintenance and expansion of the UTEP business modeling system requires ongoing financial support. For information on potential means for supporting this research effort, please contact Border Region Modeling Project - CBA 236, Department of Economics & Finance, 500 West University, El Paso, TX 79968-0543.
Abstract
Commercial banks and currency kiosk bureaus provide exchange services throughout Ciudad Juárez, Mexico, a large metropolitan economy located on the border with the United States. This study employs newspaper data to examine how the bank and kiosk sell-buy spreads are affected by fluctuations in the total number of northbound border crossers, variations in bilateral peso per dollar exchange rate, and the yield differential between 90-day Certificados de Tesorería (Mexico CETES) and 90-day U.S. Treasury Bills. The sample is comprised of monthly frequency data from January 2009 through June 2016. Parameter estimation is carried out using a GLS ARMAX procedure. Empirical results indicate that the two sets of sell-buy spreads behave very differently from each other. Bank spreads increase as the peso weakens. Exchange bureau spreads decrease as cross-border traffic flows increase. Currency kiosk spreads tend to widen as 90-day yield gaps become larger.

Key Words
Currency Markets, Border Economics, Sell-Buy Spreads

JEL Classifications
F31 Foreign Exchange; M21 Business Economics; R15 Regional Econometrics

Data Availability Statement
Data employed for this study are archived within the Border Region Modeling Project section of The University of Texas at El Paso Library ScholarWorks data repository.

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* A revised version of this study is forthcoming in International Trade Journal.
INTRODUCTION

Exchange rates are often studied in macroeconomic contexts that examine short-run currency market dynamics and/or long-run purchasing power parity fluctuations (Papell, 2006; Gabaix and Maggiori, 2015; Galstyan and Velic, 2017). Dual exchange rates, usually official and parallel or black market rates, have also been analyzed for many developing economies (Bahmani-Oskooee, Hegerty, and Tanku, 2010; Baharumshah, Mohd, and Soon, 2011). A separate branch of the literature examines geographic exchange rate differences that reflect trade patterns and other microeconomic factors such as regional price gaps (Clark, Sawyer, and Sprinkle, 1999; Fullerton and Coronado, 2001; Blanco-Gonzalez and Fullerton, 2006; Fullerton and Varella, 2013). While these efforts frequently uncover intriguing insights regarding currency markets and international economic performance, less attention has been devoted to exchange rate patterns within specific geographic regions that do not involve parallel or black market rates.

This study assembles a unique regional sample of peso per dollar exchange rate data from Ciudad Juarez, Chihuahua, Mexico, a large metropolitan economy adjacent to El Paso, Texas, USA. Local daily exchange rate data from commercial banks and currency bureaus in Ciudad Juarez are collected for a period that covers January 2009 to June 2016. Currency bureaus are also known as currency kiosks, currency exchanges, money exchanges, exchange bureaus, money offices, exchange houses, and currency offices. In Ciudad Juarez, the vast majority of all currency transactions solely involve peso-to-dollar conversions or dollar-to-peso conversions. When the conversion spread becomes larger, consumer welfare is reduced. Higher spreads reflect greater monopoly power or fewer competitive pressures.

In contrast to the “informal,” “underground,” or “black market” currency enterprises that are found in many other Latin American metropolitan economies, the exchange bureaus of Ciudad Juarez are legally registered companies. Sell and buy price spreads are calculated for both sets of spot exchange rates included in the sample. The local sell–buy spreads are analyzed using border-crossings, exchange rate, and cross-border interest rate differentials. The results indicate that the bank spread and the kiosk spread respond very differently to changes in the explanatory variables. This indicates that, in spite of the pervasive nature of global currency market liquidity, regional economic factors also influence local exchange rates and bid-ask spreads.

Subsequent parts of the study are as follows. A brief overview of related literature is provided in the second section. A description of the data and methodology is next. Empirical results follow. A summary plus suggestions for future research comprise the conclusion.

LITERATURE REVIEW

Early research on regional exchange rates does not employ actual regional currency quotes (Hervey and Straus, 1998). Instead, this branch of the literature recognizes that, due to industrial and trade pattern differences, regional economies respond in fairly distinct manners to exchange rate fluctuations (Clark, Sawyer, and Sprinkle, 1999). Regional inflation differences may also contribute to the geographic variations in those responses. Given that, regional exchange rate indices are constructed in manners that take those differences into account as a means toward understanding
economic performance variations across geographical areas within national economies (Ibarra, 1999). Because data from only one region are employed for this study, geographic inflationary differences will not affect the analysis.

Several studies have explored the menu prices of identical items sold by restaurant franchises in different regions to explore diversions between computed purchasing power parity (PPP) exchange rates and nominal exchange rates in different regions (Bojanic, Warnick, and Musante, 2007; Fullerton, Fierro, and Villalobos, 2009). Among other findings, border zone firms have been found to adjust prices more rapidly than firms in other regions when price ratios and exchange rates diverge.

A separate strand of this literature has used the prices of brand name medicines in different regions in order to explore gaps between nominal exchange rates and implied law of one price exchange rates (Quon, Firszt, and Eisenberg, 2005; Fullerton and Miranda, 2011; Fullerton, Pallares, and Walke, 2014). Those efforts yield a variety of interesting results. To date, however, there have been very few, if any, studies that examine the differences in exchange rate quotes and bid-ask spreads within individual border metropolitan economies.

This topic is important for border regions and may have implications for global finance in general. Sell-buy spreads tend to be substantial in foreign exchange markets throughout the world (Geromichalos and Jung, 2018). Border areas provide natural settings to garner more evidence on how currency market spreads fluctuate over time.

**DATA AND METHODOLOGY**

A daily newspaper, *El Diario de Juarez* (El Diario), reports exchange rate data for Ciudad Juarez. Data are collected from six exchange rate kiosks and six commercial banks located in Ciudad Juarez. El Diario has collected the data from the same exchange rate kiosks and banks from 2009 forward. El Diario reports the average buy (compra) and sell (venta) peso prices of dollars for the exchange rate kiosks and for the banks. Dollar sell prices are always higher than dollar buy prices at all twelve companies. Because currency services are not offered at commercial banks on weekends, the exchange rates are reported daily for Monday through Friday. Similar to Geromichalos and Jung (2018), data employed for this study are converted into monthly averages for January 2009 through June 2016, providing a sample size of n = 90.

Two dependent variables are calculated using the exchange rate data from El Diario. The first dependent variable is the spread (difference) between sell (venta) and buy (compra) prices offered to exchange rate kiosk customers in Ciudad Juarez. In Equation (1), KSP is the kiosk spread in pesos per dollar, KSELL is the sell price in pesos per dollar, KBUY is the purchase price in pesos per dollar, and \( t \) is a time period subscript for each month in the sample.

\[
KSP_t = KSELL_t - KBUY_t
\]  

(1)

The second dependent variable is the spread between buy and sell prices offered by commercial banks to foreign exchange customers in Ciudad Juarez. In Equation (2), where BSP is the bank spread in pesos per dollar, BSELL is the commercial bank sell price in pesos per dollar, BBUY is the
purchase price in pesos per dollar at commercial banks, and \( t \) is a time period subscript for each month in the sample. BSP is the difference between peso sell and peso buy prices of dollars offered to commercial bank clients in Ciudad Juarez.

\[
BSP_t = BSELL_t - BBUY_t
\]  

Equation (2)

Two additional steps are taken before the dependent variables are employed for regression analysis. Large transactions that occur in international currency markets can affect local spreads. Given that, KSP and BSP are adjusted by subtracting the 48-hour peso per dollar interbank exchange rate spread calculated using data from Banco de Mexico (BM, 2016). This step is performed to reduce any undue influence that large international transactions from outside the region might have on the local sell-buy spreads.

Equation (3) shows how the interbank spread is calculated using the 48-hour peso per dollar interbank exchange rate quotes reported by Banco de Mexico (BM, 2016). In Equation (3), \( ISPREAD_t \) is the interbank exchange rate spread in month \( t \), \( ISELL_t \) is the 48-hour interbank sell price of dollars in month \( t \), and \( IBUY_t \) is the 48-hour interbank buy price of dollars in month \( t \). That spread is then subtracted from the local kiosk and bank spreads to yield the adjusted spreads shown in Equations (4) and (5).

\[
ISPREAD_t = ISELL_t - IBUY_t
\]  

Equation (3)

\[
KSPREAD_t = KSELL_t - KBUY_t - ISPREAD_t = KSP_t - ISPREAD_t
\]  

Equation (4)

\[
BSPREAD_t = BSELL_t - BBUY_t - ISPREAD_t = BSP_t - ISPREAD_t
\]  

Equation (5)

The data are also adjusted to eliminate monthly seasonal factors that affect exchange rate quotes and spreads at kiosks and commercial banks. Monthly seasonal indices are used to deseasonalize or eliminate the seasonal variation in the dependent variables. The indices are calculated using the seasonal index approach of Pindyck and Rubinfeld (1998). Both dependent variables are adjusted in order to eliminate seasonal influences that might affect exchange rate quotes and spreads in certain months more than others.

![Figure 1. Commercial Bank and Kiosk Spreads (Pesos per Dollar)](image-url)
Currency spreads are used rather than exchange rate averages because spreads provide information about potential gains or losses that kiosks and banks incur as a consequence of buying and selling pesos and dollars. Sell and buy spreads provide unique information on local exchange rates and currency market conditions. That is because spreads reflect the leeway that currency bureaus and commercial banks have for buying or selling dollars to local customers. Accordingly, exchange rate spreads provide insights to local border currency markets. For example, if dollar surpluses are accumulated, then sales prices are likely to be lowered, resulting in narrower spreads. Figure 1 illustrates the behavior of KSPREAD and BSPREAD during the sample period. The bank spreads are almost always higher than the kiosk spreads throughout the sample period. Because there are fewer barriers to entry facing currency bureaus, that pattern is not surprising and likely reflects greater levels of competition among the kiosks.

Table 1: Variable Names

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
<th>Units</th>
<th>Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSPREAD</td>
<td>Commercial bank sell-buy dollar spread</td>
<td>Nominal Pesos</td>
<td>AC1</td>
</tr>
<tr>
<td>KSPREAD</td>
<td>Currency kiosk sell-buy dollar spread</td>
<td>Nominal Pesos</td>
<td>AC2</td>
</tr>
<tr>
<td>CROSS</td>
<td>Northbound border crossings into El Paso</td>
<td>Passengers</td>
<td>CBP</td>
</tr>
<tr>
<td>EXCJ</td>
<td>Average bank and kiosk exchange rate</td>
<td>Pesos per Dollar</td>
<td>AC3</td>
</tr>
<tr>
<td>RATEDIF</td>
<td>Mexico – USA yield difference</td>
<td>Percentage Points</td>
<td>AC4</td>
</tr>
</tbody>
</table>

Notes:
AC1 stands for author calculations using commercial bank exchange rate quotes for dollars as reported Monday through Friday each week in *El Diario de Juarez*.
AC2 stands for author calculations using currency kiosk exchange rate quotes for dollars as reported Monday through Friday each week in *El Diario de Juarez*.
CROSS stands for total northbound border crossings into El Paso by pedestrians, personal vehicle passengers, and bus passengers summarized in United States Customs & Border Protection monthly reports.
EXCJ stands for author calculations of the monthly nominal average peso per dollar exchange rate for all six commercial banks and all six currency kiosks reported Monday through Friday each week in *El Diario de Juarez*.
RATEDIF stands for author calculations of the monthly average nominal yield difference between 90-day Treasury Certificates in Mexico and 90-day Treasury Bills in the United States, 90-day CETES rate minus 90-day T-Bill rate.

Explanatory variables included in the sample are the total number of northbound border crossings from Ciudad Juarez into El Paso each month, the monthly average peso per dollar nominal exchange rate, and the monthly average nominal yield gap between 90-day Treasury Certificates in Mexico and 90-day Treasury Bills in the United States. Table 1 lists each of the sample variables. These data are housed within the Border Region Modeling Project section of The University of Texas at El Paso ScholarWorks (Fullerton and Pallares, 2021).

Summary statistics for the sample data are reported in Table 2. The commercial bank sell-buy spread sample mean is 58.6 centavos per dollar. In dollar terms, that is larger than the average spread reported for the dollar across five major currencies in Geromichalos and Jung (2018). The maximum bank spread of 85.0 centavos per dollar occurred in April 2016 during a heated United States presidential election campaign in which a major party candidate routinely disparaged the
North American Free Trade Agreement and argued that the government of Mexico should pay for a massive wall along the border of the two countries. The minimum bank spread of 38.1 centavos per dollar occurred in August 2010 as the United States economy was in the process of slowly emerging from the Great Recession.

Table 2: Summary Statistics

<table>
<thead>
<tr>
<th>Statistic</th>
<th>BSPREAD</th>
<th>BSPREAD</th>
<th>CROSS</th>
<th>EXCJ</th>
<th>RATE</th>
<th>DIFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>0.5864</td>
<td>0.3101</td>
<td>2.1754</td>
<td>13.528</td>
<td>4.0097</td>
<td></td>
</tr>
<tr>
<td>Median</td>
<td>0.5863</td>
<td>0.2544</td>
<td>2.2367</td>
<td>12.988</td>
<td>4.3800</td>
<td></td>
</tr>
<tr>
<td>Std. Dev.</td>
<td>0.1141</td>
<td>0.1288</td>
<td>0.1984</td>
<td>1.5929</td>
<td>0.8636</td>
<td></td>
</tr>
<tr>
<td>Maximum</td>
<td>0.8502</td>
<td>0.5630</td>
<td>2.5829</td>
<td>18.158</td>
<td>7.5300</td>
<td></td>
</tr>
<tr>
<td>Minimum</td>
<td>0.3812</td>
<td>0.1498</td>
<td>1.8309</td>
<td>11.624</td>
<td>2.8400</td>
<td></td>
</tr>
<tr>
<td>Skewness</td>
<td>0.2744</td>
<td>0.6170</td>
<td>0.1984</td>
<td>1.5096</td>
<td>1.4931</td>
<td></td>
</tr>
<tr>
<td>Kurtosis</td>
<td>2.0475</td>
<td>1.8993</td>
<td>1.9265</td>
<td>4.3763</td>
<td>7.2227</td>
<td></td>
</tr>
<tr>
<td>CV</td>
<td>0.1946</td>
<td>0.4153</td>
<td>0.0912</td>
<td>0.1116</td>
<td>0.2403</td>
<td></td>
</tr>
</tbody>
</table>

Notes:
CV stands for coefficient of variation.

Similar to Figure 1, Table 2 makes it easy to identify several differences between the bank and kiosk spreads. At 31.0 centavos per dollar, the average kiosk spread is substantially lower than that of the banks, but still higher than what is reported across the five bilateral exchange rates in Geromichalos and Jung (2018). The kiosk spread standard deviation of 12.9 centavos per dollar is roughly equal to that of the banks. The money office spreads are also more right-skewed than those of the banks. The coefficient of variation for the kiosks is also notably larger than that of the banks.

The larger bank and kiosk spreads probably indicate that the peso-dollar currency market in Ciudad Juarez is less liquid and less competitive than what collectively prevails for the dollar against the euro, the yen, the British pound, the Canadian dollar, and the Swiss franc. Direct arbitrage can occur whenever there are misalignments among the major bilateral exchange rates for the dollar. In Ciudad Juarez and El Paso, indirect arbitrage occurs via customer currency selection choices at retail stores whenever local price and exchange rate misalignments occur (Blanco-Gonzalez and Fullerton, 2006; Fullerton, Fierro, and Villalobos, 2009). Some currency service companies will physically visit exchange bureaus and banks to exploit sell-buy and/or exchange rate misalignments, but electronic arbitrage among the companies does not occur.

The sample average for the number of border crossers into El Paso is 2.175 million people per month. The sample maximum of nearly 2.583 million occurred in August 2009, while the minimum of approximately 1.831 million was tallied in February 2011. Relative to a Gaussian distribution, the monthly crossers data are platykurtic and fairly symmetric. Because of a small
variance, these data also have a coefficient of variation that is below 0.10. Northbound border crossings are functionally related to several different regional and international economic variables (Fullerton and Solis, 2020).

As reported in Table 2, the sample average for the nominal exchange rate is 13.53 pesos per dollar. The maximum value of 18.16 happened in June 2016 during the United States presidential campaign when doubts were expressed regarding the economic wisdom of trade ties between the two countries. The minimum average currency quote of 11.62 was observed in July 2011, a month during which the peso was approximately 10 percent overvalued against the dollar (Fullerton et al., 2020). The exchange rate data are both right-skewed as well as leptokurtic. In spite of that, at 11.2, the coefficient of variation for this variable is fairly small.

The sample mean for the nominal yield difference is approximately 4.0 percentage points. The biggest monthly gap separating the 90-day CETES and the 90-day T-Bill rates is 7.5 percentage points. That arose in January 2009 during one of the low points of the banking sector crisis in the United States. The smallest cross-border yield difference of 2.8 percentage points occurred in September 2014 during a period of both financial and inflationary calm in both countries. The nominal rate difference data are positively skewed and sharply leptokurtic.

To examine the relationships between each of the sell-buy spread variables and the explanatory variables, a generalized least squares autoregressive-moving average (GLS ARMAX) estimator is employed (Greene, 2000). Because of non-stationarity, all of the data are differenced prior to estimation (chi-squared and unit root test results are available upon request). Cross correlation functions are employed to determine lag lengths for the various explanatory variables included in the equation specifications (Enders, 2010). Given the speed with which currency quotes change, minimal lag lengths are anticipated. The GLS ARMAX estimator is employed because of the flexibility it provides in handling different data generating processes. It has previously proven highly useful in examining other border economic phenomena (Niño et al., 2015; Fullerton and Solís, 2020).

EMPIRICAL RESULTS

Estimation results for the commercial bank spread are reported in Columns 2 and 3 of Table 3. There is an inverse relationship between the number of border crossers and the bank spread. Although it is not statistically reliable, that result potentially reflects increased liquidity that results when greater cross-boundary travel occurs (Cheung and Wong, 2000). A direct relationship exists between the exchange rate and the sell-buy gap. Every 1-peso increase in the exchange rate leads to a 3.7 centavo increment in the spread. A negative relationship is also documented for the 90-day government bill yield differential. A 1-percentage point increase in the cross-border yield gap is associated with a 1.5 centavo decrement in the bank sell-buy spread. The latter effect, however, is statistically unreliable.

The commercial bank spread equation specification does not successfully explain all variations in the dependent variable. Given that, a first order moving average term, MA(1), is required to correct for serial correlation in the residuals. The selection of the MA(1) term that appears in Table 3 is based upon residual autocorrelation function estimates of the original specification (Enders, 2010).
Inclusion of the MA(1) term is necessary to ensure that all coefficient standard deviation estimates are accurate.

Estimation results for the kiosk sell-buy spread are summarized in Columns 4 and 5 of Table 3. A negative relationship is also uncovered between the kiosk spread and the volume of monthly border crossers. For the currency office spread, however, the slope parameter satisfies the standard 5-percent significance criterion. Exchange rate fluctuation impacts are much smaller for the kiosk spread. Although statistically unreliable, a 1-peso increase in the currency value of the dollar translates into a 1-centavo increment in the kiosk sell-buy gap. While it does not satisfy the 5-percent criterion, a 1-percentage point upward movement in the cross-border yield gap leads to a 3.5 centavo increase in the kiosk spread. That is the opposite of the inverse correlation reported for that regressor in the bank spread equation. It is similar to bilateral currency exchange estimates reported by Davutyan (1997).

As in the case of the commercial bank equation, serial correlation is present in the kiosk residuals. The data generating process in this case, however, is first order autoregressive. Accordingly, an AR(1) term is included with the exchange bureau estimation results shown in Table 3. An autocorrelation function estimated for the residuals from the baseline specification also determined the selection of the AR(1) term. The negative coefficient implies mild overshooting behavior, a common feature of many currency markets (Wong, 2020).

The estimation results in Tables 3 contain several interesting outcomes. Both spreads are inversely correlated with the monthly volume of cross-border passenger traffic. Only the exchange bureau spread responds to variations in border traffic flows in a statistically reliable manner, and the magnitude of that reaction is much larger than what is at the commercial banks. Apparently, increased border commuting creates better currency conversion opportunities for kiosk customers relative to what occurs for bank clients. That may be due to greater relative competition among currency bureaus than among commercial banks since banking has substantial barriers to entry.
Table 3: Commercial Bank & Currency Kiosk Exchange Rate Spread Estimation Results
Dependent Variables: D(BSPREAD) and D(KSPREAD)
Method: ARMAX Generalized Least Squares (Gauss-Newton)
Raw Data Sample: January 2009 – June 2016, 89 Observations after Differencing
Convergence achieved after 12 iterations.
Coefficient covariance computed using outer product of gradients.
Degrees of freedom adjustment for standard errors and covariance matrix.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Computed t-Statistic</th>
<th>Coefficient</th>
<th>Computed t-Statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>0.001379</td>
<td>0.546602</td>
<td>0.000801</td>
<td>0.209616</td>
</tr>
<tr>
<td>D(CROSS)</td>
<td>-0.006426</td>
<td>-0.158547</td>
<td>-0.11362</td>
<td>-2.54774</td>
</tr>
<tr>
<td>D(EXCJ)</td>
<td>0.036526</td>
<td>3.644545</td>
<td>0.009701</td>
<td>-2.54774</td>
</tr>
<tr>
<td>D(RATEDIF)</td>
<td>-0.015083</td>
<td>-0.956820</td>
<td>0.034919</td>
<td>1.607805</td>
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<tr>
<td>MA(1)</td>
<td>-0.286321</td>
<td>-2.707678</td>
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<tr>
<td>AR(1)</td>
<td></td>
<td></td>
<td>-0.168397</td>
<td>-1.556860</td>
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<tr>
<td>R-Squared</td>
<td>0.197323</td>
<td></td>
<td>0.113085</td>
<td></td>
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<tr>
<td>Adjusted R-Sq.</td>
<td>0.159100</td>
<td></td>
<td>0.070851</td>
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<tr>
<td>Std. Err. of Reg.</td>
<td>0.030852</td>
<td></td>
<td>0.039644</td>
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<tr>
<td>Pseudo R-Squared</td>
<td>0.896669</td>
<td></td>
<td>0.882029</td>
<td></td>
</tr>
<tr>
<td>Inverted MA Roots</td>
<td>0.29</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inverted AR Roots</td>
<td></td>
<td></td>
<td>-0.17</td>
<td></td>
</tr>
<tr>
<td>Dep. Var. Mean</td>
<td>0.003737</td>
<td></td>
<td>-0.000185</td>
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<tr>
<td>Dep. Var. Std. Dev.</td>
<td>0.033645</td>
<td></td>
<td>0.041128</td>
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<tr>
<td>Hannan Quinn Inf. Crit.</td>
<td>-4.007353</td>
<td></td>
<td>-3.506541</td>
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<tr>
<td>Log Likelihood Stat.</td>
<td>185.8349</td>
<td></td>
<td>163.5488</td>
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<tr>
<td>Computed F-Statistic</td>
<td>5.162445</td>
<td></td>
<td>2.677584</td>
<td></td>
</tr>
<tr>
<td>Probability (F-Stat.)</td>
<td>0.000909</td>
<td></td>
<td>0.037211</td>
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<tr>
<td>JB Normality Chi-Sq. Stat.</td>
<td>14.26063</td>
<td></td>
<td>83.59537</td>
<td></td>
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<tr>
<td>Probability (JB Chi-Sq.)</td>
<td>0.0008</td>
<td></td>
<td>0.0000</td>
<td></td>
</tr>
<tr>
<td>BG Serial Correl. F-Stat.</td>
<td>0.467759</td>
<td></td>
<td>0.593549</td>
<td></td>
</tr>
<tr>
<td>Probability (BG F-Stat.)</td>
<td>0.6281</td>
<td></td>
<td>0.5553</td>
<td></td>
</tr>
</tbody>
</table>

Notes:
D is a first difference operator.
For coefficient readability, CROSS is divided by 1 million prior to estimation.
MA(1) stands for moving average coefficient at lag 1.
AR(1) stands for autoregressive coefficient at lag 1.
Pseudo R-Squared is the square of the correlation coefficient between the actual and fitted dependent variable in levels.
BG Serial Correl. F-Stat. is the computed F-Statistic for a Breusch-Godfrey Lagrange Multiplier test of a null
hypothesis of no serial correlation (failure to reject implies that the residuals are independently distributed and not autocorrelated).

BPG Heterosced. F-Stat. is the computed F-Statistic for a Breusch-Pagan-Godfrey Lagrange Multiplier test of a null hypothesis of homoscedasticity (failure to reject implies that the residuals are homoscedastic).

Overall liquidity probably increases with greater magnitudes of cross-border travel as it allows visitors to access more currency exchange operations. Currency value impacts on border commuting have been previously documented (Fullerton, 2000; Fullerton and Solís, 2020). This is the first time, however, that lower peso per dollar sell-buy spreads have been quantified as consequences of increased border traffic flows. The converse also holds for cases when decreases in the volumes of border traffic flows are observed.

A reverse set of circumstances is observed for fluctuations in the currency market value of the peso versus the dollar. The commercial bank spread is positively correlated with the peso-dollar exchange rate. That relationship is statistically reliable. For the exchange bureaus, a direct correlation is also observed, but the magnitude of that association is much smaller and does not meet the 5-percent significance criterion. Currency market quotes are, thus, seen to exercise more predictable effects on commercial bank spreads than what occurs at the kiosks.

Treasury yield differentials between Mexico and the United States lead to opposite reactions in the two spreads. At the banks, an increase in the gap between 90-day Treasury certificate rates of return leads to a decline in the sell-buy exchange rate difference. The converse occurs at the exchange houses, with currency spreads increasing when 3-month yields rise in Mexico relative to those on the north side of the border. The latter effect is more reliable than what it is for the banks, but also fails to satisfy the standard significance benchmark.

Most of the parameter estimates in Table 3 fail to surpass the standard 5-percent significance criterion. The magnitudes of the coefficients are, however, economically plausible. That is an important characteristic to consider, especially for a data sample where the dependent variables are fairly stationary, as shown in Figure 1 (McCloskey and Ziliak, 1996). If a larger sample size becomes available for follow-up research, it is likely that slope coefficient standard errors will be smaller. Even in cases of larger sample sizes and more attractive statistical diagnostic metrics, parameter sizes and economic plausibility should still be taken into account (Ziliak and McCloskey, 2004).

In spite of some low regression parameter computed t-statistics, the overall characteristics of the equations reported in Table 3 are fairly good. The pseudo R-squared statistics for both equations exceed 88 percent. Lagrange multiplier tests also indicate that the residuals for both equations are well behaved, exhibiting neither serial correlation nor heteroscedasticity.

It should be noted, however, that Chi-squared tests indicate that the residuals for both equations do not follow Gaussian distributions. In both cases, the residuals are leptokurtic. In other words, both sets of residuals are more fat-tailed than that of a normal distribution. That implies that sell-buy spreads in the Ciudad Juárez regional currency market may be subject to unexpectedly abrupt movements (Ibragimov et al., 2013). For a thinly traded market that possibility is certainly plausible. More studies with larger sample sizes are required to conclusively determine if that is true.
CONCLUSION

Historically, little research has been conducted for regional exchange rate spreads. This study employs data for a northern Mexico metropolitan economy located along the border with the United States. The data sample includes sell-buy spreads for both commercial banks and currency kiosks.

On average, both spreads in this sample are larger than those associated with major currency bilateral exchange rates for the dollar. That likely results from greater market liquidity and more efficiency in major currency markets than what exists in Ciudad Juarez where arbitrage pressures tend to be indirect and exchange transactions are mostly non-electronic. Econometric outcomes for the two spreads differ substantially with, kiosk spreads responding more to border commuting changes, and bank spreads reacting more noticeably to currency market fluctuations. For government yield differentials, the reactions are in opposite directions for the two types of businesses.

Whether those results are unique to the currency market in Ciudad Juarez is unknown at this point. Follow-up studies for other regions would be helpful. In Mexico, logical geographic candidates include Tijuana, Nogales, Nuevo Laredo, Reynosa, and Matamoros. The outcomes reported in this study indicate that regional peso-dollar sell-buy spreads follow non-random patterns that can be modeled using standard econometric methods. Whether this is unique to Ciudad Juarez remains to be determined.

REFERENCES


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The authors of this publication are UTEP Professor & Trade in the Americas Chair Tom Fullerton and UTEP Border Region Modeling Project Associate Director & Economist Steven Fullerton. Dr. Fullerton holds degrees from UTEP, Iowa State University, Wharton School of Finance at the University of Pennsylvania, and University of Florida. Prior experience includes positions as Economist in the Executive Office of the Governor of Idaho, International Economist in the Latin America Service of Wharton Econometrics, and Senior Economist at the Bureau of Economic and Business Research at the University of Florida. Steven Fullerton has published research on Major League Baseball, the National Football League, and housing price fluctuations in Las Cruces.

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Announce the Availability of

Basic Border Econometrics

The University of Texas at El Paso Border Region Modeling Project is pleased to announce Basic Border Econometrics, a publication from Universidad Autónoma de Ciudad Juárez. Editors of this new collection are Martha Patricia Barraza de Anda of the Department of Economics at Universidad Autónoma de Ciudad Juárez and Tom Fullerton of the Department of Economics & Finance at The University of Texas at El Paso.

Professor Barraza is an award winning economist who has taught at several universities in Mexico and has published in academic research journals in Mexico, Europe, and the United States. Dr. Barraza currently serves as Research Provost at UACJ. Professor Fullerton has authored econometric studies published in academic research journals of North America, Europe, South America, Asia, Africa, and Australia. Dr. Fullerton has delivered economics lectures in Canada, Colombia, Ecuador, Finland, Germany, Japan, Korea, Mexico, the United Kingdom, the United States, and Venezuela.

Border economics is a field in which many contradictory claims are often voiced, but careful empirical documentation is rarely attempted. Basic Border Econometrics is a unique collection of ten separate studies that empirically assess carefully assembled data and econometric evidence for a variety of different topics. Among the latter are peso fluctuations and cross-border retail impacts, border crime and boundary enforcement, educational attainment and border income performance, pre- and post-NAFTA retail patterns, self-employed Mexican-American earnings, maquiladora employment patterns, merchandise trade flows, and Texas border business cycles.

Contributors to the book include economic researchers from The University of Texas at El Paso, New Mexico State University, University of Texas Pan American, Texas A&M International University, El Colegio de la Frontera Norte, and the Federal Reserve Bank of Dallas. Their research interests cover a wide range of fields and provide multi-faceted angles from which to examine border economic trends and issues.

A limited number of Basic Border Econometrics can be purchased for $15 per copy. Please contact Professor Servando Pineda of Universidad Autónoma de Ciudad Juárez at spineda@uacj.mx to order copies of the book. Additional information for placing orders is also available from Professor Martha Patricia Barraza de Anda at mbarraza@uacj.mx.
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