



## ARE ONLINE PHARMACY PRICES REALLY LOWER IN MEXICO?

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### ABSTRACT

*Empirical research on international pharmaceutical prices has uncovered numerous interesting commonalities and differences across international markets. This study examines price differences for brand name medicines sold over the Internet in the United States and Mexico. Web sites in both countries advertise their services in English and price their products in dollars. Sample data for 50 top selling medicines are from October 2011 for equal dosages on a per unit basis, exclusive of shipping fees, handling charges, and taxes. For a few medicines, the savings available to consumers who purchase them from companies in Mexico are very large. For most medicines in the sample, the savings are comparable to those available from Internet sources in other countries. Non-parametric test results indicate that the price differences are statistically significant.*

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**Keywords:** Brand name medicines, Online pharmacies, Price differences, Applied economics

**JEL Category:** I11, Health Markets; M21, Business Economics; P52, Comparative Studies.

### 1. INTRODUCTION

In 2010, United States consumers spent close to \$274 billion on pharmaceutical and other medical products (Christopher *et al.*, 2011). Many consumers, understandably, search for savings when purchasing medicine. It is commonly believed that Internet prescription medications from Mexican pharmacies are less expensive than those sold at drug stores in the United States, but relatively little evidence documents the purported price differentials. The potential for consumer savings created by the price differences between countries is limited by United States legislation that restricts overseas online purchases to a maximum of 90-day supplies per customer for personal use (CBP, 2011). Mexican online pharmacies benefit by being able to sell medicines, subject to the 90-day supply limits, to consumers in the United States via mail orders.

This study compares online pharmacy prices for Mexico and the United States. The principal objective is to quantify whether Mexican online pharmacies truly offer lower prices to United States consumers. Recent research indicates that, contrary to popular opinion, not all medicine prices are lower in Mexico (Fullerton and Miranda, 2011). Given that, the formal null hypothesis tested is that the unit price of an online prescription drug purchased in Mexico is equal to the Internet unit price of the same medicine ordered in the United States. The data utilized for this test are prices for fifty brand name retail medicines. These prices were collected on 12 October 2011 from medsmex.com, pharmaciesherbal.com, and bajapharmacy.com in Mexico, and from familymeds.com and drugstore.com in the United States.

The second section of this paper contains a literature review. Data and methodology are discussed in the third section. The fourth section summarizes the empirical results. Concluding remarks and suggestions for further research are included in the fifth section.

## 2. LITERATURE REVIEW

Most of the research on cross-border sales of Mexican pharmaceuticals focuses on “brick-and-mortar” or “walk-in” pharmacies that cater to medical tourists. Survey evidence indicates that the primary reason for crossing the border to purchase medicine is customers’ perception that prices are lower in Mexico (de Guzman *et al.*, 2007; Byrd and Law, 2009). Given the important role of relative prices among the various factors influencing the decision to buy medications across the border, it is interesting to ask what percentage of cross-border pharmaceutical shoppers is insured. Calvillo and Lal (2003) find that 81 percent of United States residents purchasing medications at a pharmacy in the border town of Nuevo Progreso, Mexico, have health insurance. Similarly, Saatsoglou (2004) reports that 62 percent of United States residents who purchase drugs abroad have prescription drug coverage. Customers may opt to purchase medications in another country even when they have insurance if copayments or annual deductibles are high and international price differences are large.

Medicine price differences between the United States and other countries have received increasing attention in recent years. One branch of the literature on this subject attempts to quantify international price differences, while a second branch attempts to document why those differences exist. Addressing the latter question, Ridley (2005) argues that the prescription drug market meets the three conditions for differential pricing or price discrimination. First, sellers usually have some degree of market power derived from patents or copyrights. Second, some consumers are willing to pay more than others for the same product. Danzon and Furukawa (2003) note that pharmaceutical prices in developed countries closely correlate with income levels, which condition consumers’ ability and willingness to pay. Finally, differential pricing requires restrictions on arbitrage. Wagner and McCarthy (2004) note that international arbitrage in pharmaceutical markets is often limited by government-imposed licensing requirements.

While price discrimination may account for some portion of cross-country price differentials, government intervention in the price-setting process also plays a role. Some countries impose

stringent cost controls on drugs sold within their borders (APC, 2001). Kanavos and Vandoros (2011) find that differences in the extent of government intervention in the price-setting process are associated with variations in pharmaceutical prices across countries. In a study of seven developed nations, Danzon and Chao (2000) find that, while countries with stricter regulatory regimes often have lower prices for certain types of medicine, drug prices in those countries are also less likely to decline as a result of competition between pharmaceutical producers. Manning (1997) documents that differences in legal systems and product liability laws between the United States and Canada account for at least some of the observed medicine price differentials between those countries.

Another branch of the literature attempts to quantify medicine price differences between the United States and other countries. Quon *et al.* (2005) find that customers can save approximately 24 percent per unit by purchasing medications from Canadian Internet pharmacies compared to major online United States drug stores. Only three medications are found to be more expensive in Canada. Similar results reported by Fullerton and Miranda (2011) indicate that medicine purchases at “walk-in” pharmacies in Ciudad Juarez, Mexico also permit consumer savings. The latter effort also reports evidence that not all medicines are more expensive in El Paso pharmacies. The objective of this study is to contribute to this strand of the literature by quantifying online pharmacy price differentials between Mexico and the United States.

### 3. DATA AND METHODOLOGY

The sample is comprised by the top-selling name brand medicines in the United States in 2010, as listed by the website drugs.com. Of those medications with the largest sales, the ones that are available for both the United States and Mexico are included in the sample. Prior research on medicine price differences, particularly Quon *et al.* (2005), also employs brand name medicines that constitute large shares of the medicine market at particular points in time. The sample utilized in this effort follows that approach. Each medication included in the sample had annual sales volumes of \$474 million or more in 2010 and the 50 medicines in the sample collectively account for a large share of the pharmaceutical market in the United States.

Generic medications are excluded from this study. Danzon and Furukawa (2003) indicate that generic medications have lower prices in the United States than in Chile, France, Germany, Italy, Japan, Mexico, and the United Kingdom. Generic drug sales represent only 27 percent of total medicine sales in United States (IMS, 2012). Because of this, the exclusion of these medications should not affect the accuracy of the results obtained using online pharmacy prices for brand name pharmaceuticals.

Price data collected are Internet pharmacy quotes for the United States and Mexico. In selecting sources of online drug prices it is important to consider the reputability of each site. Rabinovitch (2005) contends that, while many online cross-border pharmacies are legitimate, “rogue” online pharmacies also exist and the products marketed through such sites are more likely to be sub-standard or even hazardous to consumer health. Online sources of drug prices are therefore evaluated to screen out potential rogue pharmacies, such as those that primarily market

recreational and lifestyle drugs. The pricing information is retrieved from two online pharmacies with headquarters in the United States (drugstore.com and familymeds.com) and three online pharmacies with headquarters located in Mexico (bajapharmacy.com, pharmaciesherbal.com, and medsmex.com).

The drugstore.com site lists most of the medicines in the sample. The only exceptions are: Lantus SoloSTAR, Seroquel XR, Premarin and Ventolin HFA. Prices for these medicines are retrieved from familymeds.com to complete the sample. In Mexico, the online pharmacy site bajapharmacy.com is employed because it also advertises most of the medicines. The webpage for that site is in English and its prices are quoted in United States dollars. Prices for several medicines must be obtained from medsmex.com or pharmaciesherbal.com: Spiriva, Lantus, Diovan HCT, Viagra, Atripla, Lantus SoloSTAR, Nasonex, Truvada, Niaspan, Cialis, Namenda, Symbicort, Detrol LA, Benicar, Gleevec, Synthroid, Xalatan, Premarin, Ventolin HFA, Restasis and Femara. Both medsmex.com and pharmaciesherbal.com also list the names of drugs in English and display prices in United States dollars.

Prices for all medicines in the sample are collected for 12 October 2011. The online prices collected are those seen by the consumer. Shipping fees are excluded because of the minimal effect that these fees typically contribute to total purchase prices (Quon *et al.*, 2005). The prices utilized also exclude taxes, since most states in the United States do not levy sales taxes on medications or Internet sales, while in Mexico the sale of medicines is tax exempt. The number of pills per package generally varies between the United States and Mexico for each product. The price comparison is carried out by obtaining the unit price of the medicines as listed for the consumer. Unit prices are calculated by dividing the total price of a package by the number of units contained. Statistical moments are then calculated for the prices and price differences. Skewness and kurtosis estimates are used for normality testing (Bera and Jarque, 1981). Dosage strengths are kept the same for each unit price pair.

The formal null hypothesis shown in Equation (1) is that the difference between the unit online prices of the medicines in United States and Mexico is equal to zero. The alternative hypothesis is that the difference between online unit prices of medicines charged in the United States and Mexico is different from zero. Although incomes are higher in the United States, recent research conducted using prices for prescription medications sold in brick and mortar pharmacies shows that prices are sometimes higher in Mexico (Fullerton and Miranda, 2011).

$$H_0: P_{USA} - P_{MEX} = 0 \quad \text{vs.} \quad H_A: P_{USA} - P_{MEX} \neq 0 \quad (1)$$

In order to formally test the null hypothesis, both parametric and non-parametric statistical tests are utilized. The t-test assumes a normal distribution. With only 50 observations in the sample, that may not be a safe assumption. Cross-border price data have been previously shown to not follow normal distributions due in part to kurtosis resulting from heavy histogram tails (Fullerton and Coronado, 2001). Given that, a signed ranks test that makes no assumptions regarding the distribution of the data is also employed (Wilcoxon, 1945).

#### 4. EMPIRICAL RESULTS

Summary statistics for the data are shown in Table 1. The average unit price for medicines sold online in the United States is \$23.48 while it is \$18.62 for those sold in Mexico. As in prior studies (Quon *et al.*, 2005; Fullerton and Miranda, 2011), not all of the United States prices exceed their international counterparts. Forty of the fifty medications included in the sample, however, are less expensive when purchased from the online pharmacies located south of the border. Possible explanations of why these medicines are less expensive in Mexico include differences in income levels, regulatory controls, and product liability risks (Manning, 1997; Ridley, 2005; Kanavos and Vandonos, 2011). The limited opportunities for pharmaceutical trade between Mexico and the United States, along with potential risks of product losses or damages associated with cross-border medicine purchases, may contribute to maintaining price differentials between the two countries.

Because the Mexican Internet pharmacy sites are published in English and prices are quoted in dollars, these pharmacies are likely oriented towards the United States market. It is possible that pharmaceutical prices offered to Mexican consumers are lower than those advertised on Mexican Internet sites. However, Fullerton and Miranda (2011) find that not all brand name drugs available at walk-in pharmacies in Mexico are priced lower than counterpart products sold in the United States. In fact the price differentials reported in that study are broadly similar to those shown in Table 1. Pharmaceutical companies may be hesitant to sell medications at lower prices to residents of Mexico due to concerns that these medicines could be imported to the United States and undercut prevailing prices in that market (Danzon and Furukawa, 2003).

Chart 1 presents the unit price data from Table 1 in graphical form. Each of the 50 medicines in the sample is represented by a dot that lies at the intersection of the United States unit price, corresponding to the horizontal axis, and the Mexican unit price, corresponding to the vertical axis. Because the dollar values of medicines included in the sample span a large range, the axes are logarithmically scaled. The 45° line emanating from the origin represents equality between USA and Mexican unit prices. Dots to the northwest of this line represent medications that are more expensive in Mexico while those located to the southeast of the line represent drugs that are more expensive in the United States. Although many of the prices are clustered fairly closely to the 45° line, it is easy to see that most medications are more expensive when purchased from north of the border internet pharmacies.

Although a majority of the Mexico online prices in Table 1 are lower than the corresponding prices from north of the border, it is not clear whether those differences are statistically significant. The price differences are first examined using a standard parametric t-test. The null hypothesis for this test is that the differences in the unit prices of medicines from both countries are equal to zero. Although the unit prices of medicines from online pharmacies in Mexico are lower than those from the United States, the difference is statistically insignificant at the 5-percent level. As noted in Table 2, the calculated t-value is 0.53, which is less than the critical t-value of 2.01.

However, the t-test assumes data normality and previous research indicates that cross-border price data frequently fail to satisfy this assumption (Fullerton and Coronado, 2001). Given that,

the Jarque-Bera test is performed in order to examine whether the normality assumption is satisfied (Bera and Jarque, 1981). As shown in Column 9 of Table 1, the null hypothesis of normality for the medicine price differences is rejected at the 1-percent level of significance (Table 1). On the basis of this result, it appears that the sample data for the price differences do not follow a normal distribution and an alternative test should be employed.

Because the normality assumption is not satisfied, a non-parametric test is also utilized. A signed rank test (Wilcoxon, 1945) is used to test the null hypothesis that the differences in the unit prices of medicines in both countries are equal to zero. The Wilcoxon is approximately standard normal for samples with more than 25 observations. The test result reported in Table 2 shows that the calculated Wilcoxon T-score is 4.47, which is greater than the critical t-value of 2.01. Accordingly, the null hypothesis of price equality is rejected at a 5-percent level of significance. The evidence provided by this alternative test indicates that differences in online medicine prices between Mexico and the United States are, in fact, statistically significant.

Ten of the medications carry negative signs for the United States-Mexico price differentials. Similar to what has been reported for walk-in pharmacies (Fullerton and Miranda, 2011), this means that some prescription drugs are less expensive in the United States than in Mexico. These medicines are mostly clustered among the treatments for depression and diabetes. A possible reason why there are higher prices for diabetes medications in Mexico may be greater demand. Mexico has a higher rate of deaths by diabetes than the United States (Alwan, 2011). Other factors may also influence this differential, including costs of production and price competition (Mujumdar and Pal, 2005).

Not all the medicines that exhibit Internet price differences offer consequential monthly savings to consumers. In order to calculate the monthly savings per medicine, the recommended daily dosages are employed. The recommended daily doses are retrieved from the online prescription information for each brand name medication. The number of daily units multiplied by the unit price equals the daily cost per medicine. This value multiplied by 30 days provides the monthly expenditure for the medication in each country. The differences between the monthly expenses in Mexico and those in the United States are the monthly savings associated with buying the medicines from the websites in either country (Table 1).

The medicines that generate the largest savings for consumers willing to buy them online are Gleevec, Atripla, and Truvada. Gleevec (Imatinib) is manufactured by Novartis Corporation and used in the treatment of certain types of cancer. Atripla (Emtricitabine/ Tenofovir/ Efavirenz) is manufactured by Gilead Sciences Inc. and used for the treatment of human immunodeficiency virus (HIV). Truvada (Tenofovir/ Emtricitabine) is also manufactured by Gilead Sciences Inc. and used in the treatment of HIV. Online purchases of these medicines result in savings of greater than \$500 dollars per month when they are bought over the Internet from Mexico (Table 1).

The average monthly savings for online purchases from Mexico is \$131.73, while the sample standard deviation is \$308.11. Only Gleevec, Atripla, and Truvada are more than one standard deviation above the mean for nominal savings. None of the monthly savings in the sample are

more than one standard deviation below the mean (-\$176.38). The average monthly savings available from brick and mortar pharmacies in Ciudad Juarez is \$24.27 [Fullerton and Miranda \(2011\)](#).

The large savings gap is partly due to sample divergences between the two studies. If the comparison is limited to medicines that appear in both samples, then the average monthly savings for purchases at brick and mortar pharmacies in Ciudad Juarez is \$24.61, whereas for Mexican online pharmacies it is \$22.68. This result points to remarkable price similarities among these alternative means for acquiring prescription drugs from Mexico. The relatively low monthly savings based on prices alone also implies that much of the savings available to consumers may relate to avoiding doctor appointments when purchasing pharmacy products in Mexico. The savings can become proportionately larger, however, in cases where patients purchase more than one medicine.

Consumers make choices on health expenditures that involve several costs. The price of medications is one of these costs. Another important item is the cost of obtaining the prescription, i.e., the price of doctor appointments and visits. In general, doctor appointments are less expensive in Mexico than in the United States. [Arredondo et al. \(1999\)](#), find that the cost of outpatient doctor appointments in Mexico are \$7.90 on average, which, adjusted for exchange rate fluctuations, was \$10.33 in December 2010. That figure corresponds to a 130 peso per visit charge and approximately matches the fees quoted over the telephone by several doctor's offices in Ciudad Juarez during the first quarter of 2012. By comparison, the Medicare fee schedule indicates that the 2010 price for doctor appointments in the United States is approximately \$109.86. The sizeable bi-national gap in the cost of doctor appointments is similar in magnitude to the gap between per capita total health expenditures in Mexico and the U.S. ([WHO, 2012](#)).

Most of the medicines in the sample do not, however, require written prescriptions when purchased in Mexico. Sales of Levaquin in Mexico now require prescriptions as a consequence of the 25 August 2010 antibiotics law. This law stipulates that the sale of antibiotics requires written prescriptions from doctors who hold medical licenses (Cédula Profesional) in Mexico ([Sánchez, 2010](#)). Internet sales of antibiotics are also covered by this regulation. Given the price of doctor appointments in the United States, the fact that Mexico does not require prescriptions for most medicines provides a fairly attractive incentive to north-of-the border consumers to consider making international online purchases. Depending on how often doctor visits may be required, the savings provided by avoiding office appointment fees can be substantial for some patients.

Although FDA regulations specify that drugs imported to the United States should be used under medical supervision, proof of such supervision is rarely required in practice ([Rabinovitch, 2005](#); [FDA, 2010](#)). Aside from issues regarding legality, sales of drugs without medical consultations or prescriptions raise questions of consumer safety ([Vargas Hernández, 2006](#)). While less stringent pharmaceutical purchase regulations in Mexico may reduce consumer costs in some cases, it may also lead to mistaken usage of self-prescribed medication and ultimately impose substantial long-term costs. It should not, however, be assumed that most United States residents

who purchase medications in Mexico do so with the aim of evading appropriate medical evaluation. According to Calvillo and Lal (2003), 59 percent of United States residents who cross the border to purchase medicines at walk-in pharmacies in Mexico report being advised to take the medicine by a physician.

Material in Table 1 indicates that online prices for many medicines are less expensive in Mexico. Table 3 presents additional evidence regarding the relationship between the online unit prices of medicine in the United States and Mexico. The correlation coefficient for both sets of prices is 0.843, indicating that there is a strong relationship between the online prices in each country for these medicines. Given that, an interesting question is whether the prices in one country can serve as reliable explanatory variables for those in the second country.

The United States is the target market for online prescription medicines included in this sample. Accordingly, the Internet pharmacy prices from Mexico are regressed upon their counterparts from north of the border. The specification for this arrangement in which the direction of causality is assumed to be from north to south is shown in Equation (2). In (2),  $P_{\text{MEX}i}$  is the Mexico unit price for medicine  $i$ ,  $P_{\text{USA}i}$  is the United States unit price for medicine  $i$ , and  $u_i$  is a stochastic disturbance.

$$P_{\text{MEX}i} = b_0 + b_1 * P_{\text{USA}i} + u_i \quad (2)$$

If the unit product prices from the United States provide unbiased estimates of the Mexico web site prices, then the intercept in (2) will be equal to zero and the slope coefficient will be equal to one. The formal null hypotheses for bias are shown in Equation (3). Parameter estimation results and computed test statistics for Equations (2) and (3) are shown in Table 3.

$$H_0: b_0 = 0, b_1 = 1 \quad \text{vs.} \quad H_A: b_0 \neq 0, b_1 \neq 1, \quad (3)$$

In Table 3, the intercept term is -5.599. With a standard deviation of 4.414, it is not statistically different from zero. Given that, it is not possible to reject the null hypothesis that the constant term is equal to zero. The estimated slope coefficient is 1.031. The computed t-statistic for the hypothesis that the slope coefficient is equal to one is -0.331. Consequently, it is not possible to reject the hypothesis that  $b_1$  is equal to one. These results indicate that the intercept and slope coefficients are statistically indistinguishable from 0 and 1, respectively. That implies that the online unit price of medicine in the United States can serve as a reliable predictor of the Internet unit price of medicine in Mexico.

## 5. CONCLUSION

Conventional wisdom indicates that brand name prescription medicine prices are lower at online Mexican pharmacies than at United States Internet drug stores. Data collected for this study corroborate that belief, at least to a large extent. Consumers will save an average of \$131.73 dollars per month when buying from online pharmacies south of the Rio Grande. The savings are even larger when the cross-border differences in the fees charged for doctor's appointments are

taken into account. However, not all medicines are more affordable in Mexico. Pharmaceuticals designed to treat diabetes tend to be less expensive in the United States. In all, ten of the fifty prescription drugs included in the sample are less expensive when purchased in the U.S.

Data in this study indicate that online medicine prices in Mexico are higher than those charged by brick and mortar pharmacies located in Mexico. That may be due to the fact that transportation costs and time spent waiting to re-enter the United States make the effective delivery prices for walk-in pharmacies noticeably higher than the shelf prices for the products in question. Reduced medical tourism from the United States in response to security concerns in northern Mexico potentially contributes to this pricing pattern, also.

Linear regression results reported above indicate that the Internet prices listed in the United States provide unbiased estimates of the online pharmacy prices charged in Mexico. Because the sample utilized is cross-sectional and includes data only for October 2011, it is not possible to examine how that relationship varies over time. A natural extension of this initial study would be to collect these data over time to permit analyzing the dynamic properties associated with online pharmacy prices in these two countries.

## **6. ACKNOWLEDGEMENTS**

Financial support for this research was provided by El Paso Water Utilities, Hunt Companies of El Paso, Hunt Communities, Texas Department of Transportation, JPMorgan Chase Bank of El Paso, a UTEP College of Business Administration Faculty Research Grant, and the James Foundation Scholarship Fund. Helpful comments and suggestions were provided by Nathan Ashby and Tony Payan. Econometric research assistance was provided by Carlos Morales.

**Table-1.** Brand name medication prices for online pharmacies in the United States and Mexico.

Name	Dosage*	USA Price	# of units	USA Unit Price	MX Price	# of units	MX Unit Price	Diff. UUS-UMX**	Units per day	Monthly Cost USA	Cost per Month MX	Savings per Month **
<b>Abilify</b>	10 mg.	\$546.98	30	\$18.23	\$118.95	10	\$11.90	\$6.34	1.00	\$546.98	\$356.85	\$190.13
<b>Aciphex</b>	20 mg.	\$233.99	30	\$7.80	\$147.22	28	\$5.26	\$2.54	1.00	\$233.99	\$157.74	\$76.25
<b>Actos</b>	30 mg.	\$278.99	30	\$9.30	\$134.31	14	\$9.59	-\$0.29	1.00	\$278.99	\$287.81	-\$8.82
<b>Advair Diskus</b>	100/50 mg.	\$189.99	60	\$3.17	\$101.53	60	\$1.69	\$1.47	2.00	\$189.99	\$101.53	\$88.46
<b>Aricept</b>	10 mg.	\$304.91	30	\$10.16	\$176.68	28	\$6.31	\$3.85	1.00	\$304.91	\$189.30	\$115.61
<b>Atripla</b>	600/200/300 mg.	\$1,878.96	30	\$62.63	\$487.50	30	\$16.25	\$46.38	1.00	\$1,878.96	\$487.50	\$1,391.46
<b>Benicar</b>	4 mg.	\$125.49	30	\$4.18	\$90.00	30	\$3.00	\$1.18	1.00	\$125.49	\$90.00	\$35.49
<b>Boniva</b>	150 mg.	\$128.99	1	\$128.99	\$121.20	1	\$121.20	\$7.79	0.03	\$116.09	\$109.08	\$7.01
<b>Celebrex</b>	200 mg.	\$140.99	30	\$4.70	\$76.52	30	\$2.55	\$2.15	1.00	\$140.99	\$76.52	\$64.47
<b>Cialis</b>	20 mg.	\$209.99	10	\$21.00	\$104.90	4	\$26.23	-\$5.23	1.00	\$629.97	\$786.75	-\$156.78
<b>Crestor</b>	10 mg.	\$154.99	30	\$5.17	\$79.56	30	\$2.65	\$2.51	1.00	\$154.99	\$79.56	\$75.43
<b>Cymbalta</b>	60 mg.	\$170.99	30	\$5.70	\$171.77	28	\$6.13	-\$0.43	1.50	\$256.49	\$276.06	-\$19.57
<b>Detrol LA</b>	4 mg.	\$168.99	30	\$5.63	\$72.00	30	\$2.40	\$3.23	1.00	\$168.99	\$72.00	\$96.99
<b>Diovan</b>	80 mg.	\$95.99	30	\$3.20	\$79.47	30	\$2.65	\$0.55	1.00	\$95.99	\$79.47	\$16.52
<b>Diovan HCT</b>	160/25 mg.	\$126.99	30	\$4.23	\$171.36	28	\$6.12	-\$1.89	1.00	\$126.99	\$183.60	-\$56.61

Name	Dosage*	USA Price	# of units	USA Unit Price	MX Price	# of units	MX Unit Price	Diff. UUS-UMX**	Units per day	Monthly Cost USA	Cost per Month MX	Savings per Month **
<b>Effexor XR</b>	37.5 mg.	\$136.99	30	\$4.57	\$100.30	20	\$5.02	-\$0.45	2.50	\$342.48	\$376.13	-\$33.65
<b>Femara</b>	2.5 mg.	\$516.96	30	\$17.23	\$174.00	30	\$5.80	\$11.43	1.00	\$516.96	\$174.00	\$342.96
<b>Flomax</b>	0.4 mg.	\$153.99	30	\$5.13	\$95.32	20	\$4.77	\$0.37	1.00	\$153.99	\$142.98	\$11.01
<b>Geodon Oral</b>	40 mg.	\$520.97	60	\$8.68	\$193.02	28	\$6.89	\$1.79	2.00	\$520.97	\$413.61	\$107.36
<b>Gleevec</b>	500 mg.	\$1,506.03	30	\$50.20	\$450.00	30	\$15.00	\$35.20	1.50	\$2,259.05	\$675.00	\$1,584.05
<b>Januvia</b>	100 mg.	\$216.00	30	\$7.20	\$111.45	28	\$3.98	\$3.22	1.00	\$216.00	\$119.41	\$96.59
<b>Lantus</b>	0.1 ml.	\$331.98	3	\$110.66	\$325.00	3	\$108.33	\$2.33	0.01	\$33.20	\$32.50	\$0.70
<b>Lantus SoloSTAR</b>	0.1 ml.	\$196.17	1	\$196.17	\$325.00	1	\$325.00	-\$128.83	0.03	\$176.55	\$292.50	-\$115.95
<b>Levaquin</b>	250 mg.	\$484.97	30	\$16.17	\$69.58	30	\$2.32	\$13.85	1.00	\$484.97	\$69.58	\$415.39
<b>Lexapro</b>	10 mg.	\$118.99	30	\$3.97	\$139.86	28	\$5.00	-\$1.03	1.00	\$118.99	\$149.85	-\$30.86
<b>Lipitor</b>	20 mg.	\$159.99	30	\$5.33	\$219.39	30	\$7.31	-\$1.98	1.00	\$159.99	\$219.39	-\$59.40
<b>Lyrica</b>	150 mg.	\$94.99	30	\$3.17	\$95.04	28	\$3.39	-\$0.23	2.50	\$237.48	\$254.57	-\$17.10
<b>Namenda</b>	10 mg.	\$223.00	60	\$3.72	\$61.50	30	\$2.05	\$1.67	1.50	\$167.25	\$92.25	\$75.00
<b>Nasonex</b>	50 mcg.	\$130.99	1	\$130.99	\$26.99	1	\$26.99	\$104.00	0.02	\$62.88	\$12.96	\$49.92
<b>Nexium</b>	20 mg.	\$200.99	30	\$6.70	\$51.76	14	\$3.70	\$3.00	1.00	\$200.99	\$110.91	\$90.08
<b>Niaspan</b>	500 mg.	\$89.99	30	\$3.00	\$27.60	30	\$0.92	\$2.08	2.50	\$224.98	\$69.00	\$155.98

Name	Dosage*	USA Price	# of units	USA Unit Price	MX Price	# of units	MX Unit Price	Diff. UUS-UMX**	Units per day	Monthly Cost USA	Cost per Month MX	Savings per Month **
<b>Plavix</b>	75 mg.	\$195.99	30	\$6.53	\$122.04	28	\$4.36	\$2.17	1.00	\$195.99	\$130.76	\$65.23
<b>Premarin</b>	0.625 mg.	\$65.10	30	\$2.17	\$50.48	28	\$1.80	\$0.37	0.60	\$39.06	\$32.45	\$6.61
<b>Protonix</b>	40 mg.	\$190.00	30	\$6.33	\$30.79	14	\$2.20	\$4.13	1.50	\$285.00	\$98.97	\$186.03
<b>Restasis</b>	0.2 ml.	\$146.62	30	\$4.89	\$150.83	30	\$5.03	-\$0.14	2.00	\$293.24	\$301.66	-\$8.42
<b>Seroquel</b>	100 mg.	\$364.98	60	\$6.08	\$109.35	30	\$3.65	\$2.44	1.50	\$273.74	\$164.03	\$109.71
<b>Seroquel XR</b>	300 mg.	\$410.40	30	\$13.68	\$206.00	30	\$6.87	\$6.81	1.50	\$615.60	\$309.00	\$306.60
<b>Singulair</b>	10 mg.	\$160.99	30	\$5.37	\$93.92	20	\$4.70	\$0.67	1.00	\$160.99	\$140.88	\$20.11
<b>Spiriva</b>	18 mg.	\$245.98	30	\$8.20	\$60.76	20	\$3.04	\$5.16	1.00	\$245.98	\$91.14	\$154.84
<b>Strattera</b>	10 mg.	\$190.00	30	\$6.33	\$78.48	14	\$5.61	\$0.73	1.00	\$190.00	\$168.17	\$21.83
<b>Symbicort</b>	160/4.5 mg.	\$229.99	120	\$1.92	\$68.80	60	\$1.15	\$0.77	4.00	\$229.99	\$137.60	\$92.39
<b>Synthroid</b>	150 mg.	\$33.99	30	\$1.13	\$45.39	50	\$0.91	\$0.23	1.00	\$33.99	\$27.23	\$6.76
<b>Truvada</b>	200/300 mg.	\$1,085.04	30	\$36.17	\$495.00	30	\$16.50	\$19.67	1.00	\$1,085.04	\$495.00	\$590.04
<b>Valtrex</b>	500 mg.	\$235.98	30	\$7.87	\$265.00	42	\$6.31	\$1.56	3.00	\$707.94	\$567.86	\$140.08
<b>Ventolin HFA</b>	90 mcg.	\$45.99	1	\$45.99	\$37.43	1	\$37.43	\$8.56	0.03	\$41.39	\$33.69	\$7.70
<b>Viagra</b>	50 mg.	\$193.99	10	\$19.40	\$75.00	4	\$18.75	\$0.65	1.00	\$581.97	\$562.50	\$19.47
<b>Vytorin</b>	10/20 mg.	\$134.99	30	\$4.50	\$51.18	14	\$3.66	\$0.84	1.00	\$134.99	\$109.67	\$25.32

Name	Dosage*	USA Price	# of units	USA Unit Price	MX Price	# of units	MX Unit Price	Diff. UUS-UMX**	Units per day	Monthly Cost USA	Cost per Month MX	Savings per Month **
<b>Xalatan</b>	2.5 ml.	\$104.99	1	\$104.99	\$39.99	1	\$39.99	\$65.00	0.02	\$69.29	\$26.39	\$42.90
<b>Zetia</b>	10 mg.	\$139.99	30	\$4.67	\$88.30	20	\$4.42	\$0.25	1.00	\$139.99	\$132.45	\$7.54
<b>Zyprexa</b>	10 mg.	\$624.01	30	\$20.80	\$98.12	7	\$14.02	\$6.78	1.00	\$624.01	\$420.51	\$203.50
<b>Mean</b>		\$292.79		\$23.48	\$135.31		\$18.62	\$4.86		\$341.49	\$209.77	\$131.73
<b>SD</b>		\$338.88		\$40.32	\$109.65		\$49.27	\$26.46		\$415.39	\$179.94	\$308.11
<b>Skewness</b>		3.30		2.72	1.99		5.25	-1.22		3.25	1.43	3.71
<b>Kurtosis</b>		11.82		7.33	3.84		30.60	16.39		11.94	1.59	14.83
<b>JB Statistic</b>		317.34 ***		146.18 ***	54.44 ***		1793.10 ***	460.46 ***		319.49	19.55	474.36

**Notes:**

All data are from the week of 10-14 October 2011 and all medicine dosages are equal for both countries.

Lantus and Lantus SoloSTAR assume a requirement of 3 units/ml per day.

Nasonex contains 120 sprays per bottle (50 mcg/act), with a suggested application of 2 sprays daily.

Restasis contains 2 drops per ampule (0.05%4ml), with a suggested application of 4 drops daily.

Ventolin HFA contains 200 puffs per inhaler (108-90mcg), with a suggested application of 6 puffs daily.

Xalatan contains 45 drops per bottle (2.5ml), with a suggested application of 1 drop daily.

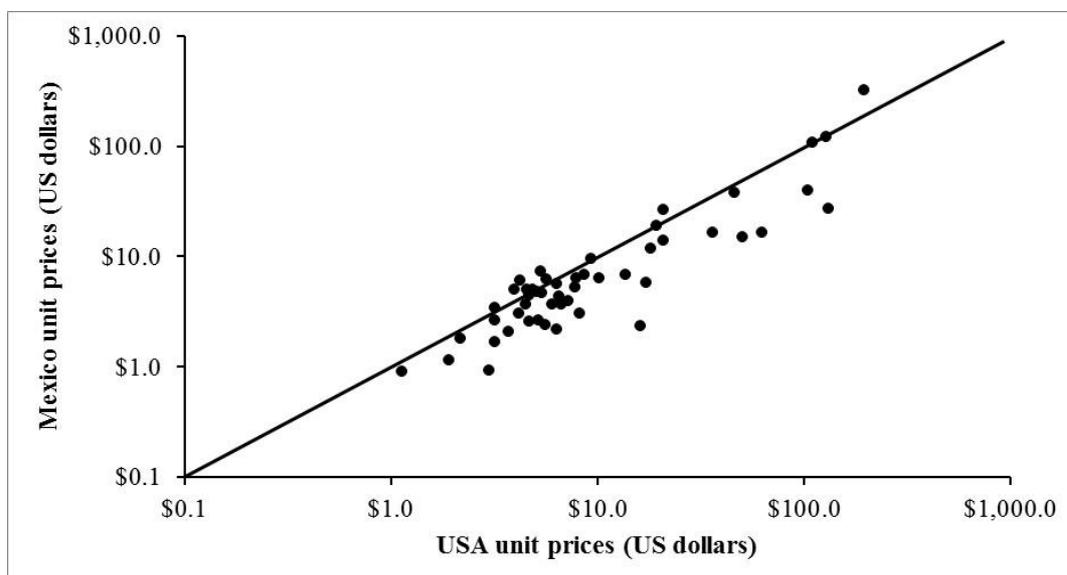
Data are from bajapharmacy.com, drugstore.com, familymeds.com, medsmex.com and pharmaciesherbal.com.

\* If brand name medicines contain ingredients of multiple generic medicines, the dosages of those medicines are separated by slashes.

\*\* Negative numbers indicate savings result from purchases at United States online pharmacies.

\*\*\* Significant at 1-percent level.

**Chart 1.** Comparison of Pharmaceutical Prices in the USA and Mexico



**Table-2.** Parametric and Non-parametric Tests for Unit Price Equality.

Computed Test Statistic	1-Percent Critical Value (Decision)
t-hat = 0.535	2.678 (Fail to reject null hypothesis of unit price equality.)
Wilcoxon T-score = 4.474	2.678 (Reject the null hypothesis of unit price equality.)

**Table-3.** United States and Mexico Online Pharmacy Price Regression Results.

Regression Test for Predictive Bias: Ho:  $b_0 = 0.0$ ,  $b_1 = 1.0$

Dependent Variable:  $P_{MEXi}$  (Mexico Unit Price)

Method: Least Squares

Sample: 1 50

Included observations: 50

Independent Variable	Coefficient	Std. Error	t-Statistic	Probability
Constant	-5.598827	4.414058	-1.268408	0.2108
$P_{USAi}$ (USA Unit Price)	1.031296	0.094604	10.90124	0.0000
R-squared	0.712294	Mean dependent variable		18.61600
Adjusted R-squared	0.706300	Std. deviation dep. variable		49.76926
Standard error regrsn.	26.97199	Log likelihood		-234.6663
Sum squared residuals	34919.45	F-statistic		118.8370

Notes:

1.  $\text{Rho}(P_{MEXi}, P_{USAi}) = 0.843$
2. For  $H_0: b_0 = 0.0$ ,  $H_A: b_0 \neq 0.0$ , t-hat = 1.268 < t-critical= 2.010, fail to reject  $H_0$  at 5-percent level.
3. For  $H_0: b_1 = 1.0$ ,  $H_A: b_1 \neq 1.0$ , t-hat = 0.331 < t-critical= 2.010, fail to reject  $H_0$  at 5-percent level.
4. Parameter estimates and test results indicate that USA unit prices are unbiased predictors of Mexico prices.

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