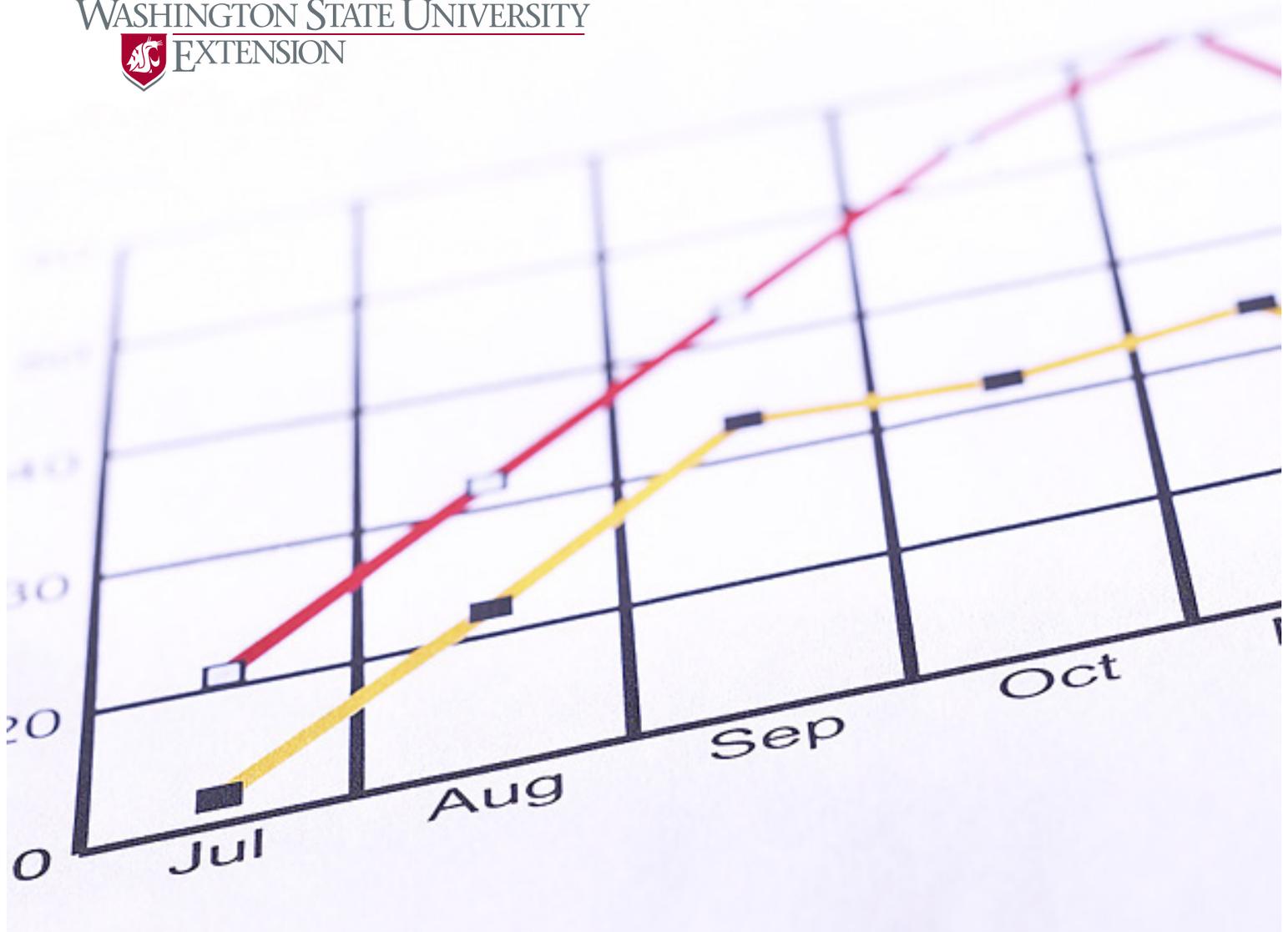


A Primer on Exchange Rates and Exporting

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A Primer on Exchange Rates and Exporting

By
Andrew J. Cassey and Pavan Dhanireddy

Abstract

Opportunities to begin exporting or to expand export operations depend on a number of factors but one of the most important is the exchange rate. Individual business owners can do nothing to affect the exchange rate, but they can leverage their export opportunities using knowledge of exchange rate movements. This short primer, intended primarily for small business owners and owners new to exporting, will 1) describe the theoretical relationship between exchange rates and exports, 2) describe and interpret the exchange rate data, and 3) examine trends in exchange rates for the U.S. dollar going back to 1990. This combination of theory and data will reveal the reasons why exchange rates are important, and how understanding them will allow for improved international business decisions.

Acknowledgements

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Introduction

One of the most daunting challenges for potential exporters in Washington state is to understand how the exchange rate between American and foreign currency can affect exports. This manual identifies and discusses important features of these exchange rates to better educate small- and medium-sized business owners and owners new to the exporting business. These features include: 1) the theoretical relationship between exchange rates and exports,

2) the correct understanding of exchange rate data, and 3) exchange rate data for American and foreign export currencies since 1990.

No individual firm can control the exchange rate or its fluctuations over time, so firms must make their export decisions given the current exchange rate and expectations of future exchange rates. Thus understanding how exchange rates work, and how to correctly interpret exchange rate data are key to a successful export decision.

The Relationship between Exchange Rates and Exporting

Two Markets, Not Just One

When a business sells domestically, there is a single transaction. A good or service is exchanged for currency at an agreed upon price. But when a business sells internationally, there are two transactions. In the first transaction, a foreign buyer pays for the good or service at the agreed upon price *in foreign currency*. This transaction takes place within the theoretical *foreign goods market*. In the second transaction, the foreign currency is traded or exchanged for U.S. dollars at the agreed upon price. This second transaction takes place within the theoretical *exchange rate market*, and the agreed upon price is called the *exchange rate*. Because there are two transactions for every international sale, the complexity and uncertainty of these sales are greater than for domestic sales. The revenue received by an exporter, in particular, can be affected by changes in two markets, rather than just one.

The market for goods and services is where a good or service is traded for currency, and this market exists for domestic as well as foreign sales. Consider what this market looks like from the perspective of a buyer. The buyer is located in a particular country, say Mexico. The Mexican buyer looks at the options available in a market made up of both domestic (Mexican) sellers and foreign (United States) sellers.

In Figure 1, the *quantity* of the good being sold (in units) is shown on the horizontal axis, and the *price* of the quantity of good being sold is shown on the

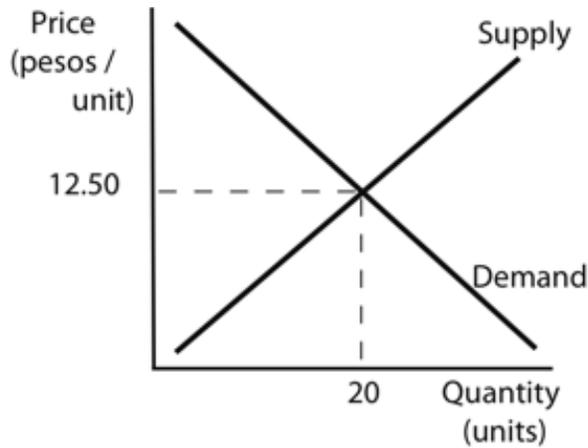


Figure 1. Market for goods and services in the foreign country. Twenty units of goods and services (horizontal axis) are being bought and sold at a price (vertical axis) of 12.5 pesos per unit.

vertical axis. Because Figure 1 illustrates the market for goods in Mexico, the price per unit of goods is shown in Mexican pesos.

Figure 1 also shows the upward sloping supply curve and the downward sloping demand curve for the Mexican goods market. The intersection of these two slopes is the equilibrium point. This point is the quantity of the good that is traded and the price per unit of the trade. In this figure, 20 units of the good are bought and sold at a price of 12.5 Mexican pesos per unit. Note that the location of the seller is unimportant, since the buyer will purchase the goods using pesos whether or not the seller is in Mexico or in the United States. Now consider the foreign exchange market (Figure 2). Suppose the Mexican buyer purchases the good or service from a U.S. seller. The Mexican pesos used in the first purchasing

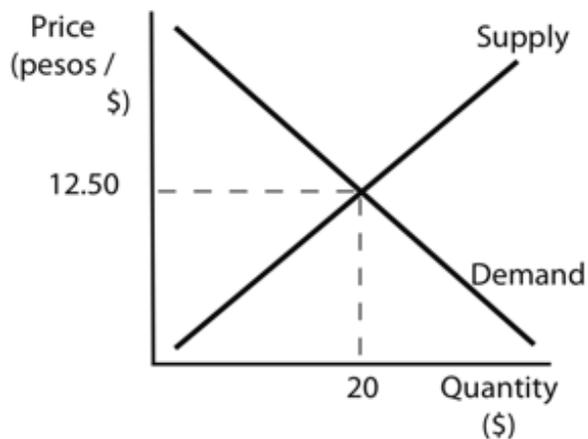


Figure 2. Foreign exchange market. Dollars (horizontal axis) are being bought and sold at a price (vertical axis) of 12.5 pesos per dollar.

transaction must then be used to buy U.S. dollars in the second transaction.

The horizontal axis in Figure 2 shows the amount of the good being purchased, and the vertical axis shows the price of the good being purchased. In this example, pesos are being used to purchase dollars, so the quantity or number of dollars is shown on the horizontal axis, and the price (in pesos) per dollar is shown on the vertical axis. The foreign exchange market functions the same way the market for goods and services does. There is an upward sloping supply curve of dollars with various prices (in pesos) per dollar, and there is a downward sloping demand curve of dollars with various prices (in pesos) per dollar. The intersecting point of these two slopes is the equilibrium point, and this point indicates the number of dollars traded and the price (in pesos) for each dollar. To see that the foreign exchange market functions in the same way the market for goods and services does, notice that the equilibrium point is the same in Figure 1 and Figure 2. In Figure 2 then, a total of 20 dollars is being sold at a price or rate of 12.5 pesos per dollar.

Why Foreign Exchange Prices Change

Changes in price and quantity affect market volatility but so do other changing factors, such as nationwide income levels, population sizes and preferences, costs of overall production, technology used in overall production as well as factors like droughts, floods, and other natural disasters. When one or more of these factors changes, the market responds by setting a new point of equilibrium. Any factors that change the demand for a country's currency (other than the exchange rate itself) will shift the demand curve and create a new point of equilibrium. Conversely, any factors that change the supply of currency will shift the supply curve and create a new point of equilibrium as well.

Both Figure 1 and Figure 3 show the same market for goods and services in Mexico, but the market in Figure 3 has responded to a change, (e.g., a change in preferences or an increase in buyers' incomes), with an outward shift of the demand curve. This shift results in a new point of equilibrium in which more goods or services are bought or sold at a higher price (in pesos).

Figure 3 illustrates one source of uncertainty, but outside events can change the price established by the market for goods and services, and both foreign (U.S.) and domestic (Mexican) sellers are subject to this uncertainty. Figure 4 shows the same foreign exchange market as seen in Figure 2, but the market has responded to an outward shift of the demand

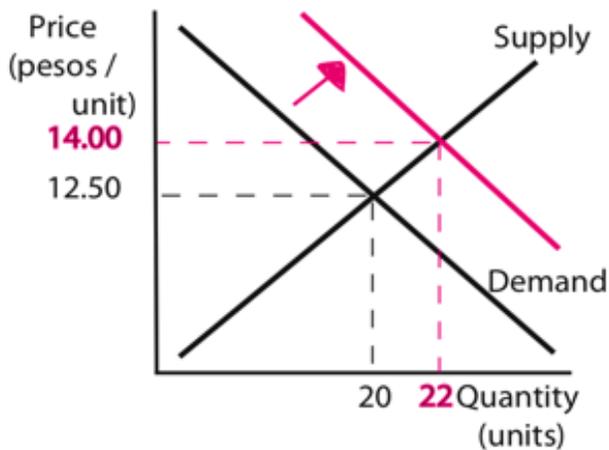


Figure 3. Market for goods and services in the foreign country with an outward shift of the demand curve. There is a new equilibrium with more units of goods and services bought and sold and an increase in price from 12.5 to 14.0 pesos per unit.

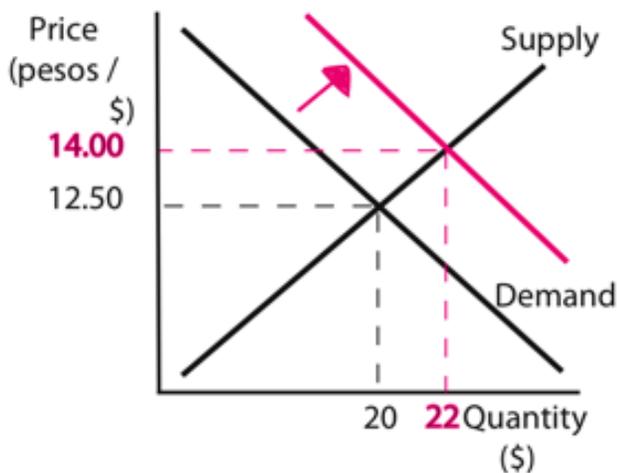


Figure 4. Foreign exchange market with an outward shift of the demand curve. There is a new equilibrium with more units of dollars bought and sold and an increase in price from 12.5 to 14.0 pesos per dollar.

curve for dollars. The result of this shift is that more dollars are being bought and sold at a higher price (in pesos).

Figure 4 illustrates a second source of uncertainty for the foreign (U.S.) seller, since outside events can shift the exchange rate (price per dollar), whereas domestic (Mexican) sellers do not have this uncertainty.

The equilibrium value of the exchange rate changes constantly throughout a given day, which means that either the supply or demand curves (or both) shift many times throughout the day. The frequency of these shifts means that they are not caused by

large or rare events like natural disasters or changes in population size or makeup. Rather, these shifts are due to current market news and speculation that precipitate a change in *expectations* regarding the value of currency in the future. Changes in the expectation of future exchange rates can shift the demand and supply curves suddenly and frequently, causing a change in exchange rates in the present. (International traders can avoid the risk of exchange rate fluctuations with financial instruments; however, a description of these instruments is outside the scope of this discussion.)

The implication of these market movements for U.S. sellers is that revenue from foreign sales is affected by both the market for goods and services and the foreign exchange market, making the U.S. (foreign) sales revenue more volatile than the sales revenue of the Mexican (domestic) seller. However, it also means that if outside events affect the foreign exchange market without affecting the market for goods and services, a Mexican buyer may *perceive* the U.S. (foreign) seller's good to be cheaper than that of the Mexican (domestic) seller. On the other hand, outside events in the foreign exchange market could make the U.S. seller's good appear to be more expensive than that of the Mexican seller.

Consider a real-world example in which a European buyer is planning to purchase 10,000 units of a good produced by an American firm or a French firm. Both the American and French firms initially charge one euro for each unit of the good. On June 8, 2011, each euro could buy \$1.46 (and each dollar could buy .68 euro), but by June 16, each euro could buy only \$1.41 (and each dollar could buy .71 euro). Thus between June 8 and June 16, the U.S. dollar appreciated. The American firm would have received \$14,600 for the sale on June 8 but only \$14,100 on June 16. In order for the American firm to maintain a profit margin, it would have to increase its price from one euro to 1.035 euros. However, this price increase makes the good from the American firm more expensive than the good from the French firm, thus making the American firm less competitive.

Appreciation, Depreciation, and their Relevance for Exports

Appreciation is when each unit of a domestic currency can buy more units of a foreign currency than it could before, which means that the price of the foreign currency *decreases*. A domestic currency that can purchase more foreign currency over a sustained period of time is known as a strong currency. Depreciation is when each unit of domestic currency buys less of a foreign currency than it

could before, which means that the price of the foreign currency *increases*. A domestic currency that purchases less of a foreign currency over a sustained period of time is known as a weak currency. Consequently, when one currency appreciates, the other currency must depreciate. In Figure 4, the price of a U.S. dollar increased from 12.5 pesos to 14.0 pesos (one U.S. dollar could buy 12.5 pesos but now that same one dollar can buy 14.0 pesos), so the Mexican peso depreciated and the U.S. dollar appreciated. There is a common belief that a currency's strength or weakness is tied to the strength or weakness of the economy. However, this belief does not prove true because a strong currency makes imported goods appear cheaper than competing domestic goods, and exported goods appear more expensive than the domestic goods. Thus, a strong currency is only an advantage to domestic buyers and foreign sellers and is a disadvantage to domestic sellers and foreign buyers. Conversely, a weak currency is an advantage to domestic sellers and foreign buyers because it makes domestic goods appear cheaper to foreign buyers, but it is a disadvantage to domestic buyers and foreign sellers. So as one currency appreciates the corresponding currency depreciates, since it is impossible for all currencies to be strong at the same time.

Floating versus Fixed Exchange Rate Systems

In a floating exchange rate system, the demand and supply curves set the equilibrium exchange rate, which is the going rate. However, in a fixed exchange rate system, the government mandates a set exchange rate and by buying or selling excess currency, it does not allow the market to determine the exchange rate. A government's buying or selling of currency is known as currency intervention.

The advantage of a flexible or floating exchange rate system is that market forces prevail, and so the outcome aligns with the market pressures of demand and supply. The disadvantage, as discussed earlier, is that the volatility in the exchange rate market makes international transactions riskier than domestic ones. On the other hand, the advantage of a fixed system is that there is no volatility, and international transactions are less risky. Risk is reduced because the government absorbs any shocks to the exchange rate by buying excess currency when there is a surplus and selling currency when there is a shortage. The disadvantage of a fixed exchange rate system is that it favors either exporters or importers, depending on whether the exchange rate is set above or below the free market equilibrium price.

In Figure 5, the Mexican government (though it could be the U.S. government as well) has instituted

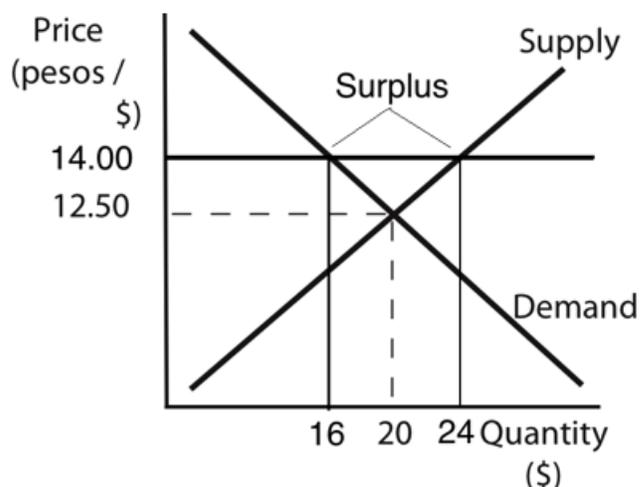


Figure 5. The exchange rate is fixed at 14 pesos per dollar, creating a surplus of $24 - 16 = 8$ dollars. To enforce the fixed exchange rate, the government must purchase the surplus \$8.00, which is then stored in reserves.

a fixed exchange rate of 14 pesos per dollar. Since the equilibrium exchange rate is 12.5 pesos per dollar, this fixed rate is artificially weakening the peso and strengthening the dollar. As described in the section on appreciation and depreciation, this policy hurts domestic (Mexican) buyers and foreign (U.S.) sellers, but helps domestic (Mexican) sellers and foreign (U.S.) buyers relative to the market's equilibrium-determined exchange rate. In other words, when a government fixes an exchange rate above the equilibrium value, it depreciates its own currency in order to facilitate exports at the expense of imports.

The Mexican government uses pesos to buy dollars and must then remove those dollars from circulation in order to enforce the fixed exchange rate, which then results in a build up of U.S. currency reserves.

Understanding Exchange Rate Data

An exchange rate can be reported for each corresponding currency. For example, an exchange rate of 10 pesos per dollar can also be reported as one peso per \$0.10. This distinction is important because a change in the exchange rate to 14 pesos per dollar means the U.S. dollar has appreciated and the Mexican peso has depreciated. Now one peso buys .0714 of a dollar, down from .1000 of a dollar. Historically, exchange rate data have been reported as foreign currency per dollar, although there are exceptions. For instance, the British pound and the euro are frequently (though not always) reported as dollars per pound and dollars per euro, respectively.

Two types of exchange rates are the *spot* rate and the *forward* rate. The spot rate is the current or

going exchange rate, while the forward rate is the exchange rate a market will use at some future date. Buyers and sellers are agreeing on a price now for a currency transaction that will take place in the future. The forward exchange rate market is similar to the futures market in commodities and is one way those engaged in international trade can avoid the risk of exchange rate volatility. Although spot rates are freely reported in the Wall Street Journal and online, forward rates must be obtained from a financial services company, since only a few rates are reported in the Wall Street Journal. An example of a forward exchange rate transaction (using the Japanese yen) is to say that on June 25, 2011, the spot exchange rate was 80.40 yen per one U.S. dollar, which means that one dollar spent on this date will buy 80.40 yen. The 30-day forward exchange rate was 78.56, meaning that one dollar spent on June 25 would buy 78.56 yen on July 25. That this forward rate is lower indicates that the market believes the dollar will depreciate relative to the yen. On July 25, the spot exchange rate may be above or below 78.56 yen. Thus it is a gamble to use forward exchange rates, but the benefit of using them is the certainty it provides in regard to future rates.

Another type of exchange rate data identifies the difference between *nominal* and *real* exchange rates. Real exchange rates account for inflation by adjusting the exchange rate using a cost-of-living price index, whereas the nominal exchange rate does not adjust for inflation. (At times, the real exchange rate is calculated using the domestic and foreign prices of a particular good, instead of using a general cost-of-living price index.) Accounting for inflation can be important because the nominal exchange rate changes if a surplus of currency creates inflation, whereas the terms of trade—which are better measured by the real exchange rate—do not change. In practice, however, real exchange rates can only be known *afterwards*, once inflation data are known, making it impossible to obtain both spot and real exchange rates at the same time. For example, consider the spot exchange rate between the U.S. dollar and the Japanese yen. In December 2010, one dollar purchased 89.90 yen, but due to differences in inflation and the cost of living, the real exchange rate was 100.00 yen. The real exchange rate is higher because the U.S. price index grew from 100 in 2005 to 110 in 2010 (indicating about a 2% annual inflation rate), whereas the Japanese price index shrank from 100 in 2005 to 98.86 in 2010 (indicating a slight deflation). Perhaps the best way to think about this is that the nominal exchange rate has depreciated relative to the real exchange rate because U.S. inflation has decreased the number of yen one U.S. dollar can buy. Another way to look at it is to see

that although one dollar buys 89.90 yen, one dollar's worth of U.S. goods is worth 98.86 yen.

A currency index, also called an effective exchange rate, is a measure of a particular country's exchange rate relative to a list of other countries. This index is used to determine the relative strength or weakness of one currency compared to all other currencies, instead of comparing it to just one other currency. Unlike a standard exchange rate, an effective exchange rate is relative to a benchmark value of 100. A trade-weighted currency index is modified using the value of trade with each trading partner. The exchange rate for a country that is a large trade partner is weighted more heavily than the exchange rate with a country that is a small trade partner. Effective exchange rates are useful as a broad measure of the dollar's strength but are not helpful in terms of financial transactions or international purchases with a customer in a particular country. The best places to obtain effective exchange rate data are from the U.S. Federal Reserve Bank and the Bank of International Settlements, <http://www.bis.org/statistics/eer/index.htm>. So, if the effective exchange rate for the U.S. dollar was set at 100 in January of 2005, and the 2011 effective exchange rate is 91.19, this indicates a general depreciation of the U.S. dollar. Further, if the effective exchange rate is 95 in 2013, this will indicate that the U.S. dollar has appreciated relative to 2011 but has depreciated when compared to 2005.

Trends in Exchange Rates

Exchange rate data are readily available on the web. The data in the following figures have been compiled by the authors using information freely available online at <http://www.oanda.com>.

Canada is currently the biggest U.S. trading partner. (The nominal and real exchange rates between the U.S. and Canada are displayed in Figure 6.) Beginning in the early 1990s, the U.S. dollar appreciated against the Canadian dollar, which means that one U.S. dollar could buy more Canadian dollars in 2000 than it could in 1990. But after 2002, the U.S. dollar has been slowly depreciating, dropping to its lowest point in 2008, then, after a sharp appreciation in 2009, again depreciating in 2010.

There are two important features to note in Figure 6. First, the nominal and real exchange rates are similar, in particular after 2002. They are similar because inflation has been low since 1990 and exceptionally low since 2002. Second, though the data exhibit frequent, although minor fluctuations, there are, nonetheless, unambiguous trends. The U.S. dollar



Figure 6. Real and nominal exchange rate between the Canadian dollar and the U.S. dollar. Source: Author's compilation using data located at <http://www.oanda.com>.

appreciated and was strong throughout the 1990s, but recently it has depreciated, meaning U.S. goods and services are now somewhat cheaper in Canada than they were previously.

Figure 7 shows the exchange rate between the Mexican peso and the U.S. dollar (since Mexico revalued its currency in 1993, data is not plotted prior to this year).¹ Unlike Canada, Mexico shows a big difference in its nominal and real exchange rates because it experienced high inflation in the 1990s. If only the nominal exchange rate is considered, then the U.S. dollar appears to have appreciated in the same period. However, the real exchange rate tells another story. This rate shows that the U.S. dollar actually depreciated against the inflation-adjusted

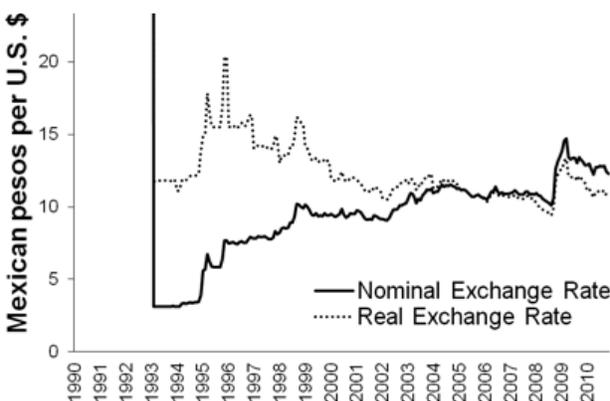


Figure 7. Real and nominal exchange rate between the Mexican peso and the U.S. dollar. Source: Author's compilation using data located at <http://www.oanda.com>.

¹ Currency revaluation occurs when a country eliminates zeros. For example, a 1000 peso note becomes a one peso note.

peso. (Note that, as with Canada, there was a sharp jump in appreciation in 2009.)

Japan is one of Washington state's biggest trading partners, and although the U.S. dollar has fluctuated, the overall trend with the nominal exchange rate has been a depreciation of the U.S. dollar relative to the Japanese yen. The real exchange rate also has had periods of fluctuation, but the overall trend has been roughly constant (Figure 8). (Unlike the Mexican peso and Canadian dollar, the Japanese yen did not experience a jump in appreciation in 2009.)

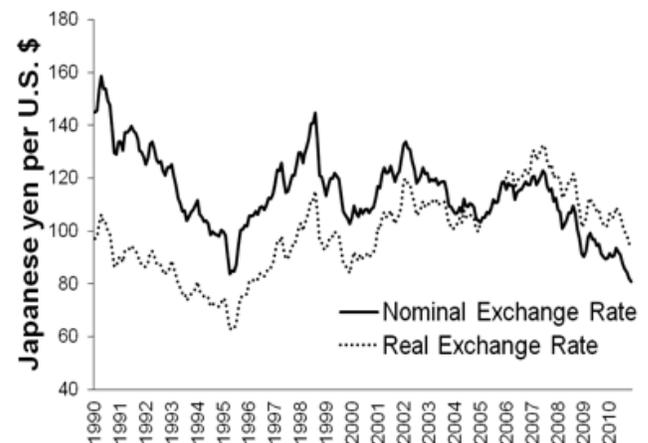


Figure 8. Real and nominal exchange rate between the Japanese yen and the U.S. dollar. Source: Author's compilation using data located at <http://www.oanda.com>.

Figure 9 shows the exchange rate between the U.S. dollar and the Chinese yuan. Compared to the other exchange rates, the rate between the U.S. and China is not volatile because China fixes its nominal exchange rate with the United States. Between 1996 and 2005, the nominal exchange rate between China and the U.S. was constant, and the real exchange rate appreciated due to somewhat higher inflation in China. In 2005, the Chinese government announced that it would let the exchange rate float to some degree. Figure 9 shows that in allowing the exchange rate to float, the U.S. dollar depreciated, which indicates that the Chinese were fixing the exchange rate above the equilibrium exchange rate. To accomplish this, the Chinese government had to buy large reserves of U.S. dollars. The Chinese government fixed the exchange rate again from 2008 to 2010 but at a lower rate than before, although this new fixed exchange rate was still above the equilibrium rate. Recently, the Chinese government has allowed the dollar to depreciate once again, but they have used currency intervention to ensure that depreciation of the dollar does not move too quickly.

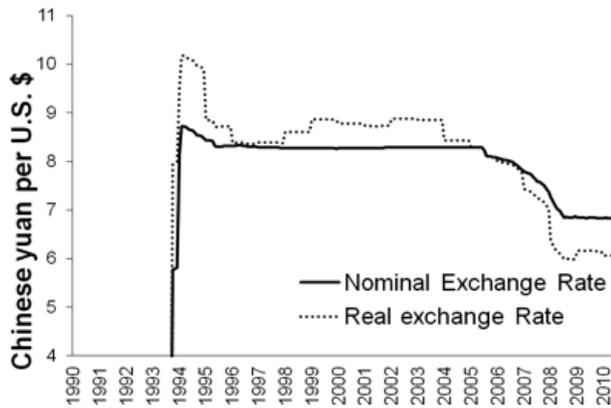


Figure 9. Real and nominal exchange rate between the Chinese yuan and the U.S. dollar. Source: Author's compilation using data located at <http://www.oanda.com>.

rate also means that U.S. exporters are not getting the benefit of depreciation in China that they get in other countries. The final lesson is that better export decisions, in particular, decisions regarding competitive and profitable pricing in overseas markets can be achieved by understanding how the movement of exchange rates affect prices in domestic and foreign markets.

Figure 10 shows the trade-weighted currency index for the U.S. dollar. This index was arbitrarily constructed so that the exchange rate would be 100 in 2005. The purpose of doing this was to determine the trend in the data over time relative to the 2005 benchmark. The trade-weighted index contains a basket of world currencies, including currencies from Canada, Mexico, Japan, and China, and it also prominently features the euro and the British pound. Figure 10 confirms the trends we have previously discussed, namely, the depreciation of the U.S. dollar since 2002 and the 2009 jump in appreciation.

The theory, data, and trends presented in this primer offer important lessons for Washington state business owners. The main lesson, seen in almost all the figures but best seen in Figure 10, is that the U.S. dollar has been weakening since 2002. This depreciation of the dollar is an advantage to U.S. firms that sell abroad because it makes U.S. goods somewhat cheaper in foreign markets. Another lesson is that as long as China keeps its currency at a fixed exchange rate, there will be little risk of exchange rate volatility for either buyers or sellers. However, China's fixed exchange



Figure 10. Trade-weighted currency index centered so that 2005 = 100. Source: Author's compilation using data from the U.S. Federal Reserve.



By **Andrew J. Cassey** and **Pavan Dhanireddy**, Washington State University School of Economic Sciences.

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