Economic Analysis of Floating Exchange Rate Systems

The business section of any newspaper will have a table of spot exchange rates. These are the rates at which a person could have bought other currencies or foreign exchange, such as the English Pound, French Franc, or the new European Euro. The prices of foreign currencies can be determined in two major types of exchange rate systems. In the United States, the dollar’s exchange rates are determined by the marketplace, i.e., by supply and demand. This type of system is called a floating exchange rate system. In other countries, governments set the price of their currencies with respect to other countries. They then buy or sell foreign exchange at the prices they’ve set. This is called a fixed exchange rate system. The economic effects of these two systems can be very different. However, in either system the underlying forces influencing the value of a country’s currency remain the same.

Due to possible confusion of being able to quote different currencies in terms of each other, e.g., $/£ or £/$, we need to explicitly define an exchange rate. An exchange rate is, therefore, the domestic cost of a unit of foreign exchange. For example, from the US perspective the price of the English Pound would be denominated as the number of US dollars per pound, or $/£.

As noted above, the exchange rate in a floating exchange rate system is determined by market forces. Our definition of the exchange rate defines the market as the market for foreign exchange. In this market we have demanders and suppliers of foreign currencies willing to pay and accept dollars in return for these currencies. We will in turn discuss the demand and supply of foreign exchange.

Foreign Exchange Demand

The demand for foreign exchange is a derived demand. With the exception of currency collectors, the demand for foreign exchange is due to people’s desire to use it in the purchase of foreign goods or financial assets. Foreign exchange demand is, therefore, highly sensitive to changes in these desires.

In order to understand changes in the demand for foreign exchange, we will need to discuss its underlying forces. These are the demand for foreign goods and services and the demand for foreign financial assets.

The supply of foreign exchange has at its roots the same conceptual basis as demand, only it is from the foreign perspective. Foreign currency is supplied to the foreign exchange market when foreigners exchange their currency for dollars in order to buy US goods or financial assets. Equivalently, the supply of foreign exchange is nothing more than a mirror image of the foreign demand for US currency. This is shown in Figure 1 by labeling the supply curve as the supply for foreign exchange (Sfx) or as the demand for dollars (D$). Using the same logic, the domestic demand for foreign
exchange is the mirror of the supply of dollars to the foreign exchange market. Again in Figure 1, the demand for foreign exchange (Dfx) is the same as the supply of dollars (S$).

One question which might arise is which foreign exchange market. New York, London, Frankfort and Tokyo are major financial centers with large foreign exchange markets. The answer as to which market is all of them. The first rule of business is to buy low and sell high. Should exchange rates be different across different financial centers, then the opportunity for arbitrage profits occurs. Currency dealers will buy low in one center and sell high in another, driving exchange rates into equality across the different markets.

For example, should the Swiss Franc be at a lower price (in terms of $) in London and at a higher price in New York, then the dealers will increase the demand for the Swiss Franc in London, driving up its price, and increase its supply in New York, driving down its price there. This continues until the price is the same in both places.

The major questions to be addressed are how are exchange rates determined and what are the forces which influence them. In Figure 1, the equilibrium exchange rate (e) is the one where the quantity demanded is equal to the quantity supplied for foreign exchange. As with most markets, the price changes in order to equilibrate the market. When quantity demanded exceeds quantity supplied, then the exchange rate will rise. If the quantity supplied is greater then quantity demanded, the exchange rate falls.

What does it mean when the exchange rate rises or falls? As we have defined the exchange rate ($/£), when the exchange rate rises, the value of the dollar decreases or depreciates. It now takes more dollars to buy an English pound than it did before the change in the exchange rate. Fewer foreign goods can now be purchased for a given number of dollars. The reverse is also true. As the exchange rate falls, the dollar cost of foreign exchange falls, increasing the dollar’s value. This is termed an appreciation of the dollar. More foreign
goods can now be purchased.

Should market forces lead to a change in either the supply or demand for foreign exchange then the exchange will change accordingly to re-equilibrate the market.

In Figure 2, demand increases from D to D’. At the initial exchange rate e, the increase in demand leads to a shortage of foreign exchange. Domestic demanders bid up its price and the exchange rate rises to e’, which as before this represents a weakening or depreciation of the dollar. The major question to be addressed is what are these market forces which lead to changes in the demand and supply of foreign exchange. These will be discussed in order of the time frames in which they occur.

Figure 3 represents the movement of exchange rates over time. It shows the day-to-day fluctuations (the jagged movements), as well as the longer-term trend (the smooth upward sloping curve). We need to be able to explain both of these characteristics. The day-to-day volatility is explained in terms of the short run. The trend is best explained in the long and medium runs.

Long-Run Effects - Law of One Price
The basic notion is that exchange rates are sensitive to differential inflation rates across countries. Should the domestic inflation rate rise at a rate greater than our trading partners, then at a given exchange rate, the price of domestic goods will be rising relative to foreign goods. This will, in turn, increase the demand for foreign goods (imports are now cheaper in domestic currency terms) and decrease the demand for domestic exports (domestic exports are now more expensive in foreign currency terms). This results in an increase in the demand for foreign exchange, as well as a decrease in the supply of foreign exchange.

It is left to the student to use the diagrams to show that this would lead to a depreciation of the domestic currency. (Shift Dfx to the right and Sfx to the left. Does the exchange rate (e) go up or down?)
This is a long-run effect because of the Law of One Price. This concept states that in the long run the price of tradable goods must be the same across countries. If this was not the case, then the opportunity for arbitrage profits, buying low in one country and selling high in another, would result in a movement in the exchange rate bringing about the equalization.

For example, suppose Argentine wheat, at the prevailing exchange rate, is cheap in US dollars. As North Americans buy more and more Argentine wheat, they increase the demand for the Argentine currency, driving up its value, thus making wheat more expensive in dollar terms.

The exchange rates which would prevail under the Law of One Price are called purchasing power parity exchange rates (PPP). While these do not exist in reality (there are many other factors affecting exchange rates) there is an underlying pressure moving exchange rates in this fashion. PPP exchange rates are used in comparing the economic performance between countries. The World Bank compares countries in their *World Development Report* using a PPP exchange rate.

Medium Term - Differential Growth Rates

As an economy grows, its demand for imports will also grow. As income increases, some portion of that increase will be spent on imported goods. In the jargon of macroeconomics, the proportion of the additional dollar of income spent on imports is called the marginal propensity to import. Assume that the marginal propensity to import is the same across countries.

Should a country’s economy grow faster than its trading partners, then its demand for imports will also be growing faster. In the context of Figure 4, this is represented by increases in both the demand and supply of foreign exchange, but the demand would increase by more. This would result in a slight depreciation of the domestic currency.

Short-Run - Differential Interest Rates

This factor has become extremely important as countries have liberalized their economies, allowing the flow of financial capital into and out of their countries. It has played an important role in the East Asian and Mexican Peso financial crises.
Liberalization benefits a country by foreign financial capital entering into that country. These resources finance the building of factories and roads and increase employment opportunities. But it is a double-edged sword. Foreign financial capital can flow back out. When it does, it wreaks havoc on a country’s economy.

One aspect of the financial crises in Asia and Mexico was that international investors lost their confidence in the security of their assets in these countries. This loss of confidence jeopardized these countries’ currency values and the value of financial assets denominated in their currencies. Fearing that currencies would depreciate (or devalue in the case of fixed exchange rate regimes), investors started a panic selling-off of their financial assets denominated in pesos, ringgit or won and purchased dollars or other stable currencies. These investors, in essence, created a self-fulfilling prophecy.

The return to financial assets across countries has an important effect on exchange rates. If a country’s return to financial assets rises relative to other countries, foreign investors have an incentive to purchase these assets. First, the investors will have to change their currencies into that country’s currency in order to purchase these assets. Simultaneously, the country’s own investors will be less inclined to purchase foreign assets, keeping their money at home. This is pictured in Figure 5 as an increase in the supply of foreign exchange (Sfx to S’fx) and a decrease in the demand for foreign exchange (Dfx to D’fx). The end result is a decrease in the price of foreign exchange (e to e’), of course being an appreciation of the country’s currency.

One example of this occurred in the 1980s. The US government ran up unprecedented budget deficits which led to an increase in the rate of return on financial assets in the US. The government acts as a borrower in financial markets to obtain the resources required to bridge the deficit. This increase in the demand for credit increases the interest paid on financial assets or borrowing. Foreign investors began to buy dollars in order to purchase Treasury Bills - government bonds. This led to an increase in the supply of foreign exchange, and the value of the dollar went way up. As the value of the dollar rose, the US trading sector became less and less competitive. The dollar price of imports fell.
leading to increasing demand for foreign products and at the same time increasing the foreign cost of US exports. The US trade deficit grew tremendously as a result. The US budget and trade deficits are sometimes called the “twin deficits” because of being interrelated.

The financial crisis in Southeast Asia can also be partially explained in these terms. Suppose you, as an investor, wish to purchase stock on the Hong Kong stock market. You first need to exchange US dollars for HK$ in order to make the purchase. Now you buy a financial asset denominated in HK$. But suppose a rumor has it that there will be a weakening in the value of the HK$. If this happens, you will lose money when you sell your HK asset and change HK$ back into US $. You and a hoard of other investors would sell now in order to avoid these exchange losses. But this, in and of itself, would cause the HK$ to depreciate. You and the other investors just made the rumor true. Whatever gains you made in the value of the stock may be wiped out by the change in the value of the currencies. If many investors try to get back into US dollar assets, there would be a large sell off of Hong Kong financial assets and, as investors switched from HK$ to US$, the HK$ would depreciate.

Fixed Exchange Rates

The previous story, while it makes sense in economic terms, has not been completely honest. The exchange rate system in Hong Kong is not a free float. The central bank in Hong Kong maintains a fixed exchange rate. This means they establish the exchange rate for the HK$. The manner in which this is done is that the central bank stands ready, willing and, hopefully able, to buy or sell HK$ at the established or fixed exchange rate. Buyers and sellers would then transact this price.

For a fixed rate system to work, the central bank needs to have foreign exchange reserves, should people wish to buy it. This is called the bank’s international reserves. When the bank buys foreign exchange, its reserves increase; and when they sell foreign exchange, their reserves fall.

Figure 6 paints a picture of a situation that a central bank may face in maintaining a fixed exchange rate system. Suppose the fixed exchange rate is equal to the prevailing equilibrium exchange rate that would have obtained by market forces ($e^* = ef$). If this situation continues, then the amount of foreign exchange that the bank is required to sell
is exactly equal to the amount it is required to buy. In these circumstances, its international reserves do not change.

Now suppose for whatever reason (several were given above in discussing floating exchange rates) that the demand for foreign exchange increases. Now at the fixed rate, $e_f$, there is an excess demand for foreign exchange. The central bank, in order to maintain the fixed rate, has to sell more foreign exchange, $q_d$, than it is buying, $q_s$. International reserves decrease by the amount of the difference. The big question facing the central bank at this point is whether this increase in demand is a temporary phenomenon or a permanent change. If it is temporary, then the bank suffers only a short-term fall in its international reserves which it may be able to recoup later.

If it is a permanent change, then the bank will see its international reserves deplete. It will need to change its policies to bring the market back in line with the fixed rate. Usually when it can, it will change interest rates, making its country’s financial assets more attractive and thus attract foreign exchange. Sometimes this does not work. No matter what the interest rate, investors are too concerned about the exchange rate risk.

Now things get nasty! Should the central bank’s international reserves begin to deplete, then holders of the currency or financial assets denominated in that currency will begin to fear a devaluation. The smart investor will want to dump the currency so as not to get caught with it once the devaluation occurs.

For example, suppose it cost 4 HK$ for a US$ and you have 1000 HK$ or a HK financial asset worth 1000 HK$. You have the equivalent of US $250. If the Hong Kong central bank devalues the HK$ so that it costs 5HK$ per US$ - you just lost US $50.

If there is concern about the Hong Kong banks' ability to support its fixed rate, then a panic can occur where investors dump HK $. This causes the demand for foreign exchange to increase and there is a sell off of HK$, deepening the central bank’s crisis as international reserves plummet.