Bloomberg

THE **FOREIGN** EXCHANGE **MARKET**

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FX: What is it, why is it traded, and why specialize in it?

Foreign exchange is the single largest market in the world. It is the means by which countries are able to trade with another and is the glue to the global economy. Whenever one nation's currency is exchange for another, we have a foreign exchange transaction. Without functioning FX markets, international trade and securities markets would be stunted and even international travel may be difficult.

It is traded because any type of global commerce or investment – whether by a small company or global fund manager or you and I traveling abroad - results in an exposure to the value of one currency in terms of another. It is therefore not only traded in order to transact, but also to hedge this exposure. Additionally, the around the clock trading, and vast size and liquidity make it a speculator's dream.

In today's world foreign exchange affects everyone and every market. Even if you're a domestic business or if you prefer to travel in the continental U.S., foreign exchange values spill into your economy and ultimately to you by affecting the prices of the goods and services you buy, and even the wages you make. Weak dollar? Companies raise their prices of goods. Strong dollar? Companies outsource their labor and supplies.

This means that understanding FX requires understanding economics and interest rates, the keys that turn the global economy. And how can you understand the health of the economy without also understanding what is going on in its equity, bond, and commodities markets? In addition to the markets you also become knowledgeable of world events and the geo-political landscape.

Finally, if nothing else, FX is still a somewhat newer market to Bloomberg L.P., and it represents a substantial growth opportunity. In FX there is still a world of thousands of market professionals we can add value to and sell to.

History of FX

The evolution of the foreign exchange ("FX") market goes back to the practice of bartering. Bartering is the exchange of goods or services for other goods or services and arose out of need or want of profit. It originated thousands of years ago and endures to this day.

Currency began to take the form of coinage and paper money around 2000 and 800 B.C. respectively and overcame the main limitations of bartering. It was backed by gold so its value was known, and it was also *convertible*, *portable*, and did not depend on *mutual convenience*. It is far easier to transport currency than it is cows or bushels of corn (portable). It is also easier to trade currency for something else as its value is agreed upon and widely accepted (convertible). Lastly, your cow is only valuable if you find another person that needs it (mutual convenience).

In sum, currency became important as a **store of value** and **a means of exchange**.

The modern-day currency markets took shape after World War II. In 1944, allied nations signed the Bretton Woods agreement. The agreement was intended to foster reconstruction in Europe after the war. It is named for the place it was signed, Bretton Woods, New Hampshire. The major outcomes of the agreement were the creation of the International Monetary Fund, an international lending body, and the **Gold Standard**.

The gold standard was intended to help economic reconstruction by promoting exchange rate stability and convertibility. Member nations agreed to fix the value of their currency to gold, within a band of +/- 1%. Gold in turn was fixed to a value of $35 U.S. dollars per ounce, effectively fixing the other currencies to the dollar. To maintain the band, countries had to buy or sell dollars, and the dawn of the dollar as the global payment and reserve standard began.

In 1971 however there was a major shift towards free currency markets. The fixing rates under the Gold Standard had become unsustainable due to a variety of factors. Inflation forced large currency devaluations in places like England and Germany. A crisis of confidence in the dollar grew as the U.S got mired in Vietnam and ran a huge trade deficit for the first time. An oversupply of dollars on the market made it overvalued, and countries began redeeming their dollars for gold and the U.S. did not have enough reserves to cover it all. President Nixon therefore ended the Gold Standard by closing the "gold window" in August 1971, ending official dollar convertibility into gold.

After the gold standard, currencies began to float freely, to an extent. Stable currencies were still desirable and so their values were influenced by central bank intervention, which is known as a "managed" or "dirty" float. In 1976 IMF members signed the Jamaica Agreement, officially declaring floating currencies acceptable and abandoning gold as a reserve asset. Thus began today's era of mostly freely-traded currencies.

The Euro

The next major era occurred as Europe moved towards a unified economic region and ultimately a single currency. In 1979 the European Monetary System (EMS) was created along with the European Currency Unit (ECU). The ECU was a weighted basket of member currencies, and each country had to maintain its currency's value within +/- 2.25%. The Exchange Rate Mechanism was introduced, allowing countries to intervene when bands were threatened, and to raise interest rates to punish speculators. During the 1980's diverging fiscal and monetary policies throughout Europe forced multiple realignments of the currencies within the EMS

The EMS & ERM gave way in the early 1990's to the European Monetary Union, an economic group where members had to meet certain monetary and fiscal targets known as the Maastricht Criteria The EMU laid plans for the establishment of a single European Central Bank (the ECB), and a single currency, the Euro. On Jan 1, 1999 11 EMU countries had their currency's value fixed and the Euro replaced the ECU and began as an electronic and accounting currency. On Jan 1, 2002, Greece joined the original 11 and the Euro begin circulating as cash currency.

Almost immediately after inception, the Euro began a 29% decline. But subsequent to intervention (discussed in the section on Central Banks) it began an almost un-interrupted 7 year upward trend and is currently about 3% above its long-term average of 1.1830. This strength and broad use has also seen its status as a reserve currency grow, with now 26.5% of central bank reserves kept in Euros, up from 18% in 1999. Today 15 European countries have adopted the Euro and several more in the European Union may do so. See chart below.

{EUR <Crncy>}

THE U.S. DOLLAR

Despite the Euro's challenge, today the U.S. dollar is still the global benchmark. As a legacy of the Gold Standard, it is still the most prevalent reserve currency, with 63% of all global central bank reserves kept in dollars. Though no longer backed by gold, the dollar (and other currencies) is known as "fiat" money: something otherwise useless but used as an of order of a government (i.e. legal tender laws in the U.S.). It enjoys this status largely due to its *liquidity* and relative *stability* of the U.S. government. The dollar also the world's primary **transaction currency**, with over 86% of daily currency trades involving it and major world commodities like oil being priced and sold in it. A freely traded currency, the dollar's value is determined in the open market and has gone in cycles as seen in the chart below. Due to a surging trade deficit, slowing growth and a credit crisis, if suffered through a 7-year down-trend from 2001-2008. The financial crisis that peaked in 2H 2008 resulted in a huge demand for USD as structured investments originally funded with dollars were liquidated. The rebound in the global economy in late 2009 saw a resurgence in the use of the USD as a funding currency, driving it to a record low Vs. the EUR

Through mid-2010 the still unresolved fiscal crisis that began in Greece and that has now engulfed other EUROZONE members generated a sharp decline in the EUR with the USD now only 3% weaker than its LT average of 1.1830. Markets are casting doubts on the ability of the ECB and EUROZONE policy makers to solve the crisis. May wonder whether the one-size fits all monetary policy coupled with the lack of enforceable fiscal rules could cause a break-up in the EUROZONE itself.

{**DXY Index**}

The FX Market Today

The term Foreign Exchange (FX) Market refers to where trading occurs for one currency in terms of another. There is no physical market or central exchange floor. Instead, vast majority is traded "over-the-counter" (OTC) by a global network of trading desks at large, international banks that transact with each other electronically.

The reason foreign exchange exists is because it is the means by which global commerce is conducted. Foreign borrowing and lending, global investment, imports and exports, and international travel all can not occur without exchanging foreign currency. Therefore it should come as no surprise that the FX market is the largest and most liquid (actively traded) market in the world. The Bank for International Settlements, the bank to central banks and quasi-regulatory body in foreign exchange, estimates that more than $3.2 *trillion* is traded every day. To put that in context, the NASDAQ and New York stock exchanges *combined* average only 73.5 billion in value traded according to Bloomberg data. The market has also experience staggering growth, with up 69% from 2004.

This vast amount of trading volume is motivated by two types of activity: hedging, and speculating. (Other types of activity like funding and international investment flow fall under these categories as well). FX **hedging** is the reducing of one's risk to adverse moves in foreign exchange values. Multinational corporations and institutional money managers fall largely into this group. For them foreign exchange is a byproduct of their primary business and it must be managed. FX s**peculation** however is the attempt to profit on a currency's direction, through buying or selling it. Here the risk is not part of their primary business, it *is* their business. Banks and hedge funds comprise this second group. Speculation, although sometimes blamed for market volatility, helps to keep the market efficient and liquid. In today's market, low volatility, higher yielding currencies, and the proliferation of hedge funds has led to speculation accounting for an ever increasing percentage of overall volume. That being said it should be noted that nearly 75% of all FX transactions are entered into by counterparties with no profit motive.

Geography

Part of the FX market's vast liquidity is attributable to its unique geographical dispersion, with cities around the world trading actively around the clock. Most of the trading (34%) occurs in London, because it is the financial capital of Europe and its unique location allows it to trade with both Asia and New York in the same day. New York is next with 16% followed by Tokyo at 6%. This geography allows for longer trading hours than most markets, with trading occurring *24 hours a day* from Sunday at 3:00pm EST (the New Zealand open) to Friday at 5pm EST (the New York close). The most actively traded currency pairs are the Euro against the Dollar (27%), the Dollar against the Japanese Yen (13%), and the British Pound against the Dollar (12%).

Structure

Tens of thousands of FX market participants, including traders, salespeople, research analysts, economists, and treasurers all over the world concerned with foreign exchange. The participants can be broadly divided between the buy-side and sell-side. The **buy-side** refers to customers, those who buy and sell securities like foreign exchange. The **sell-side** is comprised of banks and dealers who "make markets", i.e. they standby and make prices for the buy-side to trade on.

Inter-bank market

Most FX trading, 43% according to BIS 2007 is between major FX banks, in the "**inter-bank market**". This market is comprised of major global investment and commercial banks. Names like Deutsche Bank, UBS, Barclays, Goldman, and RBS fall into this category. They trade FX as a result of providing FX services to customers, and use FX for hedging, speculative, and funding purposes. They trade with each other predominantly by using electronic dealing platforms, with Reuters and EBS being the two primary systems. Reuters Matching users trade by posting prices on the system and having those prices get matched up with other dealers. They also trade "conversationally" on Reuters Dealing, where they call other banks electronically and ask for prices and deal. EBS is similar to Reuters Matching. The main difference between the two is the currencies on each platform. The market tends to trade GBP/USD, USD/CAD, USD/MXN and others on Reuters. EBS however dominates trading in EUR/USD, USD/JPY, and USD/CHF. This dichotomy arose out of the banks' desire to not be dependent solely on Reuters for FX trading, and so they started EBS in the early 90's as a bank-owned initiative to end the monopoly on FX trading. The FX electronic trading landscape is constantly shifting, especially on the customer-side, but this duopoly still endures today.

Customer Market

The balance of trading is done between banks and financial institutions (40%) and non-financial institutions (17%) in the "**customer market**". This market refers to the buy-side, those who buy and sell foreign exchange as part of their business and do not make markets. Financial institutions include hedge funds, mutual funds, pension funds and insurance companies. Non-financial institutions are comprised of corporations and government agencies.

Electronic Trading

Although one of the first markets to trade electronically (on Reuters Dealing in the 70's), the complexities of the FX market allowed it to resist modern-day e-commerce for many years. However, starting in the early part of this decade, FX began to migrate towards electronic trading on the customer side. Although clients still primarily transact over the telephone, this trend is shifting as electronic volumes continue to increase. Greenwich Associates estimates that 56% of FX users traded online in 2007, and today there are myriad online trading platforms that do substantial amounts of volume. Some of these, like Bloomberg, are multi-bank, some are anonymous ECNs, and many

banks have developed their own, “single-dealer” platforms as well.

Bloomberg L.P.

Bloomberg L.P. began in the early 1980’s as a bond trading and information platform. The decades that followed brought staggering growth and successful expansion into other asset classes that made Bloomberg L.P. the standard in financial markets. The FX market however was monopolized by Reuters and it wasn’t until recently that Bloomberg L.P. made a concerted and formidable push into this market. Due in large part to that effort, today you will see a majority of inter-bank players relying on Bloomberg for our market-moving news, economic data, charts, and communication tools. We have also become the tool of choice for buy-side customers to monitor this market, and are gaining electronic trading market-share from industry leaders FXAll and FXConnect (more in the section on Electronic Trading). While still a small part of overall *trading* in FX, we have become a unique and integral part of an FX professional’s day and have achieved a dominant market share as measured by desktops.

Global foreign exchange market turnover						
Daily averages in April 2007, in billions of US dollars						
	1992	1995	1998	2001	2004	2007
Spot transactions	394	494	568	387	631	1,005
Outright forwards	58	97	128	131	209	362
Foreign exchange swaps	324	546	734	656	954	1,714
Total “traditional” turnover	820	1,190	1,490	1,200	1,900	**3,210**
**BIS Triennial Bank Survey FX and derivatives market activity 2007*						

The Role of the Central Bank

Central banks are institutions created by governments and mandated to achieve certain economic conditions. They are generally independent bodies but government ties and influence does exist. Their mandates are usually primarily concerned with one or more of the following: *containing inflation, promoting growth, or stabilizing the currency.*

Central banks occupy an unique niche in the FX markets: In some countries they are active participants in the market while in others they are largely passive with their role limited to very infrequent activity designed to maintain a minimal level of liquidity.

As examples, in the U.S. the central bank is the Federal Reserve Bank (the "FED"), and it has a dual mandate: to control inflation and promote growth (maximum sustainable employment). In Europe, the European Central Bank (ECB) is tasked with containing inflation in the 15 nations that use the Euro as their official currency. The Swiss National Bank is primarily concerned with a stable currency, to cement its position as a safe-haven currency and important financial center. Other important central banks in the FX markets include the Bank of England (BOE) and the Bank of Japan (BOJ).

Adhering to their mandates helps a central bank and its policies earn credibility. This is especially important when fighting inflation as they have to be able to anchor the market's perceptions or expectations of higher prices. Balancing the need for growth with the need for stable prices is a difficult task, and occasionally the Fed will deem one much higher than the other. At no time was this clearer than when hawkish Fed chairman Paul Volcker committed to ending stagflation and fighting the 13.5% inflation rate by raising the fed funds rate to 20%! (Chart below)

{FDTR <Index>} Fed Funds target rate, then and now

These central bank mandates are important because containing inflation focuses on minimizing price rises and helps create a stable business environment and achieve smooth, long-term growth. Price stability often gets top billing – particularly at the dozens of formal inflation-targeting central banks around the world, including those of Australia, Brazil, Canada, England, Korea and Sweden.
Typically, the price stability objective is not literally a zero inflation rate, but more in line with a target rate or range (Figure 1). Promoting growth is also important as it focuses on stimulating production and consumption as a way of fostering employment. Finally, a stable currency emphasizes reducing volatility, and helps instill confidence in the economy and attract foreign capital flows.

{PCE CYOY <Index>} Core rate of personal consumption expenditure

Since inflation, growth, and employment are all factors that are integral to currency values, you can see that Central Banks can and do have an impact on the FX markets. The direct link comes in the form of the banks' monetary policy and the tools they use to implement it, including in some historic cases direct intervention.

Monetary Policy

Monetary policy is comprised of a set of policies and goals and the corresponding actions taken by a central bank to achieve their mandates by affecting the short term rates and thereby the direction of the economy. Although central bank monetary policy does not directly change the trajectory of the economy, it does influence credit, output, employment, and inflation (and thereby currency values) by affecting aggregate supply and demand. It can generally be divided into two categories or "**biases**" as they are known:

> ***Expansionary or Stimulative***: Short term rates(The Fed Funds Rate) is reduced in order to stimulate growth, and therefore to promote lending and borrowing.

This policy is also know as a monetary "easing" and affects the economy in several ways: first, it stimulates growth by changing lowering interest rates thereby increasing credit availability and stimulating asset prices. (A by product of such a policy mix is a depreciating exchange rate, thereby encouraging growth in the export sector.) Second, the resulting economic growth puts pressure on capacity utilization and business costs. After a lag of varying lengths labor is encouraged to seek higher wages thereby creating the risk of higher inflation.

Contractionary or Restrictive: Short-term rates are increased which dampens growth by making credit less available thereby deterring or reducing credit expansion and in turn overall economic activity.

The primary levers for influencing monetary policy are changes in benchmark interest rates. The central bank sets rates at which banks can borrow from them as well as from each other. These rates in turn affect what banks charge companies and individuals seeking to borrow.

Central Bank Tools

Using the Federal Reserve Bank as an example, it has two main ways to implement monetary policy:

1. Interest *rates*: The Fed has two benchmark interest rates at its disposal: The **Discount Rate**, which is the rate they charge banks to borrow from the Fed, and the **Fed Funds Rate,** the rate they set for banks to borrow from each other.

The Fed is intended to be the lender of last resort, so the discount rate is higher than fed funds in order to discourage its use (*It is interesting to note that due to recent turmoil in the credit markets, this gap has narrowed*). It is therefore the Fed Funds rate that is the primary benchmark in the U.S. It directly impacts the economy and is crucial to financial markets including foreign exchange (more in the section on Interest Rates). The rate is set periodically by the Federal Open Market Committee **{FOMC <go>}**, usually at 2:15 pm EST on pre-determined dates. The FED implements its policies through *Open-market operations*. Here the FOMC directs the NY FED to buy or sell U.S. Treasury securities in order to increase or decrease the amount of money in circulation which in turn influences the Fed Funds Rate

2. *Reserve Requirements*: Finally, the Fed sets the percent of total capital a bank must keep on hand to fund its liabilities (deposits). This is generally the least impactful tool but raising the requirements reduces money supply by limiting the amount of money banks can lend, and vice versa.

Intervention and Reserve Management

Before examining the types and track record of intervention a brief summary of why central banks and governments consider using a such a policy tool at all:

1. **Intervention as a form of protest: In this case policy makers are protesting current market levels as a threat, whether to the country's export sector or out of fear that the country's financial markets are being destabilized due to a surge, in or out, of portfolio flows**
2. **Intervention to calm markets in times of political turmoil: The U.S. intervened in March 1982 when President Reagan was shot.**

Intervention comes in several forms:

Verbal Intervention: This approach consists of well-timed statements by numerous officials from both the public and private sector. Some will carry more weight than others: For example concern over currency levels made by the chairman of a major exporter vs the same statement made by the Minister of Finance. The former would be seen as talking his book while the markets are apt to take a comment from the latter much more seriously. Finally, the same statement, if made by a central bank official, typically expected to be more apolitical than a political appointee, would carry even more weight. Verbal intervention can also be effective, even by just one nation acting alone, at least in the short term. It usually occurs in the form of Central Bank and policy-maker statements that provide clues about the Fed's possible actions in the future. These statements are important signals in the FX markets and can cause knee-jerk reactions in the spot market. A recent example of such intervention was when ECB president Trichet signaled on 7/3/08 that he had "no bias" towards increasing rates again this year, and caused an immediate 1% drop in the Euro.

- Actual intervention undertaken by one country, unilaterally or on behalf of another country. In this case the government in question decides to actually back up statements with real Dollars, or Yen, EUROs or Reis as the case may be. This action itself can take several forms. The CB can act purely on its own, or can enlist other central banks to act on its behalf. For example, the Bank of Japan has intervened on numerous occasions over the past decade and at times the U.S. FED would act on its behalf. In terms of credibility, or market impact, the FED acting on behalf of the BOJ has always been seen as less impactful than the FED trading for its own account. In terms of tactics there are many approaches. A central bank can leave orders at a certain level either during its trading day or on a 24 hour basis. This approach is more passive than actively requesting prices from the market with the latter approach guaranteed to garner more headlines, make more noise and hence have a more lasting impact on market psychology.

- Coordinated intervention: This constitutes concerted and repeated intervention by a group of central banks such as the G-7 or those within the ASEAN bloc. The actions of all are focused on the currency of one or two members, such as when the G-7 all intervened to weaken the YEN or the DM in 1995. Even in this instance different countries may exhibit different levels of commitment as evidenced by the amount of funds committed or by the release of statements by policy-makers. The latter can have the impact of amplifying or muting the actions being taken in the market.

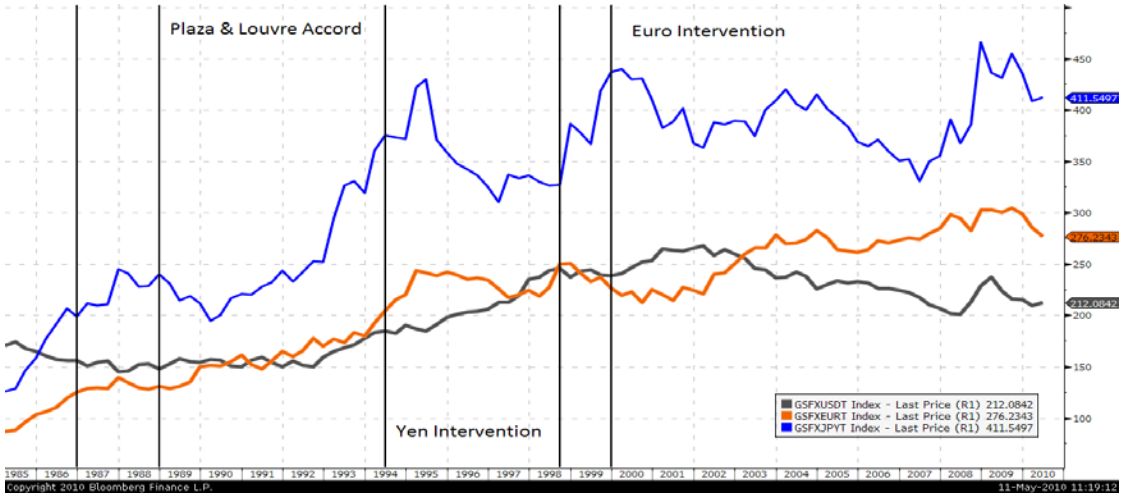
- Sterilized Vs Un-Sterilized Intervention: Whether done on a unilateral or coordinated basis markets have learned to pay close attention to whether the actions taken the Foreign Exchange markets are "sterilized" by offsetting actions taken in the domestic money markets. For example, when a country sells its currency in order to weaken it the additional supply of that currency will all things being equal lead to an increase in domestic liquidity. Should the country's central bank then decide to "drain" that liquidity via various policy actions the intervention has effectively been "sterilized" Clearly sterilized intervention is less effective as in the above example the draining of liquidity will, all things being equal, lead to higher domestic rates. This in turn would increase the attractiveness of the local currency, thus blunting the impact of the just completed currency intervention.

Does Intervention work:

In smaller Emerging Markets, where regulations often limit the ability of the FX markets to operate freely intervention is resorted to on a regular basis. Within the G-10 however, given that the size of the FX markets dwarf the resources available to the central banks, intervention is a tool that has been used sparingly and in recent years, virtually not at all. During the decade from 1985 to 1995,m when daily volume was much smaller then at present, several successful rounds of intervention were undertaken by the G-7. The most famous was set in motion by the Plaza Accord in September 1985, and was designed to weaken the USD across the board. While seemingly successful it is worth nothing that the dollar had already depreciated nearly 20% from its record high Vs the DM before policy makers finally came together at the Plaza. Furthermore, two years later when the G-7 attempted to halt the USD's two-year decline they met with limited success with markets ultimately driving the USD down another 15%.

To have more than a passing impact intervention must be well-timed to catch the markets off-guard. In some cases the actions of policy makers can be amplified if certain segments of the market correctly anticipate the onset of a round of intervention. This occurred during the summer of 1995 when the U.S. intervened to weaken the YEN. By using leverage through the purchase of low-delta options the hedge fund community controlled a sizable portion of the market's liquidity. These positions served to amplify the actions taken by policy makers as they forced the market to buy USD in order to cover those option positions.

Short term success notwithstanding, for intervention to succed in the long-term the actions taken by central banks must be backed and reinforced by medium and long-term policy actions taken by monetary and fiscal policy makers.



Central Bank Currency Intervention over the past 30 years ($, ¥ and €)

In the first half of 2008 the idea of dollar intervention was gaining attention. Given the precipitous drop in the dollar against the Euro, an obvious focus at the time was whether direct intervention should be used to the stem the dollar's decline. However there were many reasons for this decline, including a cyclical current account squeeze; the onset of the credit crunch; and interest rate cuts to mitigate the effects of the US recession. These factors, along with an increase in commodity prices led to a wide appreciation of the Euro vis-à-vis the dollar and hurt European exports. There was backlash against the ECB from European populists, most notably Nicolas Sarkozy of France, claiming that the unprecedented rise in the Euro was bad for Euro zone business. The case for intervention was strong but decoupling in monetary policy would have made it challenging for success. Three factors tend to drive the success of FX intervention: long-run valuations, market conditions and, most importantly, monetary policy. It seems two of these factors were present, valuation and conditions, but there was no coordination between the Fed and the ECB due to divergent monetary policy agendas: one with a dual mandate and the other with price stability, which stymied this discussion.

Reserve Management

Foreign exchange reserves are holdings of foreign-denominated securities by central banks of foreign governments. They serve as collateral for foreign borrowing and ammunition for intervening in the currency markets. About $8 trillion globally is held on reserve, the vast majority in US dollars, in the form of U.S. Treasury securities. In order to achieve a desired level of safety, liquidity, and return, central banks will diversify these reserves among different currencies, primarily the USD, EUR & GBP. Given the large proportion of reserves based in USD, the FX markets pay very close attention when talk surfaces of banks diversifying away from U.S. dollars.

More often, central banks have been known to use their reserves to intervene in the currency markets as discussed above. For instance, a country may wish to increase the competitiveness of its export sector and to do so would require a weaker currency. The country would therefore buy foreign currency or assets and pay with – i.e. they would sell - their domestic currency and attempt to depress its value. In another example, a country may desire a less volatile, more stable FX rate to encourage investment and trade flows and would therefore tap into their reserves and buy/sell their currency as necessary. In a more dramatic scenario, a country might use them to fend off a speculative "attack". A bank that has accumulated adequate reserves may sell them to buy and prop up their local currency.

International Reserve Assets

1) World	Current (Bil USD)	Pct Of World	1 Year Ago (Bil USD)	1 Month % Change	1 Year % Change
6) World	6926.32 09/26	100.000%	5715.57	-.7%	21.2%
2) Americas					
7) Brazil	206.05 09/25	2.753%	162.51	.4%	26.8%
8) Mexico	81.98 09/19	1.184%	73.24	4.5%	11.9%
9) United States	39.97 09/19	.577%	43.79	-2.5%	-8.7%
10) Argentina	45.37 07/31	.655%	42.50	.1%	6.7%
11) Canada	40.76 07/31	.588%	38.56	-2.8%	5.7%
3) Europe/Africa/ME					
12) Russia	582.01 07/31	8.076%	407.50	5.0%	42.8%
13) Eurozone	220.67 07/31	3.186%	200.67	1.2%	10.0%
14) Algeria	133.24 06/30	1.924%	90.96	3.2%	46.5%
15) Libya	87.49 04/30	1.263%	64.20	2.3%	36.3%
4) Asia/Pacific					
16) China	1808.83 06/30	26.115%	1332.62	.7%	35.7%
17) Japan	971.25 08/31	14.023%	910.87	-.6%	6.6%
18) India	282.81 09/19	4.047%	228.57	-1.1%	23.7%
19) Taiwan	282.09 08/31	4.073%	261.37	-3.0%	7.9%
20) South Korea	243.20 08/31	3.511%	255.30	-1.8%	-4.7%
5) Currency Holdings					

{WIRA <Go>} for Central Bank international reserves

Effects of USD-denominated selling

It is possible that governments may decide to undertake large amounts of USD selling. The weakness of the dollar or even political reasons may causes. Given the large amount of USD on reserve, and the nation's increasing deficit, concerted selling would likely reduce the value of the USD against these other nations. A depressed USD can lead to higher import prices in the U.S., which cause higher consumer prices and inflation. Inflation is typically met with higher interest rates, which slow the economy, can lead to layoffs, and hurt consumers already affected by higher prices.

However, there is a market saying that states: "If you owe the bank a million dollars, that's your problem. But if you owe the bank a billion dollars, that's the bank's problem!" This saying neatly describes the other side of heavy USD reserve selling, and points out that there are effects on not only the U.S. economy, (a debtor nation), but on the seller's (creditor nation) economy as well. A USD decline is conversely a rise in the foreign currency, making their exports less competitive. This can pose a problem for Japan and China, the largest holders of USD reserves, as they are heavily dependent on their export sector. Furthermore, the selling would force the asset prices down, thereby reducing the value of their remaining holdings.

Summary

Central Banks control monetary policy, the supply and price of money, and in doing so affect the health and direction of the economy. They are typically focused on controlling inflation and promoting economic growth, and their main tools are interest rates. They are at the helm of their respective economies, and so are also the architects of the very same economic situations that they try to improve.

THE ECONOMICS OF FOREIGN EXCHANGE

An FX rate is relative price, expressing the value of one currency in terms of another. What the rate is really comparing however is the economies of the two countries involved. With FX, you are hedging or speculating on the fortunes of different nations. The economy which is performing better and that is perceived to have better prospects for the future will see its currency appreciate relative to the other. Hedge fund manager John Taylor calls it "The game of world" and in the long-run it is won or lost based on economics.

So what exactly is an economy? An **economy** can be broadly thought of as a system of production and consumption of goods and services of a country or other area and how those goods or services are distributed or exchanged. Goods can be everything from clothing to airplanes. Services include financial, medical, entertainment, and the like. Economic systems are generally market or controlled. A **market** economy is governed by supply and demand, where the open market determines both the value of goods and services and how they are allocated, meaning they can be bought and sold freely between participants that want or require them. In a **controlled** society the economy is centrally planned. That means the government determines the value of goods and services (read: wages), and controls the supply of raw materials and finished goods and attempts to manage their demand in order to sustain their price levels and their own political power. Not surprisingly then, most market economies tend to have "freely" traded currency, while most controlled ones tend to have more-heavily regulated currencies.

The fundamental approach

An economy yields enormous amounts of data about itself that can be used to analyze it. The data provides clues about its growth, inflation, labor markets, trade position, and overall health and prospects. The data are gathered and published by governments, government organizations and central banks at fixed intervals (weekly, monthly, and quarterly). Information providers like Bloomberg are essential in distributing this data as well as a calendar of future releases and consensus expectations to the market. This data are vital for traders, strategists, economists, investment managers, corporate treasurers, and policy makers for making trading, business, and policy decisions. Each major release is scrutinized to identify trends and discern the direction of the economy, and for hints at future policy decisions. It is also used to compare the performance of different economies and to determine if a currency is under- or over-valued. This approach to valuing and forecasting foreign exchange based on its economic fundamentals is known as the **fundamental approach**.

A list of some of the most important and widely followed economic data and metrics for this approach in the FX markets are detailed on the subsequent pages.

Consumer Price Index:

The consumer price index is the indicator most people use to track inflation. The index is familiar and readily available, but not necessarily accurate due its fixed weighting of prices and goods, which has led many economists' and the Fed to use the core personal consumption expenditure (PCE) as their benchmark inflation gauge. The British have a similar inflation gauge called the Retail Price Index (RPI), and the European Union's statistical agency, Eurostat, publishes a harmonized index of consumer prices for the Eurozone.

CPIs measure the cost of a basket of goods and services purchased by the average household each month. The basket's composition and weightings are usually based on surveys of household expenditure habits. The weightings of each countries inflation index varies by different factors, such as income and standard of living, which leads less-developed nations to have a higher weighting for food and staple products. The recent surge in commodity prices has had dire effects on these nations.

Another key CPI measure is called "Core CPI" which is the CPI less food and energy prices. The reasoning behind this is because of the inherent volatility in energy and food prices they may skew the value of the index. They are also viewed as non-discretionary items, meaning consumers will purchase them almost regardless, and so they are not a meaningful measure of price increases across the broader economy. This last point is the subject of much debate, but CPIs remain as important and ubiquitous inflation indicators. An important use of the CPI is as guide for setting wages and if not anchored properly can lead to a wage price spiral as seen in the US in the 1970s.

Inflation is the bane of financial markets, as it destroys the value of money. A simple back-of-envelope calculation can conclude the damage that high inflation can cause. If you take 72 divided by the annual rate of inflation this will give you the time it will take for prices to double. The issue for consumers lies in the ability to generate higher wages, which has been heavily reduced since the onset of a globalized economy, and can lead to lower real income and purchasing power.

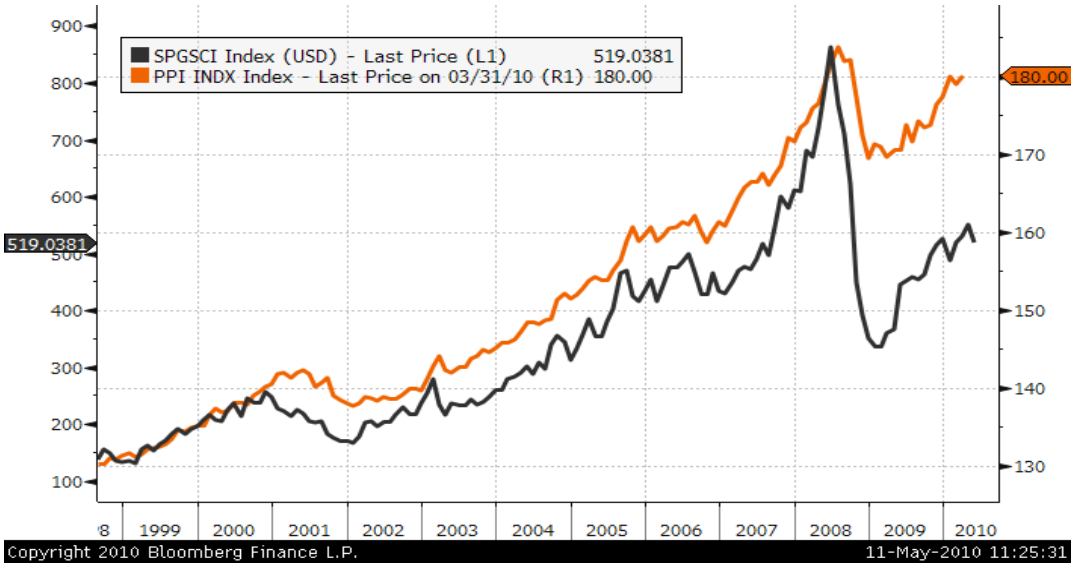
Inflation, therefore, has profound effects on the bond and currency markets as well. Short-term inflation may lead to currency appreciation vis-à-vis the effects of tighter monetary policy but once inflation is embedded in the economic framework this can be detrimental to the value of a currency. Just think: would you want to have a store of value in a currency that will be worth substantially less in the future, certainly not. The effects that inflation has on the value of money causes investors to sell bonds and will lead to an exodus of capital denominated in the currency of inflation-rich economy, as displayed in Latin America in the 1990s.

Producer Price Index:

PPIs track prices of domestically produced goods at the factory gate. They are used t to measure price levels for wholesalers, in contrast to CPIs which measure the cost to consumers. Most PPIs cover output prices of goods produced in factories. This index relays the cost pressures put on the supply-side of the economy. The indices are complied on the basket principle with weights reflecting the output of each contributor relative to the total.

It is important to note that PPIs are directly related to the cost of commodities, since these are the inputs used to derive the products sold on the shelves. If there is a rise in commodities, as seen from 2004 – 2008 (Figure 1), this can have a grave impact on the price businesses' pay for their inputs. Since businesses' will always want to meet their margins they will be inclined to pass these prices onto the consumer, which can lead to a rise in consumer prices (CPI). Once again, if not anchored properly by the central bank, producer prices can lead to a general rise in inflation.

Figure 1. PPI & Standard & Poor's Goldman Sach's Commodity Index



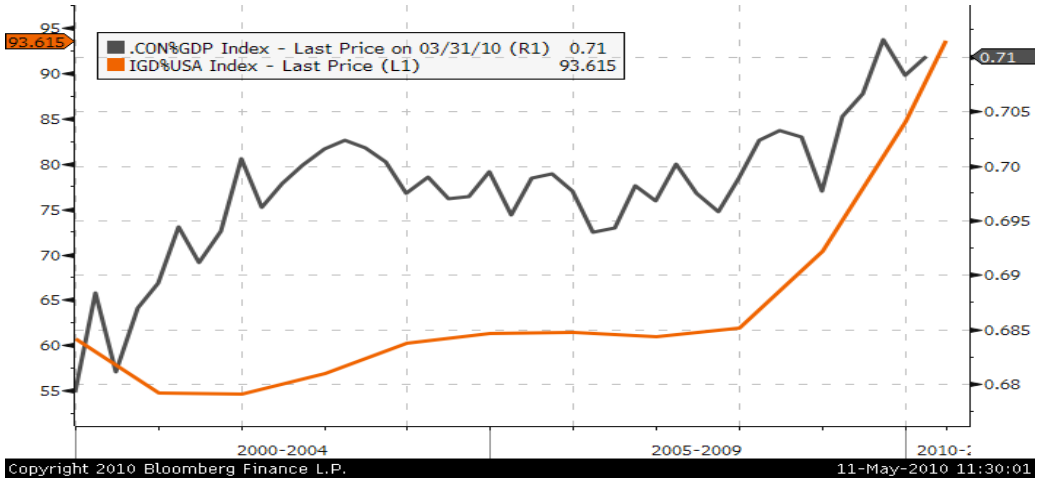
Source: Bloomberg, Goldman Sachs

Gross Domestic Product:

GDP is the measure of the market value (output) of all final goods and services produced in a country during a year. It is a measure of growth and serves as the pulse of a nation's economy. GDP is comprised of four key components and each component accounts for percentage of total expenditure. The four components are: **consumption, investment, government spending** and the **trade balance** and are denoted as C+I+G+X**.** As noted, each component comprises a value in the real economy that helps analyze the saving and consumption patterns of a nation. Each of these are accessible under **{ECOF <GO>}, {ECST <go>}** or **{GDP <go>}**.

Consumption is spending by households on goods and services such as food, clothing and oil. Consumption is the most important part of the GDP equation as it is the engine of the US economy and has been one of the main drivers of world GDP for the past decade. To the concern of many economists, consumption spending on durable goods, non-durables goods and services accounted for nearly three-fourths of American output, most of which was imported crude oil (Figure 2).

Figure 2. Consumption % of GDP & Government Debt % of GDP



Source: Bloomberg, IMF

Over the past ten years consumption has been on a tear as Americans binged on cheap products imported from Asia, notably China. To fuel this demand people borrowed from their homes, credit cards and saving accounts to the tune of nearly 133% of disposable personal income. Consumption is largely a function of disposable income and even more so, credit. With the onset of the housing crash and subsequent US slowdown this seems to have come to an end and there will be a global rebalancing of consumption patterns, leading to a much slower US economy.

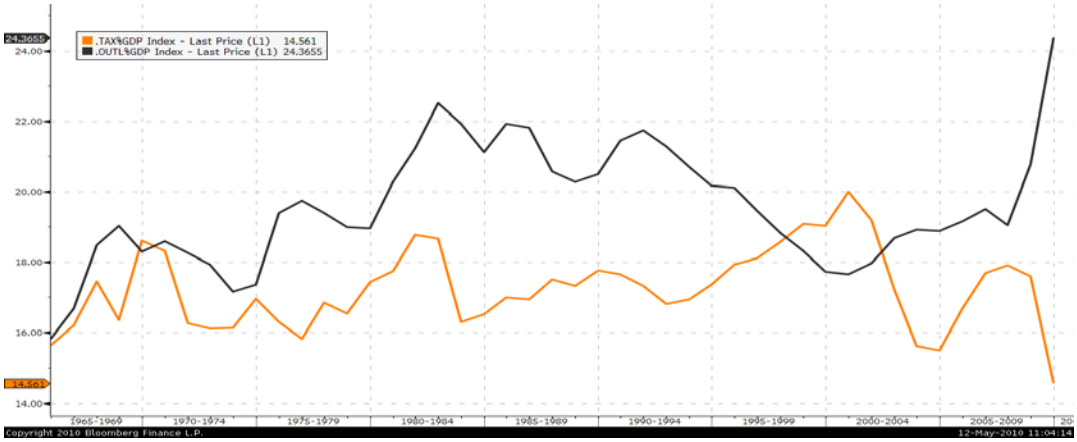
Investment is not to be confused with spending on financial products (which qualifies as *savings*). Instead, it refers to spending by firms on final goods and services (inventories), primarily capital stocks, such as machinery, factories and the like. Investment may also include the goods that a firm produces but does not sell during current quarter. Although a much smaller part of the US GDP equation (it accounts for 14% of total output), increasing investment may reflect business expansion and the manufacturing sector's outlook on the economy. Business spending is typically spurred by strong return on capital, low borrowing costs and strong financial conditions. Therefore, the biggest challenge to investment is to whether firms can fund these activities. (During the noughties, emerging markets and developing Asian accounted for the largest of investment, as their countries were rife with cash from savings and global investment.)

Government spending comprises the next largest part of the GDP equation. It includes purchases by federal, state and local governments of final goods, such as bridges, roads, tanks and teachers pay. The federal budget is the difference between revenue (tax receipts) and outlays (spending). If spending matches revenue the budget is balanced. When spending is greater than revenue the budget is in deficit and vice versa.

Countries with budget deficits and lower domestic savings are reliant on the financial markets to fund their deficits, which leaves their growth and currency position at the whim of the market's confidence in their fiscal position. This theory does not always hold, though. Italy and Japan, for example, have been able to run sizeable deficits for some time without a deterioration of their currency value or a run on their banks. But as their population ages and workers retire they may be forced to look for international funding, as their domestic savings shrink.

It is conventional wisdom that a country's fiscal balance is challenged during a recession. This is due to the lower tax receipts from decreased demand and automatic stabilizers, such as unemployment insurance, that increase expenditures. This weighs on the state and federal coffers. Moreover, over the past 30 years the US have embraced policies that increased spending while reducing taxation, leaving the international markets to fund its deficit. Since 1979, for instance, federal spending has increased by some 495%, while tax revenue has only increased by 354% (Figure 3).

Figure 3. Federal Budget: Revenues & Outlays, % of GDP



Source: Bloomberg, Treasury

Outlays are broken out into two separate categories, discretionary and non-discretionary. Health care, social security and other mandatory entitlement components are characterized as non-discretionary. These entitlement programs consume 60% of spending and are the major long-term concern of budget hawks. But to alter these provisions would require enactment by congress, which-makes budget reconciliation that much more convoluted. Thirty percent of the budget is considered to be discretionary, of which defense spending is the major contributor.

In theory, this spending is not mandatory but when a country is mired in two wars any adjustment becomes contentious. The 2011 defense budget will increase from about $500 billion in 2005 to $738 billion in 2010, which based on 2009 expenditures consumes 4.5% of GDP. As a percentage of outlays, defense spending accounts for 18% of government expenditures.

Trade balance is the sum of net export, meaning exports minus imports, and is the last piece of the economic output. Exports are domestically produced goods or services that are sold abroad and imports are purchases by domestic buyers of goods and services that were produced abroad. If the value of exports exceeds imports that is known as a trade **surplus** and if imports exceed exports that is known as a trade **deficit**. This is a keen insight into the spending and saving patterns of a nation and can have a big impact on the value of a nation's currency, as it clearly shows if the currency is being net purchased, to pay for its exports, or net sold, to pay for the imports. According to economic theory, sustained trade surplus should lead to currency appreciation and a trade deficit to depreciation, as the flow of money is influence by supply and demand patterns.

Overall, economic output (GDP) will influence the value of a nation's currency since investors' rely on GDP as a key measure of growth and as a backdrop for overall confidence. Therefore, impacting trade and capital flows and should favorably increase the value of that nation's currency, as incoming capital surges. Crises of confidence can have severe effects on a currency, as was the case in the 1997 Asian currency crisis when 13 nations lost nearly 40% of currency value due to diminished economic confidence and a corresponding exodus of funds. This also occurred in Latin America throughout the nineties as investor's eschewed risk from the on-doing defaults and banking crises that plagued Argentina, Mexico and Brazil.

Industrial production:

This is manufacturing production plus the supply of energy and water, and the output of mines, oil wells and quarries. This represents total output of factories and mines and is broadly indicative of the economic well-being. The output of industries producing capital goods and consumer durables tends to be squeezed most during a downturn. This can diminish consumer confidence and can lead to a squeeze on consumption spending. If the US consumers are spooked and must reduce their spending this will have a tremendous impact on economic growth since 72% of the American economy hinges on spending.

Capacity utilization:

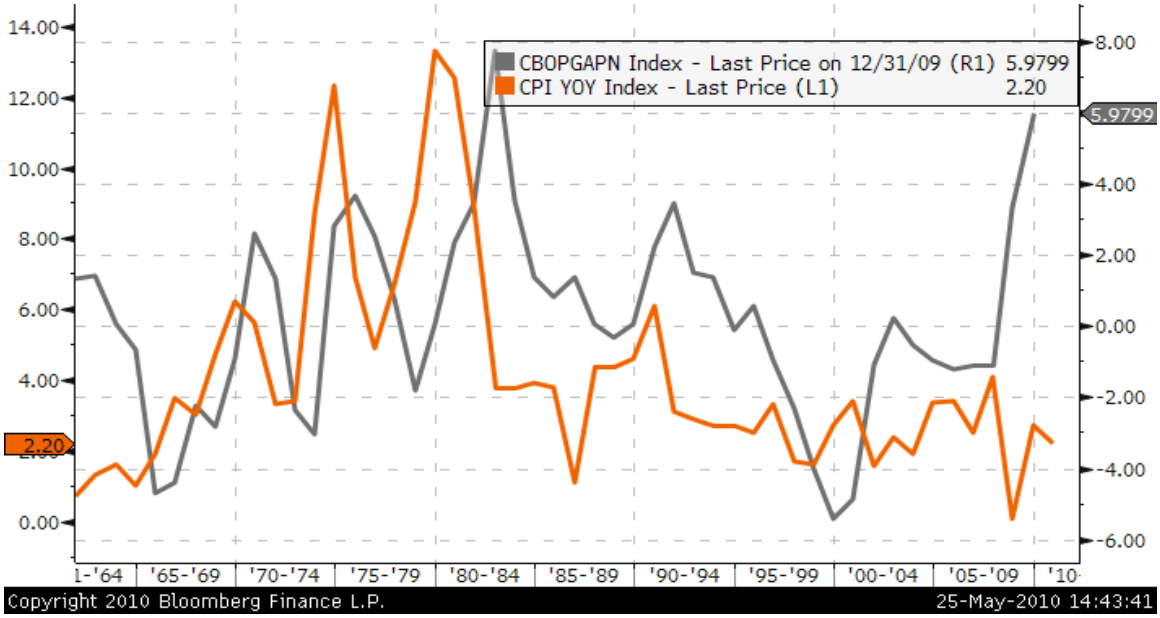
Capacity utilization measures the extent to which plant and machinery is in use and has a very strong relationship with industrial production. Capacity use is usually defined as output divided by the potential maximum capacity. Think of running a factory at 70% capacity or 95%: this will provide insight into the business cycle and, generally, how well firms are using their resources to meet potential demand.

There are two interpretations that can be useful when looking at the broader economy. First, strong economic growth with higher capacity usage (90%-95%) usually suggests inflationary pressures since firms are running businesses' with very little potential output left. Second, when firms cease to meet their potential and have capacity utilization of around 65% to 75%, it can be an indication of slowness in the economy.

On a larger scale, the capacity measurement for the economy as a whole is called the **output gap**. The output gap is defined as the difference between the actual output of the economy and its potential output. Potential output is the maximum level of goods and services an economy can produce at full employment, NAIRU. Economists also refer to potential output as trend output or the production capacity of the economy. A positive output gap means that the economy is operating above its capacity to sustain that level of production owing to excess demand. A negative gap means that there is excess supply – that is to say, spare capacity or slack in the economy – due to weak demand.

The output gap is an important variable for monetary policy as it is a key source of inflation pressures in the economy. When demand for goods and services presses against the economy's capacity to produce, this tends to put upward pressure on prices. When demand is weak, it tends to push prices down. Put another way, when the rate of inflation consistently comes in higher than expected, it is typically a sign that demand for goods and services is pushing against the limits of capacity. When the rate of inflation consistently comes in lower than expected, it is generally a sign of weak demand and of spare or unused capacity. Indeed, the output gap and inflation tend to push in opposite directions (Figure 4).

Figure 4. US Output Gap, % from Potential & Inflation, y/y

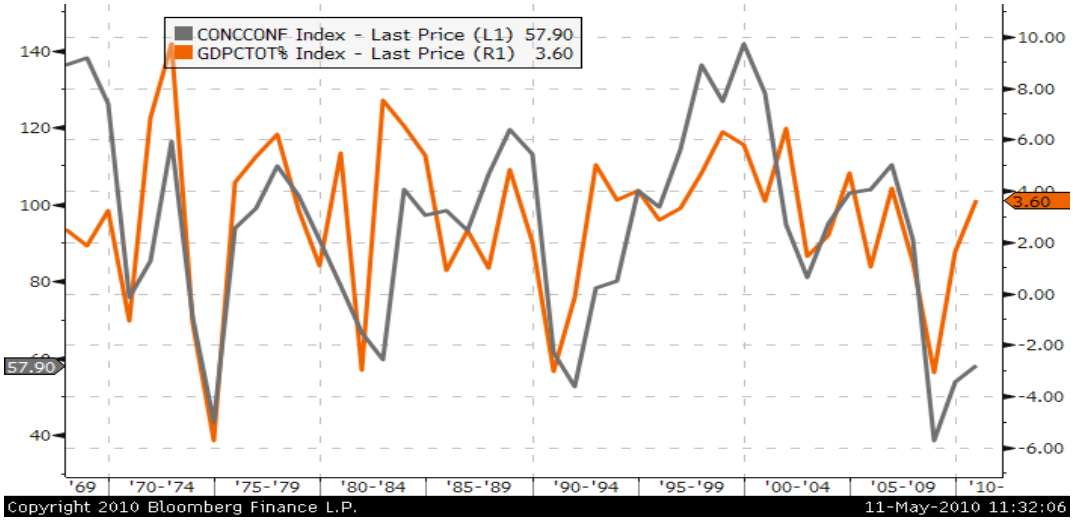


Source: Congressional Budget Office, Bloomberg

Consumer confidence:

Consumer confidence are monthly surveys complied by the Conference Board and University of Michigan that attempt to measure the consumers' perception of their economic well-being. These surveys can be misleading but are valuable as leading and sentiment indicators. In general, the higher the index means the more optimistic consumers are, and the more likely they are to spend. This boosts the consumption part of GDP and overall economic output. Historically, there has been a strong link between confidence and consumption spending (Figure 5). As economic data go, confidence indicators tend to be of moderate importance. They are highly subjective and anecdotal, and rely on small sampling sizes. Still, pronounced changes in the index do provide signals that the FX market will react to.

Figure 5. Personal Consumption & Consumer Confidence



Source*: Bloomberg, Conference Board, BEA*

Housing:

The housing market can be summed up in three parts: starts, completions and sales. These are the number of new homes begun and finished, and sales of new and existing homes. It is a key barometer of construction activity, consumer demand, and economic growth. Indeed, since 1988 the rolling 1 year percent correlation of GDP and the Case-Shiller housing index averaged nearly 53%. And, according to the Bureau of Economic Analysis, housing activity accounts of nearly two-thirds of personal consumption.

Experts reckon that housing activity tends to lead the business cycle and can be useful for determining turning points. Housing affects the FX markets because of its strong relationship with output. In sum, a depressed housing sectors leads to weakened output that, in theory, would reduce demand for the currency.

Much has been made of the recent financial crisis being started by the housing bubble. In the run-up to 2007 housing prices were up nearly 120% in the US and 140% in the UK and have precipitously fallen back as the failure of Lehman Brothers has exasperated the recession (Figure 6). The explosion of these markets and the development of securitization allowed banks to lend, repackage the loan and sell-off the loan to the highest bidder. This was supposed to dilute the risk of default by spreading it throughout the financial system, but once housing bubble burst banks become concerned about each others balance sheets, in turn freezing up lending. This weakened financial conditions and led to a liquidity freeze which subsequently reduced growth and investment.

Figure 6. US & UK Housing Returns, y/y

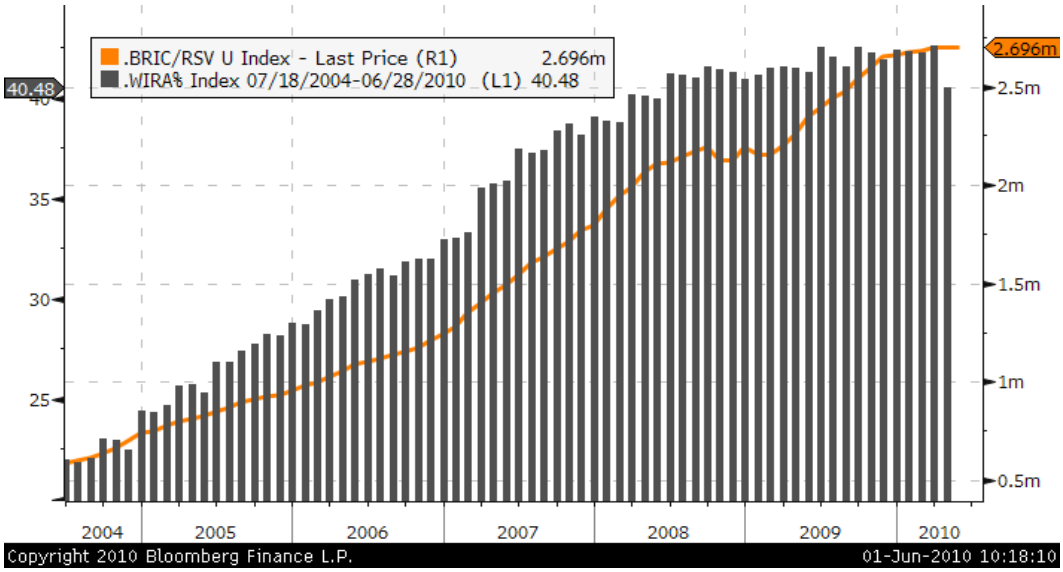
Source: Bloomberg

The banks were not the only culprits of this bubble as consumers took on too much debt. In the U.K., for example, by the end of 2007 UK household debt had reached 177% of disposable incomes (141% in the US), according to the OECD. Not to mention, US consumers extracted nearly $210 billion in the form of home equity credit (HELOC) from 2001 to 2006, most of these funds used to fuel personal spending. It is, therefore, not surprising that the housing bust and resulting decline of wealth (nearly $17 trillion) was the catalyst for the global credit crunch and the Great Recession. According to data compiled by Bloomberg, as of 5/12/10 global financial institutions have written off nearly $1.8 trillion, with the US accounting for $1.2 trillion and Europe $546 billion.

The housing bubble developed from a combination of low interest rates, lax lending standards, financial innovation, deregulation and a search for yield at all cost, on behalf of banks and speculators. In short, what was seen in the US and around the globe was a frothy housing market that created a “wealth effect”, which allowed many consumers to draw-down their savings and buy homes and leverage their homes to finance consumer spending. Research by the Peterson Institute of Economics suggests that consumption declines by 4% for event 1% drop in household wealth. This relationship may explain the 5% plunge in US GDP in the summer of 2009.

The demand for housing was further enabled by demand for the greenback by the BRICs (Brazil, Russia, India and China), whom purchased dollars to maintain their export advantage. Currently, the BRCIS account for nearly 43% of all dollar reserves (Figure 7). This system exchange rate management, dubbed Bretton Woods II, reduced yields on American treasury bonds, helping to keep interest rates low and bolstering Americans inclination to borrow. In the summer of 2007 this all came crashing down and many pundits believe that the US-led recession will not abate until the excess housing supply is worked off.

Figure 7. BRIC Reserves



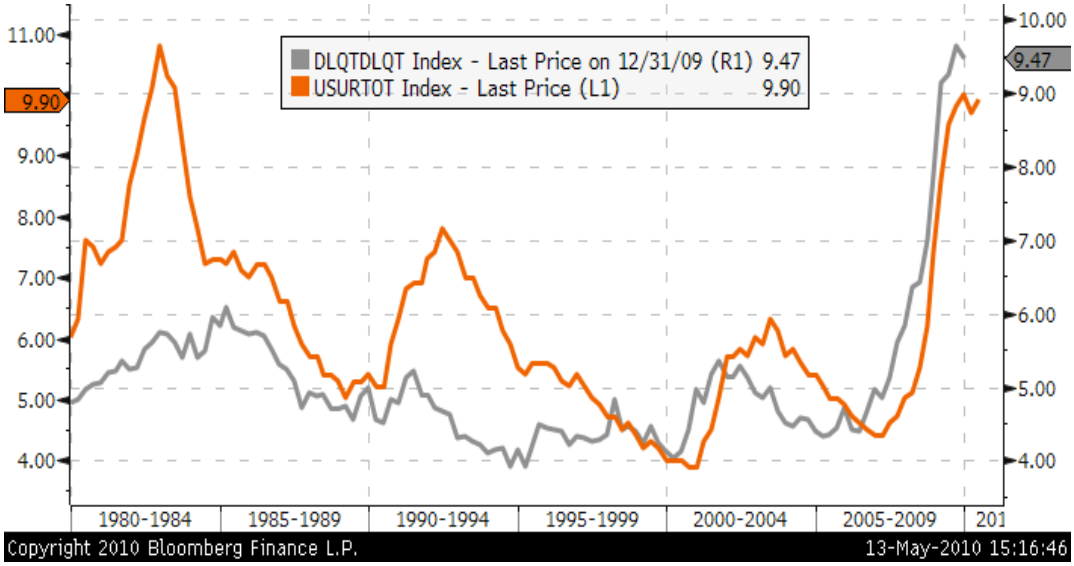
Source: IMF

From their pre-recession peak, economic output fell 3.3%, but housing starts dropped 73%. In 2009, housing starts were lower by half than in any year since 1959, when the US population stood at 178 million. About a third of the jobs lost in the Great Recession have been in construction, real-estate finance, and architecture or building services. Housing prices, meanwhile, have fallen 28% since their peak in 2006, according to case-shiller home index.

The Great Recession exasperated the housing downturn, as prime borrowers started to default on their mortgages in lieu of subprime borrowers. Indeed, 60 day subprime delinquency peaked in December of 2008; starting at a low of 1.18% in 2005, prime rate delinquencies as a percent of total loans climbed to nearly 21% by the end of the Q1 2010. As wealth plunged homebuyer affordability dropped, leading to a surge in vacancy rates and a greater supply of homes.

With the unexpected rise in unemployment it became increasingly burdensome for homeowners to keep up with their mortgage payments. As you can see from Figure 8 there is a strong relationship between the unemployment rate and mortgage delinquencies. In the case of many homeowners, the mortgage was worth more than the value of their property, which enabled a few folks to simply walk away from their obligations.

Figure 8. US Unemployment Rate & Mortgage Delinquencies, % of Total Loans



Source: Bloomberg, BLS

Unemployment

The unemployment rate is an important figure when trying to discern the economic landscape. The rate is measured as the percentage of the labor force that is unemployed and is released the first Friday of each month in the monthly jobs report. The labor force includes all employed persons and those unemployed individuals who are seeking jobs. It excludes workers who are not currently seeking employment, such as students, retired and homeless.

The unemployment rate tends to reflect the state of the business cycle: when output is falling, the demand for labor falls and the unemployment rate rises and vice versa. During the Great Depression the unemployment rate reached an unprecedented level of 25%, which has yet to be surpassed. But, during the Great Recession the underemployment rate – which is the ratio of the total number of unemployed person to the total number of employed persons - was close, peaking at nearly 20.2% in early 2010 (**.UNDEREMP INDEX <GO>**).

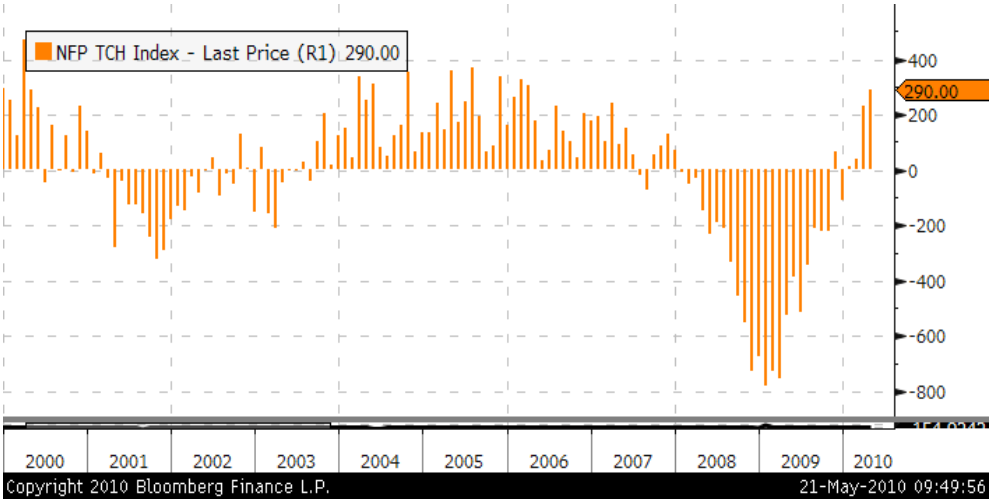
Employment data are important because they reveal how businesses and others responsible for hiring decisions view the current and upcoming economic environment. Companies will not shoulder the expenses involved in adding to their payrolls if they believe they won't need the extra workers in the near future. Similarly, they will be reluctant to dismiss workers if they foresee increasing demand for their wares. From the household perspective, nothing is more important than employment status. It is said that consumers can be expected to cut spending when faced with higher prices or declining wealth. Truth be told, consumers will indeed continue to spend despite higher prices and lower portfolio values. But nothing erodes consumer confidence and subsequently stops a consumer from spending like the loss of a job. The loss of nearly 8 million jobs during the Great Recessions,

therefore, has been catastrophic for the US economy and forced the administration to enact a nearly $800 billion stimulus package to necessitate demand (Figure 9).

Source: BLS

A rise in unemployment is a good signal that growth has fallen below potential. Better still, it matches the definition of recession and some economists' feel it would serve as more suitable recessionary-barometer than the two quarters of negative GDP growth, currently the market standard. During the past half-century, whenever American's unemployment rate has risen by a half percentage point or more the NBER has later declared it a recession. With that in mind there is an old adage on Wall Street: when your neighbor losses his job, it is called an economic slowdown. When you lose your job, it is a recession. But when an economist loses his job, it becomes a depression.

Figure 9. US Non-Farm Payrolls



Souce: BLS

Current-account

The current-account is a ledger of the country's overall balance of payments, the record of all transactions between a country and the rest of the world. Put simply, the current account measures mainly trade in goods and services; the capital account measures borrowing and lending. A current-account deficit means that more goods and services are flowing into a country than is flowing out and vice versa. This difference needs to be paid for, so the current-account deficit must be matched (financed) by an equivalent amount of foreign borrowing (i.e., a capital-account surplus) or by running down reserves of foreign exchange at the central bank.

The biggest component of the current account is the trade balance (exports minus imports) discussed above. However it also comprises services; interest payments to foreign investors; private transfers; and official transfers (foreign aid and domestic welfare). The current-account therefore is an integral indicator in the foreign exchange markets and over the years there have been many balance-of-payments currency crises, particularly in Latin America and Asia.

The size of the current account tells you little but if you dig into the details it can provide insight in the financial stability of a nation. Is the country saving too little? Is domestic investment too low? Is the money borrowed (based on a country with a deficit) being used for productive investment, such as roads, schools, bridges and the like. If a country is using the borrowed money to fuel frivolous spending that country may find it difficult to fund its deficit. An over-stretched current account deficit, nearly 7% of GDP, was a catalyst for the five year deprecation of the dollar (Figure 10).

Figure 10. Trade-Weighted USD & US Current Account Deficit, % of GDP y/y

Source: Bloomberg, Federal Reserve

It is important to note that not all current accounts are interpreted the same way. For example, an oil exporting nation has a visible trade surplus (exports > imports) but may pay out sizeable dividends in the form of interest payments on its debt. This means that even though they have a trade surplus, their current account is actually negative. Alternatively, a country with a visible trade deficit (exports < imports) can still have a positive current account if they have borrow sparsely from the global financial markets.

But, if the global investment community becomes spooked, too much foreign lending can lead to a balance of payments crisis, as investors unwind their positions in risky assets. This may lead to a deprecation of the currency or a spike in interests, depending on the government's actions. In the wake of the Asian crisis, for example, Thailand's government dithered over whether to float their currency or protect it and these actions cost them dearly as the market bet correctly that they would eventually be forced to devalue. These actions were consistent in Mexico's government, during the so-called Tequila crisis, which led to a balance of payments and subsequent currency crisis.
Although, it is conventional wisdom that current accounts are essentially accountings metrics, measuring inflows and outflows, the lessons we can bear from history teach us that in times of risk aversion, current account positions matter.

Balance of Payments

The Balance of payments is the sum of the current account and financial account. The current account is the broadest measure of net flow of trade and investment income. The financial account is where these transactions are recorded: credits for incoming cash and debits for outflows. The movements of money across borders, in the form of foreign direct investment (FDI), treasury purchases, stock purchases and the like, have a great impact on the demand of currency. Reduced appetite for dollar assets will depreciate the currency and vice versa, as has been seen throughout the dollar's decline characterized by low returns and reduced confidence in the US currency. This led to an outflow of dollars as investors focused their attention towards emerging markets as a new mechanism for capturing return.

There is also a risk premium attached to nations that run current account deficits since the deficit must continue to be funded to avoid a sharp depreciation of the debtor nation's currency. When a country runs a current account deficit they are funding their consumption by issuing debt to foreigners. In other words, a country exchanges government bonds for cash to fund consumption spending. However, this carries an inherent risk that the debtor nation could default on their debt, such as Russia in 1998, Mexico in 1994 and Argentina in 1992. Such events are cataclysmic for currencies as principal evaporates and trust is eroded.
Each one of the above examples endured an ensuing currency crisis and devaluation. The second risk is simply that the lending nations' demand might recede. This has long been argued throughout the dollar's decline, as the concern rises that China and Japan and other nations will lose their appetite for an increasing indebted, low-interest yielding U.S. dollar.

As the net difference between a country's exports and imports, the trade balance displays a country's fundamental trading position and is an influential part of the current account balance, which is exports minus imports, income earned abroad minus transfer payments. This balancing act can have a major impact on the value of a nation's currency.

A trade ***deficit,*** when imports exceed exports, can have a depreciating effect on a nation's exchange rate. The reason is straightforward: with imports it is necessary to *purchase* the currency of the importer and therefore *sell* the domestic currency, depreciating its value relative to the exporter. With the growth of manufacturing juggernauts such as China and India it has been advantageous for American consumers to import goods from these nations because they are cheaper to produce (they have what's known as "*comparative advantage*"). This has led to a surge in imports that puts enormous pressure on the U.S. dollar (it also puts downward pressure on things like American wages, which although unfortunate helps to keep inflation at bay).

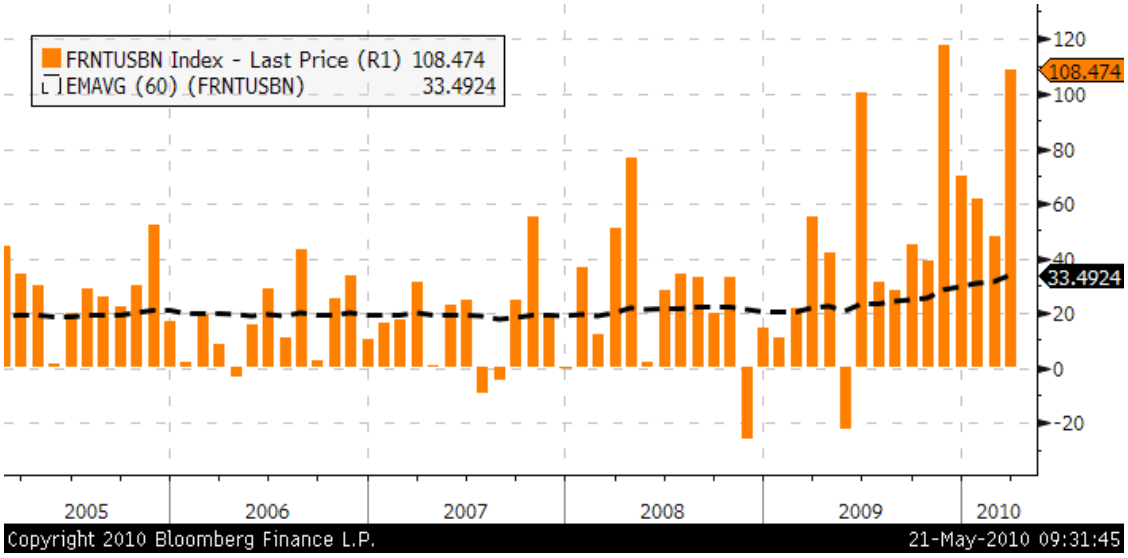
So what about the exporter; what does a **surplus** balance of trade infer about future exchange rates? Theoretically, it should have the inverse impact as running a deficit and would appreciate. This is due to importing nations buying the exporting nation's currency, which will of course drive up its price. This was the case in the early 1980's when the value of the dollar was driven up by Volker interest rates hikes. However as the value of the dollar ascended to unprecedented levels the competitiveness of the US export sector was greatly diminished. As a consequence of the dollar's strength there was an influx of Japanese goods into the US market. Japanese car makers in particular were able to sell their products at a much cheaper cost to US consumers. Ultimately this led to a large Japanese surplus but also stronger currencies in the exporting nations and in 1985 the Group of Five signed the **Plaza Accord** and each country agreed to gradually devalue the dollar exchange rate. Incidentally this led to a recovery of US exports but also expansionary fiscal and monetary policy in Japan that created asset bubbles and was a catalyst for Japan's worst recorded recession.

The lesson here is that strong currencies are good for investors, but not for exporters. Therefore export driven economies will tend to see their currency appreciation managed, like in China, Japan, and Brazil.

TIC flows

TIC flows are foreign purchases of securities, including stocks, bonds, and foreign exchange, reported by the Treasury. This report is, albeit with a two month lag, the best indicator of the demand for US securities, and therefore dollars, by international investors. Money flow can be bolstered by confidence in the banking system; and performance of the bond and equity markets. At the peak of the liquidity crisis, the depth and liquidity of the US bond market, secured a safe haven to international investors as they eschewed risk (Figure 11).

Figure 11. Foreign Net Transactions of US Treasury Bonds & 60 Month Exponential Avg



Source: Bloomberg, Treasury

History has shown a strong relationship between the TIC flows and strong capital markets. There was a large infusion of foreign capital during the dot-com bubble; the Volker era of fed policy; the East Asian currency crisis; and the LATAM balance-of-payments crisis to name a few. Although, this data are reported quarterly, it is important to determine demand for US capital. You can find these tickers on Bloomberg using **{ALLX FRNT <GO>}** and **{TICD <go>}**.

As the above indicators come out periodically, they have regular and immediate impacts on the value of spot foreign exchange.

Fiscal Policy

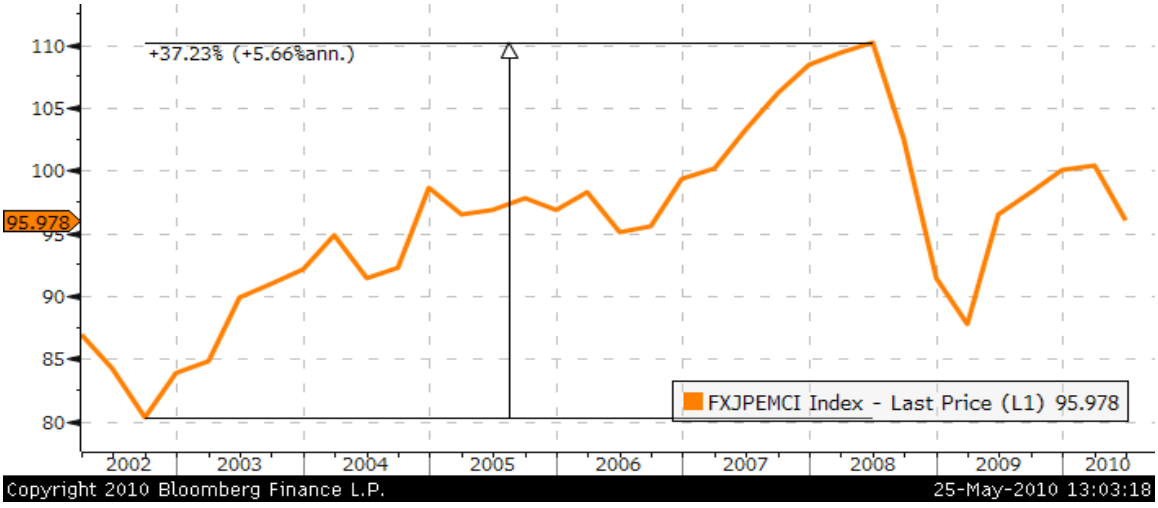
Economists are still debating the role that fiscal policy has on exchange rates but there is one conventional model that seems to have gained the most clout. The mundell-fleming model suggests that expansive fiscal policy exerts different influences on currencies over the short- and long-term. In the short-term increased fiscal expansion will lead to increased real interest rates, therefore attracting foreign capital and leading to currency appreciation. In the long-term, however, the buildup of government debt, in theory, forces the borrowing nation to restrict fiscal policy by cutting spending or raising taxes to reduce the deficit. This leads to weaker economic growth and an outflow of capital. Alternatively, the government could monetize debt, thereby reducing the debt through inflation. This process is known as 'inflating your debt away', since the weaker currency value reduces the real value of your debt. Moreover, empirical evidence suggests that expansionary monetary policy and tight fiscal policy, lead to a weaker currency and tight monetary policy and expansionary fiscal policy, lead to a stronger currency.

Capital Flow Model

In the previous section we mentioned the impact that TIC data has on demand for currency and now we will elaborate a little more on the trends and dynamics of this relationship. Capital flow models are used a gauge of long-term currency demand. The logic is simple: if a country in anticipated to have large inflows of foreign capital, unless sterilized, their currency will strengthen versus their trading partners. With greater financial integration and breakneck speed of computing power, investors can shift billions of dollars of capital at the drop of a hat. And if global investors prefer to invest in one country's equity or bond market over the other, then the currency will react favorably to this demand.

Capital inflows can take many forms: from hedging and speculative flows; merger and acquisitions; repatriation; portfolio flows and foreign direct investment (FDI). Anecdotally, cross border equity flows tend to follow the current economic landscape. At the onset of the 2007 credit crunch there was a gaping outflow of cash out of US securities, exacerbating the dollar's decline. But in recent times, the European debt crisis have sent investing packing, searching for a haven safe in the US, Japan and gold. Indeed, the inflows of capital into emerging markets during the Great Moderation, elevated the currency values of the key receipts, such as Brazil, Chile, India and other Asian and LATAM countries (Figure 12).

Figure 12. JP Morgan Emerging Markets Currency Index



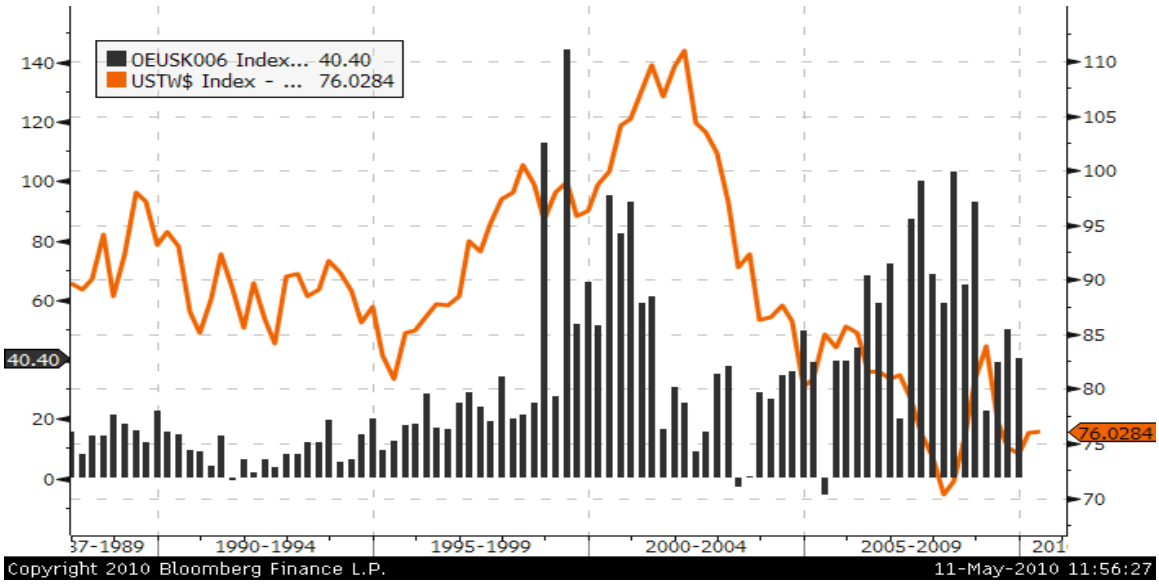
Source: JP Morgan

Two of the same factors that led to the housing market bubble also helped fuel a cross-border mergers and acquisitions boom. Excess liquidity, coupled with very low interest rates, led to ideal conditions for investors to borrow money and leverage it to fund investments, particularly the purchase of other companies. A rise in cross-border merger and acquisitions activity creates demand for a target company's currency. Bloomberg's **{MA <go>}** provides a useful tool for monitoring cross-border M&A.

Another form of cross-border money flow is called foreign direct investment. Foreign direct investment, in its classic definition, is defined as a company from one country making a physical investment into building a factory or purchasing physical assets in another country. The direct investment in buildings, machinery and equipment is in contrast with making a portfolio investment, which is considered an indirect investment. FDI is very important to the development of a nation and has helped manufacturing juggernauts India and China supplant certain antiquated technologies.

But inflows of FDI and portfolio are essential for countries that have sizeable deficits and weak domestic savings. The US, for example, was able to maintain the strong dollar mantra throughout the Clinton years, despite a gaping current account deficit, because global investors were willing to invest in the US (Figure 13). So the foreign investment was the capital needed to balance current account, therefore allowing the US maintain their spending patterns.

Figure 13. United States FDI, y/y & Trade-Weighted USD



Source: Bloomberg, OECD

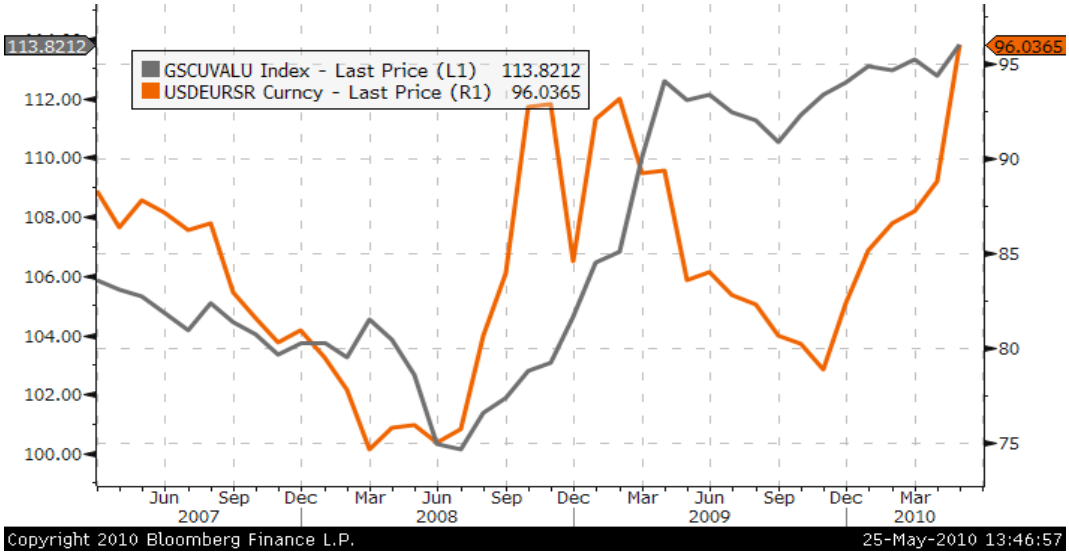
Indeed, the United States has been one of the largest recipients of FDI, culminating in $321,274M at the peak of (and likely contributing to) the dot-com era. The persistent weak dollar of the noughties was this in reverse, as international investors eschewed dollar securities. Investors pursued more lucrative returns in emerging markets, like China, whose stock markets were the darlings of the decade. Furthermore, a study by the IMF indicates that net equity flows do have a significant relationship to the domestic currency value, along with relative economic growth. On the other hand, the Bank for International Settlements reported in 2000, "There is little evidence of a robust significant correlation between stock market indices and the major exchange rates. " The takeaway: correlations ebb and flow just like markets so trying to predict the future with historic data may be an exercise in futility.

Economic Growth

According to the mundell-fleming framework, a rise in domestic output (GDP) should be bullish for a currency, in the short-run. In theory, the positive feedback loop, associated with increased domestic activity is positive for the economy, which may attract foreign capital. The inflow of foreign capital, increases the demand for the currency, thereby increasing its value.

The currency should increase in value, until the increased value and associated rise is living, make the economy less competitive. This phenomenon is known as the Dutch disease. Alternatively, the increase in domestic economic activity may lead to increased imports, as the rise in currency makes imported goods cheaper. At this point, the trade balance starts to deteriorate and, depending on the composition of spending and the global risk appetite, may lead to capital outflows, reversing the strength. As you can see from Figure 14, the EUR/USD has a strong correlation with Goldman Sachs growth valuation trading slice.

Figure 14. Goldman Sachs Growth Trading Slice & EUR/USD Spot Return



Source: Goldman Sachs, Bloomberg

Purchasing Power Parity

One of the most basic and popular theories of how exchange rates are determined over the long-term is called Purchasing Power Parity, or PPP. It is commonly referred to as the ***Law of one price*** and states that if transportation costs are relatively small, the price of an internationally traded good must be the same in all locations. The PPP is a notion that a dollar should buy the same amount in all countries. Thus in the long run, the exchange rate between two countries should move towards the rate that equalizes the price of an identical basket of goods or services in each country.
For this of you that are familiar with *The Economist,* they created a light hearted study in 1986 called the Big Mac Index. Their "basket" or “good” is a McDonald's Big Mac, which is produced in about 120 countries. The Big Mac PPP is the exchange rate that would mean hamburgers cost the same in

America as abroad. Comparing actual exchange rates with PPP indicates whether a currency is under- or overvalued. The most recently published Big Mac can be viewed on Bloomberg at **WBG <GO>**.

As previously mentioned this indicator attempts to discern exchange rates based on the law of one price. You can see that a big mac costs $3.57 in the United States, but in China the cost a big mac is only $1.83. Based on the law of the PPP the Renminbi or Yuan is undervalued by some 49%. Since this currency is undervalued most pundits agree that in the long run there needs to be a revaluation or an appreciation of the CNY relative to the USD. This would wean china off their export indulgence and would allow for a pragmatic reduction in inflation, leading a shift towards domestic spending.

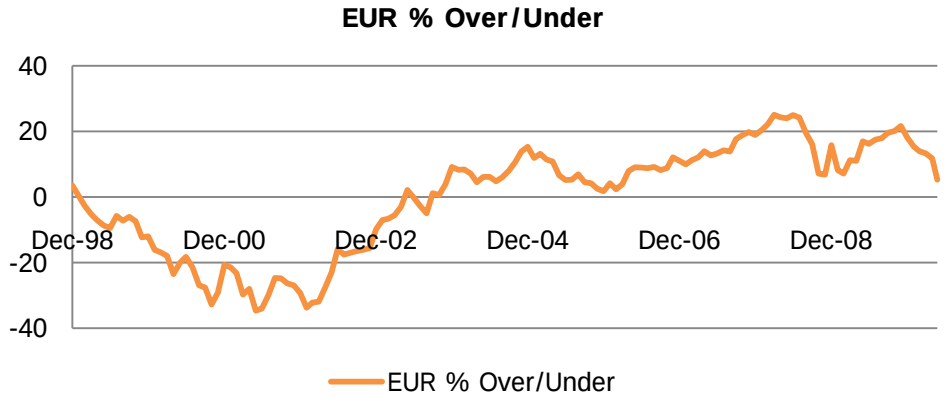
For an overvalued exchange rate you might look at the cost of a big mac in the Eurozone. The same all beef patty that was only $3.57 in the US is an astounding $5.34 in any of the 15 countries that use the Euro as their official currency. Based just on the law of PPP you would expect long term depreciation of the value of the EUR/USD exchange rate.

It needs to be stressed that PPP is a "theory" of expected exchange rates and theories are not always exact science. Some well noted shortfalls of the PPP are that the equilibrium price is only a very long-run one, which makes it useless in the short-term, and the PPP completely ignores capital flows.

To put this indicator in perspective, we can compare the Big Mac Index with analyst forecasts for FX rates on **{FXFC <GO>}.** FXFC is a composite of foreign exchange rate forecasts, which you can analyze by contributor and currency. It seems that the EUR/USD is a little "overcooked" and is expected to depreciate substantially by 2011. A composite list of 27 analysts' also believes that the CNY is "undervalued" and will appreciate relative to the USD.

Bloomberg has added their own PPP model, along with estimates from the OECD, listed on **{PPP <GO>}**. Below is an OECD estimate of the EUR/USD, which in the wake of the Greek debt crisis and subsequent 12% deprecation, is still nearly 6% overvalued, according to their model (Figure 15).

Figure 15. EUR/USD OECD PPP Estimates, % Over/ Under-valued



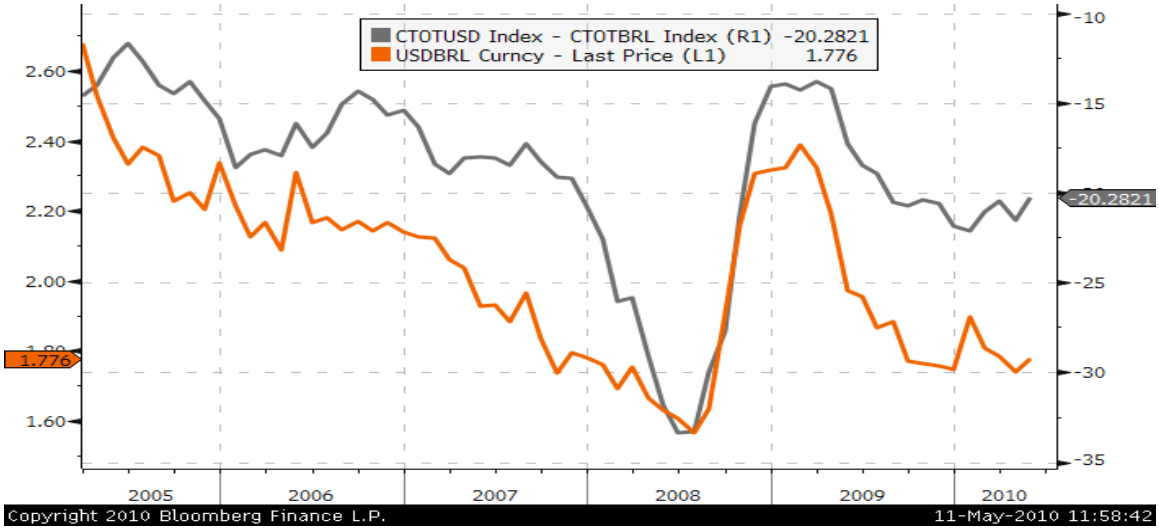
Source: OECD. Bloomberg

Terms of Trade

Terms of trade is the ratio of export prices to imports prices (export/import) and measures the volume of imports that can be bought with one unit of exports. Simply put, terms of trade indicate the purchasing power of a country's exports in terms of the imports that they will buy. Generally, when the terms of trade data are favorable that means there is a greater demand for exports and can lead to an appreciation of a commodity producing nation. Unfavorable terms of trade mean that an importing nation must pay more for each unit of imported goods and can have a devastating impact on the importing nation's currency.

The era of loose-liquidity from early 2004 until mid 2008 provided a keen insight into the relationship between terms of trade shocks and their impact on currencies. In fact, some commodity indices increased two fold, which benefited commodity exporters. Intuitively, this was not a boon for commodity importers, as their bills became dearer. The rapid industrialization of China and India increased demand for based metals and food-stuff, which in turn increased demand for the currencies that mine, farm and export these products. This has led to favorable terms of trade shocks and demand for commodity sensitive currencies, notably the Brazilian Real (Figure 16).

Figure 16. USD/BRL TOT Spread & USD/BRL Spot



Source: Bloomberg, Citi

Russia, Norway, Brazil, Australia and New Zealand were the most exposed to positive terms of trade trends. As you might deduce, countries that imported these products suffered from an unfavorable terms of trade shock, which led to a macro-economic slowdown in places like Japan and the US. As commodity prices have turned around, however, the AUD, BRL and CAD regressed from their 2007 peaks and the unwinding of commodity prices, notably oil has helped to narrow the US current account deficit, for the time being.

Summary:

The economic landscape is a crucial determinant of foreign exchange values. It provides insights into a nation's growth, employment, and trade positions and what they might mean for inflation and monetary policy. The order of the data we discussed is not relevant, as various factors may cause their relative levels of importance to the FX markets to fluctuate. What is important is that large percentage changes or surprises in the data (versus market expectations) may result in sharp and immediate changes in currency values, and that trends that emerge in the data will be followed by a corresponding longer-term trend in the FX value.

Finally, it is important to be aware that the market's reaction to this data may come in two subsequent and sometimes opposite stages. The initial reaction is usually based theory or what is perceived or thought to be the common knowledge, and the second reaction comes after the market has digested the information in terms of how they expect policy makers to react. For example, higher than expected inflation may lead to a surge in the spot value as the market interprets it as higher interest rates and inflows of deposits are imminent. However once the data is digested if the inflation is seen as severe and the economic backdrop is weak, the currency will resume a decline. Note also that this example is not a prescribed rule for how the market interprets inflation; it can just as easily go the opposite way. Indeed, there have been many times when CPI was higher than expected and the dollar weakened, and many times when it was higher and the dollar appreciated. The important thing to understand is that there tends to be two phases of market reaction.

All of the aforementioned indicators can be located on Bloomberg on **{ECOF <GO>}**, **{ECST <GO>}** and economic forecasts are on **{ECFC <go>}.** A calendar of events can be found on our flagship **{ECO <GO>}** page shown below, which thousands of traders rely on each day to help with their trading decisions.

Other Factors That Affect Exchange-Rate Determination

Interest rates and economics are the two main drivers of FX and are what really defines the blueprint for how a currency will trade. But along the way currencies will be impacted by a host of other factors. Looking across the FX markets you will see relationships with commodities, geo-politics, and occurrences in other financial markets. Some of these we will discuss in this chapter.

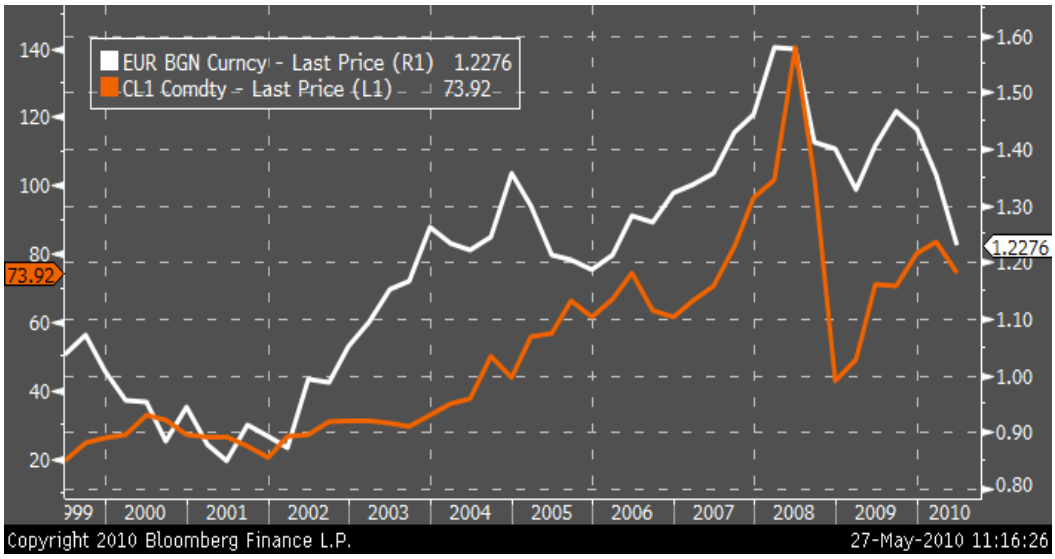
Commodities

Commodities have long been associated with currency values. This is because many economies are heavily dependent on their export sector, of which commodities tend to be a large part. As the value of the commodity rises, so too does the amount of exports and their trade balance may improve as a result. Recall that the more a country exports and the less it imports, that its currency should appreciate. More of the currency will have to be bought to purchase the commodity (increased trade flow) and as the currency appreciates, investment & speculative flow may follow, further supporting the currency. The opposite is also true: as commodity prices decline, as result of a price bubble bursting, receding demand or increased supply, the country will see less revenue and their imports would increase relative to exports, leading to a weakening currency.

Not surprisingly, these commodity-sensitive currencies are commonly referred to as “commodity currencies”. They include countries with big metals and minerals mining industries (think gold, copper, aluminum, iron ore), like Canada, Chile, and Australia. On the other end of the spectrum, commodities like oil have also played a big role in FX as of late. Many of the oil-producing nations in the Middle East have fixed or pegged currencies, but countries like Norway, Russia, Mexico, and even the U.K. are large oil exporters and see their currency rise and fall with the price of crude.

Oil

Aside from major oil exporters, correlations between oil and currencies vary and are generally not long-lived. However in an interesting development in the oil/fx relationship, starting last summer and continuing to April of this year, there was an almost unprecedented correlation between the EUR/USD and crude oil future, trading persistently above .90! For a few months this made for a very profitable long oil/short USD trade. Part of the rationale behind this correlation was that since oil is priced in dollars, as the dollar weakens, it should cost more of them to buy oil, i.e. the price of crude should rise. But there is a feedback loop here in the other direction as well. As oil rises, it tends to cause inflation and hamper growth. In the U.S., a nation already struggling with a housing and financial crisis, and being heavily dependent on oil, rising oil was seen as a recipe for disaster and the USD depreciated as a result. Opinions abound, but the question remains: does a weak dollar lead to higher oil, or does higher oil lead to a weak dollar? See chart below:

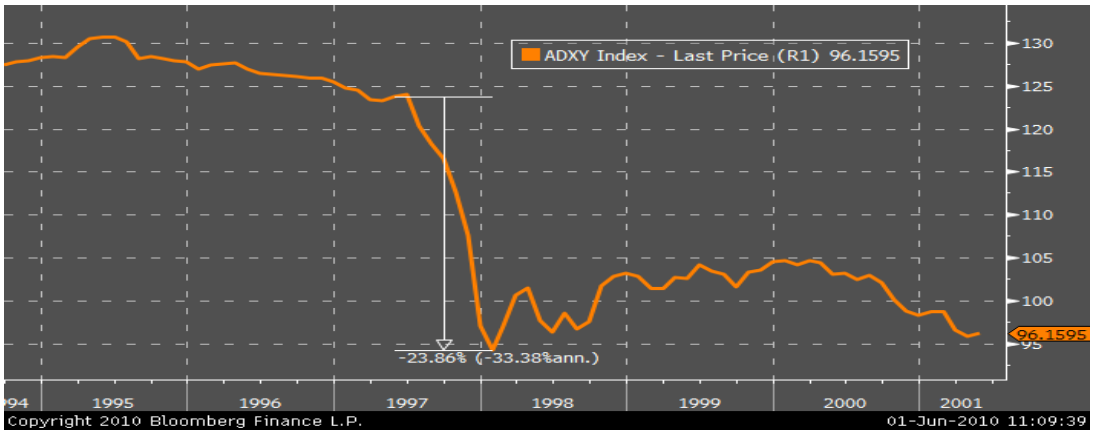


{G <go>} with **{EUR/USD <Crncy>}** in white, crude **{CL1 <Cmdty>}** in orange

The moral of the oil story for FX is that it is used as an inflation gauge. Because oil is used in the production and transportation of so many goods, it can easily cause prices of other goods to rise. The more dependent a nation is on oil, the more of an impact it can have on inflation and FX.

Geo-politics

Geo-politics is a broad term that refers to a country's political and economic systems, and how they relate them to and interact with the rest of the world. Its bearing on FX values has to do with investor *confidence*. To put it in context, look at what a *lack* of confidence can do: in 1997 Asia, pegged currencies gave way to inflation and a series of defaults and FX devaluations led to a mass exodus of money which crippled currency values (below) and sent the Bloomberg-JP Morgan Asian Index **{ADXY <Index>}** down 27%. The Thai Baht was the most affected and plunged from 25 to 50 THB per USD!



{ADXY <CRNCY> GP <GO>} – 1997 Asian Currency Crisis

Foreign policy magazine has a yearly list of the worlds "worst" currencies. Atop this list are some dubious economic fundamentals such as hyperinflation, egregious budget deficits and "closed" economies, but a striking commonality is that of each nation's ideological beliefs. That is, relating socialism, communism, theocracy or any other form of government controlled politics and economics. In 2007, *Foreign Policy's* list of worst currency was Somalia, Iraq, North Korea, Venezuela and Zimbabwe.

We can breakdown the geo-political affects on foreign exchange in three ways:

1. **Political stability**: if a country is politically stable, (especially democratically so), it would be perceived as having lower risk. Low risk is of course conducive to international trade and investment, and therefore a positive for the currency. Conversely, a country that is political unstable, i.e. there is constant regime change, a dictatorship, or public unrest, would carry a higher risk premium and see its currency depreciate.

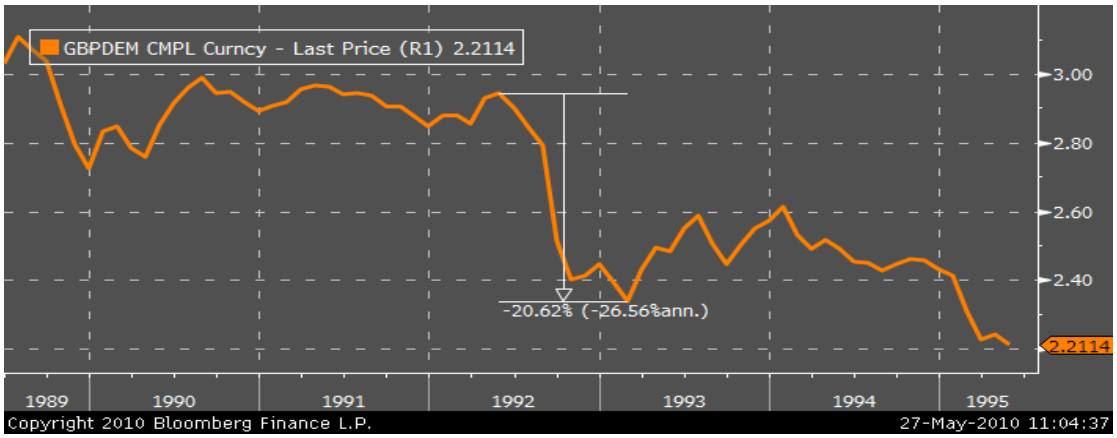
2. **Economics**: Equally important from a market perspective is the economic situation. If a government is oriented towards free market policies, including a developed or developing banking system and open markets, it will create a climate that should foster investment and trade and should also see its currency appreciate as a result. Conversely, if a country's economics are more centrally planned and less free market-oriented, and the government exerts too much control over it in the form of regulation or nationalization of industry, that policy mix would likely discourage foreign direct investment and be a negative for the currency.

3. **Foreign exchange regime**: Many governments or central banks institute a currency **peg**, where they tie the value of their currency to another currency or a basket of currencies, or they **fix** the value of their currency to another. For example, many European nations under Bretton Woods had their currencies pegged to the dollar. As the dollar rose and fell in relation to gold, so did those European currencies. A more recent example is China, who pegs the renminbi to a basket of currencies. Pegging may have advantages: it sends a clear signal to the markets and the public, and generally offers a stable currency value. In the case of China, it has kept prices stable, encouraged investment, and fostered an export boom. See {PEG go} for a list of FX regimes currently in use.

However, pegging the currency also has disadvantages: the pegged currency is subject to the other's monetary policies. This is problematic because if one currency is experiencing inflation and the other slow growth, or the absence of inflation, the currencies will need to head in opposite directions. In addition to remain credible and viable the central bank must maintain the peg through intervention, a very difficult task.

The most glaring example of this is when the U.K. government decided to join the ERM and maintain a peg of one GBP per 2.95 +/- 6% German deutschemark. High inflation from the reunification of Germany and a nasty recession in the UK created obstacles for single monetary policy. England needed to pursue expansionary to lift their economic output, by stimulating

export growth, while Germany needed to reduce inflation, therefore raising interest rates. Astute investors, such as George Soros, were aware of these policy flaws and sought to profit by shorting the sterling, betting that England would break rank with the ERM in order to reduce interest rates and promote growth. He was right, it turns out, as England officially exited the fixed exchange rate system in 1992 and recorded a handsome $10 billion profit to boot.



{GBPDEM <Crncy> GP <go>} - Devaluation of GBP and break from the ERM.

Venezuela

Venezuela provides a useful case-study for socialist and pegged FX regimes. In January 2010 the VEB was devalued and fixed at 4.2900. President Chavez's policies, particularly those of nationalizing entire industries like media, telecommunications, and banking, and taking over private property, are not market-friendly. They have also led to a deep political divide in the country, marked by high crime rates, strikes, street protests. Inflation is rampant as both the currency rate and food prices are fixed, and they are unable to adjust causing shortages of staples like milk to be common. All of this has created uncertainty and earned Venezuela a high risk premium. Foreign investors are skittish, as are many residents, and as a result you have less foreign investment coming in, and more money that wants to get out. (Venezuela is a commodity country as a major exporter of heavy crude), but some of the highest inflation in Latin America and political risks remain, weighing down the currency.

The Philippines

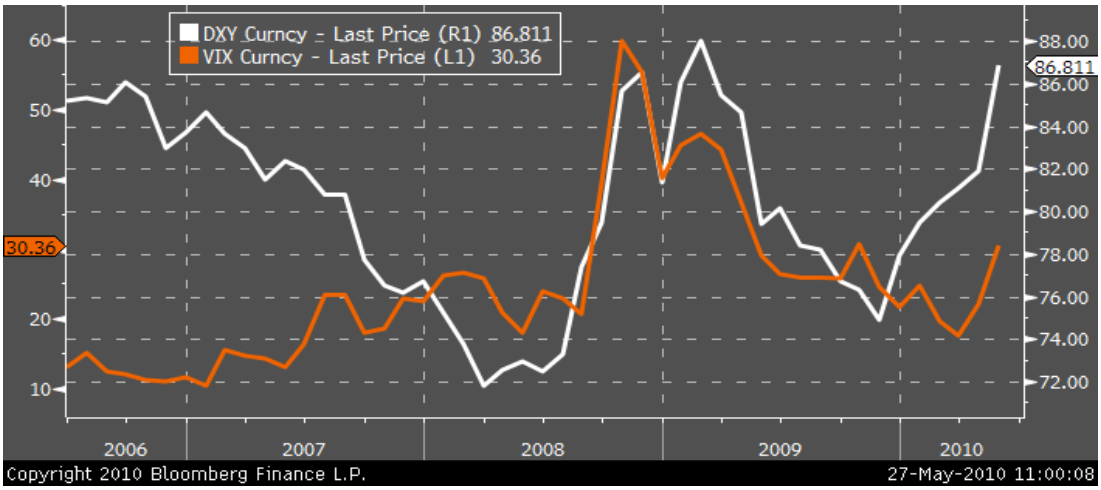
The Philippines tell a different story. A developing economic nation and currency, the Philippine peso appreciated 15% from September 2007 to February 2008. However this trend drastically reversed and it depreciated 17% over the following six months. What happened? Nationalization? Regime change? Civil war? No. They ate *rice*. A major staple of the Philippine diet, they are the world's largest buyer of the grain. As the world experienced a virtual food shortage and hoarding occurred, along with inflation and higher oil prices, food prices around the world increased, and the effect was pronounced in the rice market. Compounding the issue was that the government long subsidized rice, selling it at below cost, and the government was going bankrupt. Inflation and risk increased,

and foreign investment and the currency therefore decreased. While the PHP has re-bounded on the strength of the global and Asian economic recoveries the episode is a sobering reminder of the power of global markets to wreck even reasonably well managed economies

*{G <go>}: rice **RR1 Cmdty** (white) Philippine peso **PHP <Crncy>** (orange)*

Equity markets

As markets become increasingly intertwined, the way they interact and influence each other increases. As we've discussed, interest rates and economics set the stage for currency movement, but there are many different actors that come and go and play different roles, affecting currencies in different ways and to varying degrees. One such factor is the equity markets, and specifically the S&P 500 index. A key measuring stick for equity sentiment is the VIX Index. In fact as a barometer of risk acceptance/aversion the VIX has been a good indicator of sentiment toward the USD. This can be seen by examining the relationship or the DXY to the VIX

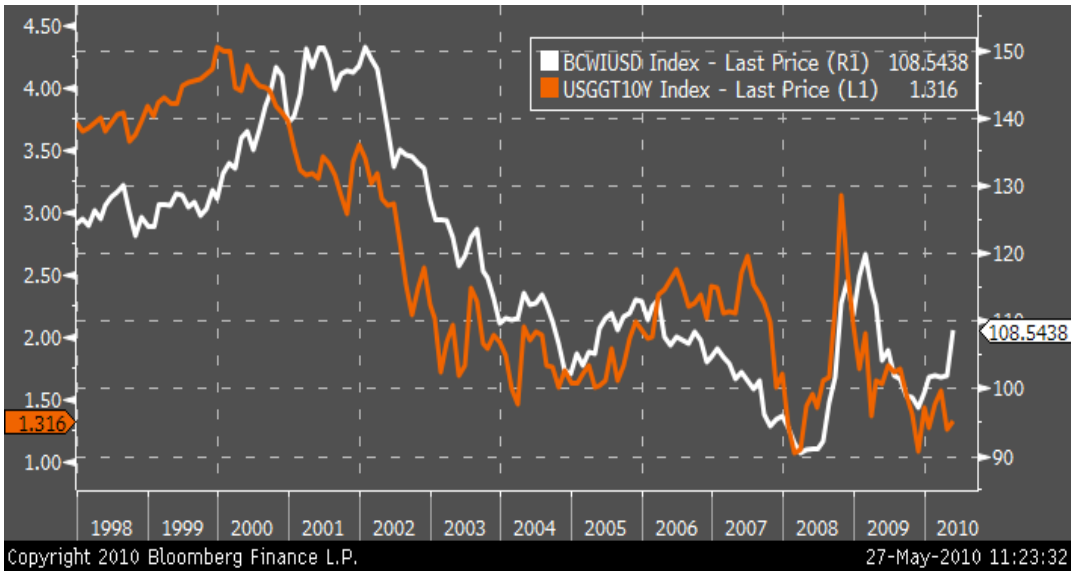


*{G <GO>}: **DXY INDEX** (white), **VIX INDEX** (orange)*

Suffice it to say for now that the VIX is looked upon as a barometer for market risk and volatility. Generally speaking, if the VIX is stable of declining, the financial markets are perceived to be doing well, and will be inclined to take on more risk in the form of things like the carry trade. This results in a weaker JPY, and stronger AUD. Conversely, if the index is doing rising , there is perceived greater risk and volatility, which will cause the market to be risk adverse and exit the carry trades for the relative safety of other investments like U.S. treasuries. Aside from this example, the correlation between equities and FX has typically been spurious. However, worth noting is that sharp or erratic moves in an index may elicit similar responses in FX. For example, both the Dow Industrials and the Nikkei Index have experienced large, atypical swings in value of late and both the DXY and JPY have responded similarly. During the global meltdown that began in 2H 2008 and which lasted until December 2009 the USD was negatively correlated to the VIX. This led to the USD being sold during periods of risk acceptance while it was heavily bought during periods of risk aversion

Government bonds

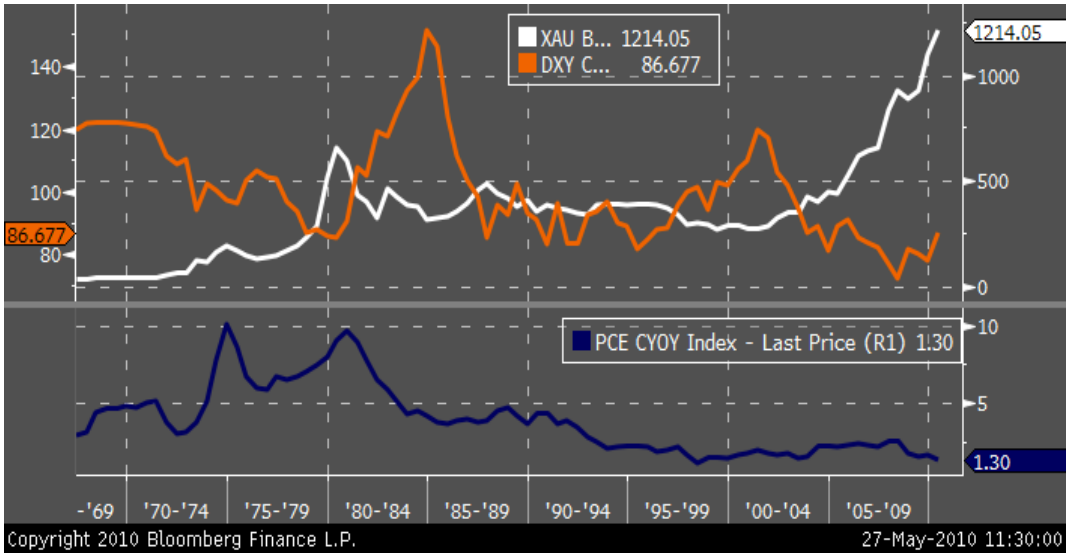
Currencies also have a relationship with the bond market. Fixed income instruments, bonds have a coupon that they pay periodically. This means there is an easily determined yield associated with them. This yield, like currencies, is highly interest rate sensitive. If interest rates go up, the bond price will go down and its yield will increase. Combine higher yields with the added safety and liquidity of government bonds, and you have a very attractive investment in that currency. Therefore it should come as no surprise that when bonds are expensive and have low yields, their will be downward pressure on the currency, and that when bonds are cheap and yields are high, their will be upward pressure. The graphs below illustrate this with the EUR/USD exchange rate and the yield spreads on German vs. American bonds, and the U.S. Dollar index against the U.S. 2 year yield.



*{G<GO>}: **Bloomberg Correlation Weighted Index** (white), **10Y TIPS Yield** (orange)*

Gold

Once the most widely used metal for coinage and monetary exchange, and the former anchor of foreign exchange values, the barbarous relic, is today most commonly thought of for its use in jewelry. Its most important use, however, is actually as a store of value or a flight to quality. As the most valuable precious metal, many central banks still hold large amounts of gold on reserve and it is widely traded in the financial markets. Its connection to FX has to do with its use as an inflation hedge. As prices rises, money is worth less, and so investors may buy gold to preserve their investment. Similarly, gold is a safe-haven commodity, when in times of geo-political uncertainty investors may choose to put their money in gold as well. The correlation with FX is viewed over the longer term, as a way of confirming (or disaffirming) trends. For example, an uptrend in the dollar combined with gold decreasing is a sign that inflation is abating and the trend may be sustained. However, if the dollar and gold both rise, we have conflicting signals and the trend may be misleading or that risks have correlated and the US treasury market and gold are the only perceived safe havens. In the graph below you can see periods of marked inflation that coincide with a declining dollar and rising gold, and as inflation subsides the dollar rallies and gold tends to depreciate.



{DXY <Index>} in orange, **{XAU <Crncy>}** in white, and **{PCE CYOY <Index>}** in blue

News

It is nothing new to proclaim that news moves markets. However we now know that it is not just FX news that is important. Developments in the stock, bond and commodities markets are equally important. So is news on economics, central tanks and anything geo-political. That is why Bloomberg news is essential, because of its breath, and depth of coverage and up-to-the-minute releases. In one clear example, we can look to a BN story from July 30, 2007: Turkish Court Rejects

Lawsuit to Ban Erdogan's Party. Bloomberg broke this seemingly legal/political news story, beat our competition by 5 minutes and sent the TRL up 2.5%!
That example is why {NI FX<go>} is broad-based and designed to catch any news that moves FX markets in real-time. However it is not just our content but our functionality and how our news can be used that adds value and makes Bloomberg unique. For example: combining NI Codes (ECO,FED, etc) within custom news filters;{TOP FX <go>} for the biggest stories impacting FX markets at any point in time; and {NLRT <go>} to avoid missing important stories
Finally, perhaps our most powerful news application is {NSE<go>}: a search as easy as Google but faster and more targeted that allows a user to quickly find any breaking or historical news on Bloomberg or even on the web. NSE also helps Bloomberg address another need of FX players: rumors. It is Bloomberg policy to report news, not rumors, but here is no denying that FX trades on them. Anything perceived to impact FX, real or not, has the potential of actually doing so. For example, rumors of a central bank decisionior of an investment bank going out of business would fall into this category. While Bloomberg still does not report unsubstantiated information, NSE is capable of scraping websites and blogs that may reveal additional information important and of value to our users

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Summary

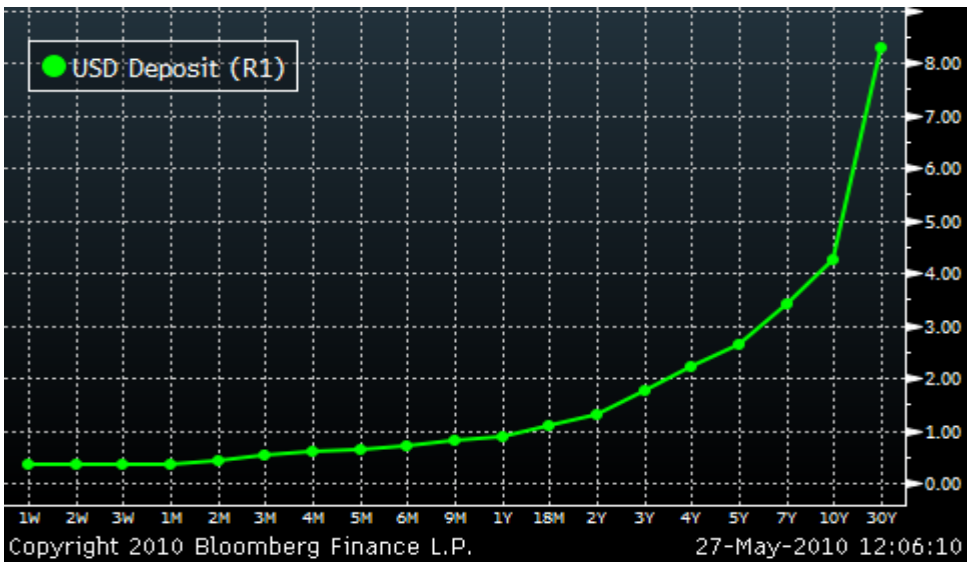
In sum, although interest rates and the economic landscape are by far the most important factors affecting currency values in the long term, there are always other cross-currents that are brewing. These include geo-political events, commodity prices, and correlations with other markets. The importance of these events may ebb and flow, and market participants must attempt to stay aware of them as they can have strong implications on the currency in the short and medium term.

INTEREST RATES

Interest rates tell us how much it costs to borrow or lend money for a period of time. In simple terms, they represent the **cost of money**. The time value of money shows that a dollar received today is worth more than a dollar received in time. So if you lend or invest that dollar, you will require more than a dollar in return, and if you borrow that dollar, you will have to pay more than a dollar in return. That additional amount is interest, and as we'll discuss, it means *everything* to the foreign exchange markets.

Interest is integral to FX because when you buy a currency, you earn its interest rate, and when you sell a currency, you pay its rate. They therefore play an important role in determining a currency's value. All else equal, countries with higher rates tend to see their currency appreciate, as capital is used to buy the currency and earn the higher yield. Conversely, currencies with lower rates tend to stay low as the market borrows (sells) the currency to invest in higher yielding ones. Interest rates are also important in pricing FX Forwards (as discussed in the section on Instruments and the section on Interest Rate Parity).

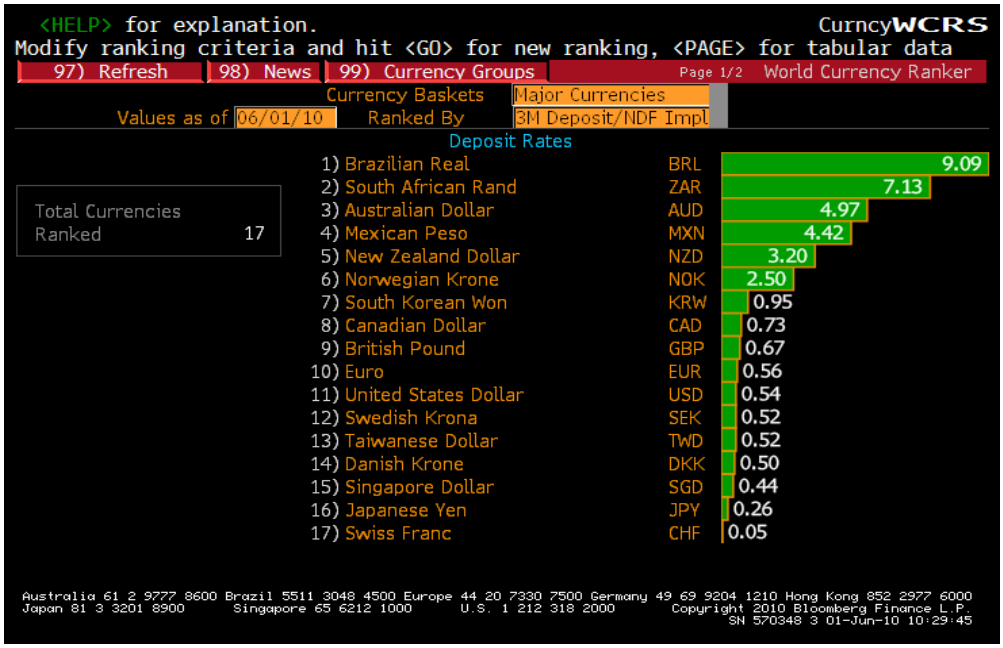
There are many of kinds of interest rates, with names like LIBOR, Fed Funds, deposits etc. There are short- and long-term rates, rates based on credit, and many others. They are quoted for just one-day up to many years, and are commonly plotted over time in what's referred to as a **yield curve**. A typical yield curve slopes upward, with short-term rates lower than long-term ones. This is largely because uncertainty and therefore risk of default increases with time, so long term rates tend to be higher to compensate for these realities. However from time to time market forces and expectations may cause rates to shift, causing short/long term rates to rise /fall(curve flattening) or fall/rise (curve steepening).



*{**OVDV <go>**} Above: U.S. Swap Curve, S23, as of 5/27/10*

Risk

Interest rates can also be a valuable indication of risk. All things equal, a higher interest rate may imply a higher level of risk. Risk comes in many forms, like credit, liquidity, and market risk, and there is even interest rate risk itself – the risk that rates will change and adversely affect your investments or borrowing. But no matter the risk it can always be understood in relation to return. An investment considered high risk will offer a high return to compensate for it, and if an investment is low-risk, it will offer a lower return. Corporate bonds for example offer higher yields than comparable government bonds, because a company is more likely to default than the government, i.e. it is riskier. It's similar in foreign exchange: a higher yielding currency may look attractive, but look closely: it is high for a reason and probably carries more risk. The country may be battling inflation, or may have an unstable currency which would undermine returns. Higher interest rates are often found in emerging market regions.



*{**WCRS <go>**} for world currency rankings. Shown above: 3-month interest rates*

Deposits

FX is linked to interest rates through the "depo" market. This is where banks trade deposits, which really means they borrow and lend with one another for periods of time (usually short-term) for the purpose of depositing funds (lending) or funding positions (borrowing). Large corporations and asset managers help drive this market by using it as a way of earning the highest yield on their cash. As an interest-rate product, deposits are linked to FX through the **FX swap**. This is because using an FX swap is similar to borrowing or lending in another currency. For instance, a bank has the option of making a deposit in its currency, or buying a foreign currency for spot and then swapping it back forward.

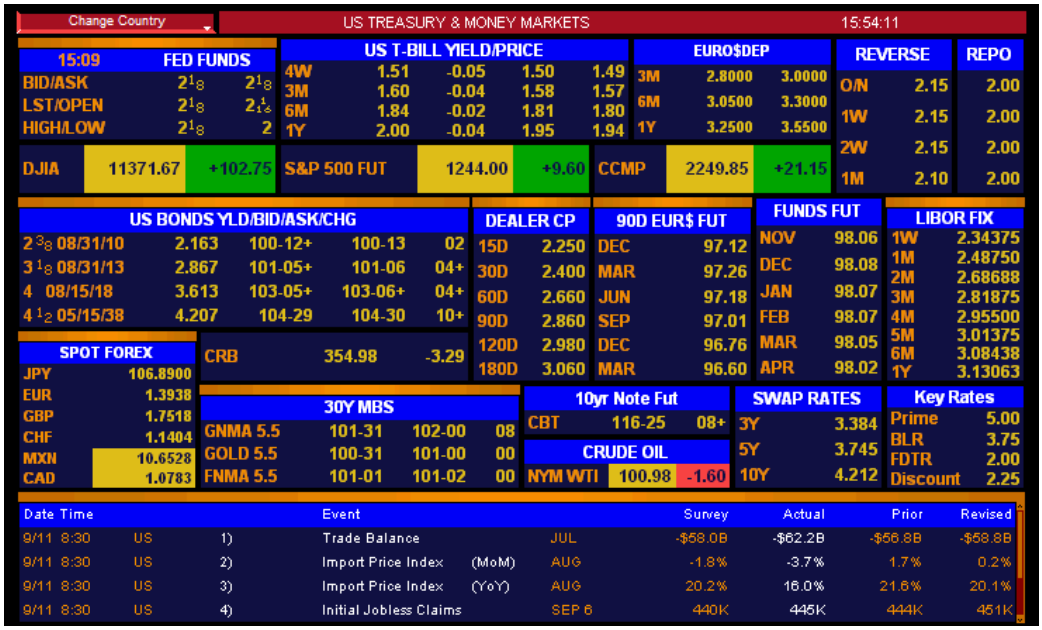
They choose based on what's more favorable, i.e. where they can get the better rates, factoring in things like credit risk and bid/ask spreads. Bloomberg's **{FXIA <go>}** helps inform this decision by showing deposit rates in different currencies and the equivalent yield in a home currency. At many banks the money market desk (where depos are traded) is often located close to the FX desk. In many smaller or foreign banks, depos and FX may be traded by the same person. Deposit rates for major currencies are viewable on ***{IM <go>}*** pages and are also stored in the Money Market Rates page, ***{MMR <go>}***.

The most widely held currency on deposit is the U.S. dollar. Dollars deposited in foreign countries are referred to as ***Eurodollars***. The term can be misleading. Since we are dealing with deposits, Eurodollars refer to interest rates, and have nothing to do with EUR/USD. Instead the term refers to *any currency deposit held outside of the domain where it is legal tender*. For example, yen held in Frankfurt or dollars in London. The market originated during the post-WWII reconstruction of Europe when there was a surplus of dollars in global markets. As this was also the beginning of the cold war, Russia was concerned its dollar accounts at U.S. banks could be confiscated, so they began holding dollars through a bank in the U.K., and Eurodollars were born.

LIBOR and EURIBOR

By far, the most important benchmarks in the market for currency deposits (and arguably the entire financial system) are **LIBOR** and **Euribor** (for euro deposits specifically). These rates are published by the British Banker's Association (BBA) and the European Banking Federation (EBF) respectively and arose out of a need to provide transparency and consistency in the market for interest rates and derivative products. They have grown to be the basis for settlement in *trillions* of dollars of financial contracts.

They each represent essentially an average rate for where member banks are willing to offer deposits, with the only real difference being the universe of banks that contribute. They are each published once a day, LIBOR at 11:00am London time (6:00am EST) and Euribor at 11:00am CET (5:00am EST). Each are quoted for terms up to 12 months. There is a LIBOR for US, Canadian, Australian, and New Zealand dollars, as well as for Swiss Franc, Japanese Yen, Danish Krone, and Swedish Krona. There is also one for euros but Euribor tends to be the more widely followed benchmark for euro deposits. You can find LIBOR rates on Bloomberg on the **{BBAM <Go>}** screen. As these rates are only set once a day, the market will use LIBOR futures like **{EDA <Cmdty>}** and deposit rates **{MMR12 <Go>}**, to monitor updates during the trading day.



{BTMM <go>} *Benchmark page for global treasury, money markets, and economic releases*

Central Bank Rates

All interest rates are important and have different significance for the markets, but for FX the most important ones tend to be **money market** or short-term rates, which include deposit rates and rates like LIBOR and Euribor discussed above. However another crucial rate for FX would be **central bank rates**, as they are what implements monetary policy and serve as the turnkey for all other rates and by extension the economy. In the U.S. this rate is the **Fed Funds**, set by the Federal Reserve **{FED <go>}**, and it is the rate for U.S. banks to borrow from each other. It is extremely important to the markets because it affects what banks charge customers and thereby gets funneled into the economy. In the Euro region we have the ECB's main **refinancing rate {ECB <go>}** and other central banks have similar rates as well that are also used to effectuate monetary policy (discussed in the section on Central Banks) and signal things about the health and direction of the economy. Because of this and also interest rate parity (discussed below), interest rates are *the* primary factor that affect currency values.

Expectations

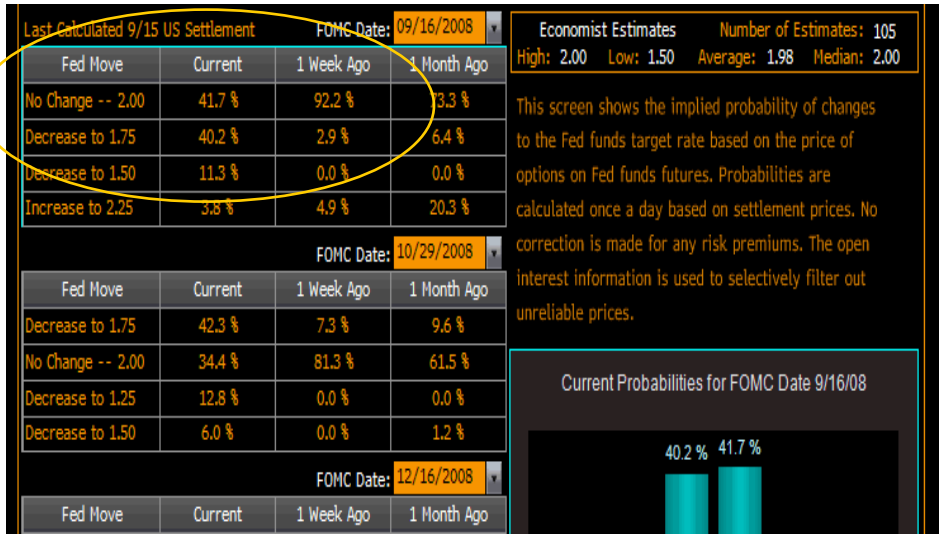
As known quantities, interest rates are already priced into the market. This means that more important than the rates themselves are the ***expectations*** for them in the future. Generally, interest rates that are expected to increase should in turn see their currencies strengthen, and vice versa. In FX, it is important to realize that *any* deviation from these expectations will cause FX markets to react. For example, if a country that is expected to raise rates all of a sudden lowers it or

the expectation shifts to suggest that they will keep it the same, the interest rate outlook becomes less favorable and the currency will be expected to depreciate. Therefore the market will react *immediately* and punish the currency by selling it, as seen in the example below.

{*EUR <Crncy> GPO <go>* click on News tab, navigate to 9/15/08 for headlines}

Because interest rate expectations are so important, it is market practice to come up with forecasts and ways of divining the direction of interest rates. For the most part, these forecasts are published by banks and research firms that analyze economic data, monetary policy, central bank statements, and other information available in the market and use it to perform a fundamental analysis. They will then extrapolate projections for growth and importantly, **inflation** (more in the section on Economics) to assess where interest rates should be. Because there are many different methods used resulting in many different forecasts, Bloomberg helps the market by aggregating and disseminating the various forecasts as a *consensus expectation*, used by market participants to make investment or trading decisions. You can view these forecasts on screens like {**ECO <GO>},** {**BYFC <GO>},** and {**ECFC <GO>**} .

In addition to this fundamental approach which helps assess where rates should be in the future, there is also a market-based approach to interest rate expectations that tells us the expectations being priced in the market *now*. This approach involves looking at where interest rates are currently trading and calculating probabilities for where they may be headed. For example, {**FFIP <GO>**} shows the likelihood of an interest rate increase, decrease, or no-change. It does so by using Fed Fund futures or options to calculate the implied probability of interest rate levels. Similarly, {**FWCV <GO>**} projects forward interest rates from a chosen yield curve. Not to be confused with FX forwards, these are interest rates that we would expect in the future based on where the curve is trading now.

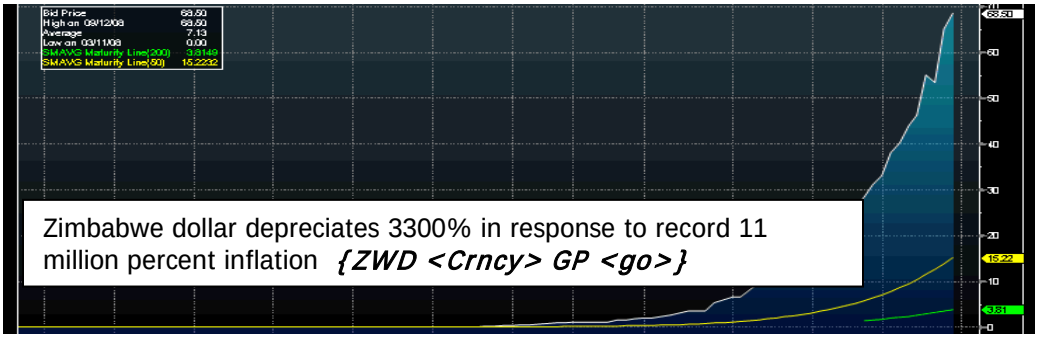


{FFIP <GO>} In just a week the market went from a 3% to 40% chance of a rate cut

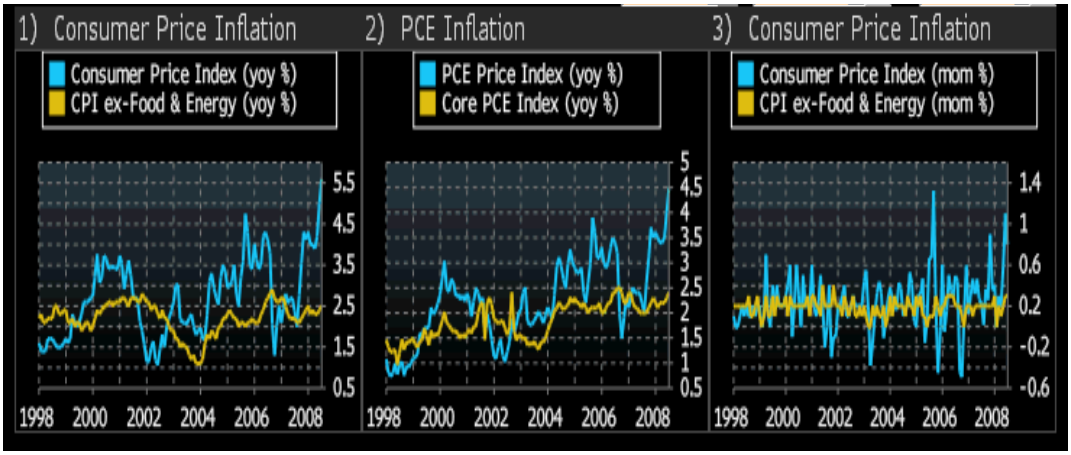
Nominal vs. Real

As discussed in the Economics section, indicators like CPI and PPI give us an idea of price levels and warn us of inflation. Inflation erodes the purchasing power of your money. If you earn 5% on an investment, but inflation is 3%, your return was really only 2%. For this reason interest rates are spoken of as *nominal* and *real*. **Nominal** refers to the rate itself, as stated or observed in the market. **Real** means the rate is adjusted for inflation. For example, the yield on a bond or the fed funds rate is nominal. If these rates were adjusted for inflation, using say CPI, they would be real. Note that increasing inflation normally leads to currencies being worth *less*. However if central banks raise rates in response, the currency may appreciate. Inflation bears heavily on interest rate forecasts and thereby currency values.

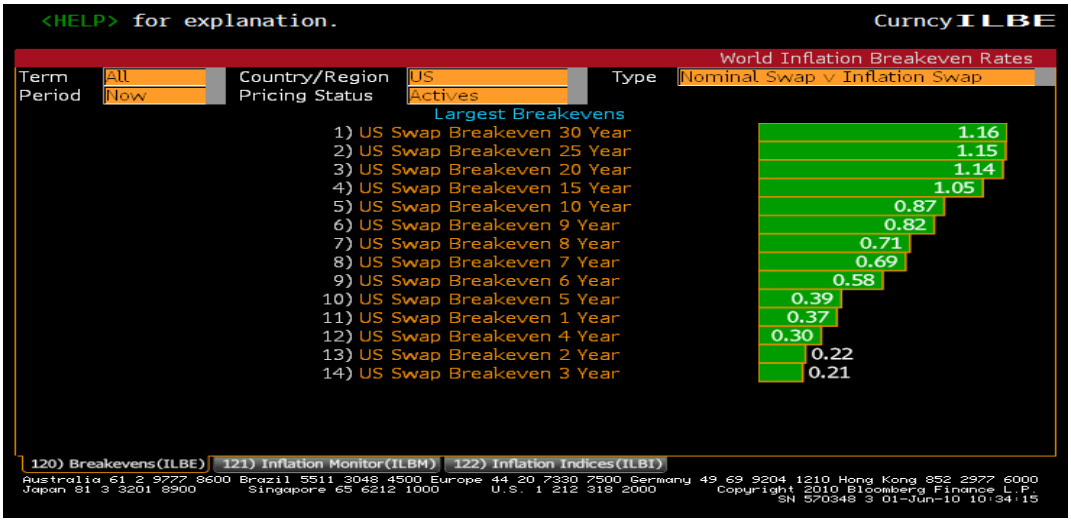
In one recent and extreme example, political instability and hyper-inflation in Zimbabwe caused it's currency to depreciate 3300% from July to September. Inflation was a record 11.25 million percent and the government was forced to devalue it's currency to a ratio of 1 USD = 10,000,000,000 ZWD!



Other useful tools on Bloomberg for monitoring inflation include:



*{**ECOW <go>**} Economic Data Watch. Monitor trends in inflation and other indicators*



*{**ILBE <go>**} Inflation Breakeven Rates using nominal and inflation-adjusted bonds*

Relative

In FX, rates are seldom looked at in isolation. In one sense this is because investors are always looking across multiple currencies for the highest yields, and borrowers looking for the lowest. But really what it comes down to is that an FX rate involves two currencies, so the market is always looking at the two interest rate environments involved. The key to looking at a rate in one currency versus another is the **differential** between them. How wide or how narrow is it, and how is it expected to change over time? As discussed, if a currency enjoys a significant rate advantage over another, it may find its currency appreciate as investors buy it to earn the higher yield while the lower yielding currency will depreciate as it is sold to fund the higher yielding position. This is what's known as the **carry trade**, and it has a pronounced effect on the FX markets (more in the section on Global Macro Analysis).

From our forward pricing formula we can see that the differential is important in determining the price of an FX forward, and we can *approximate* it using a modified version:

$$\textbf{Interest rate differential} \sim \frac{\textbf{(Forward points x 100 x 360)}}{\textbf{(Spot x days)}} \qquad \textbf{(eq. x.x)}$$

For example:

3-month USD deposits: 2.82% EUR/USD: 1.4191 3-month days: 91

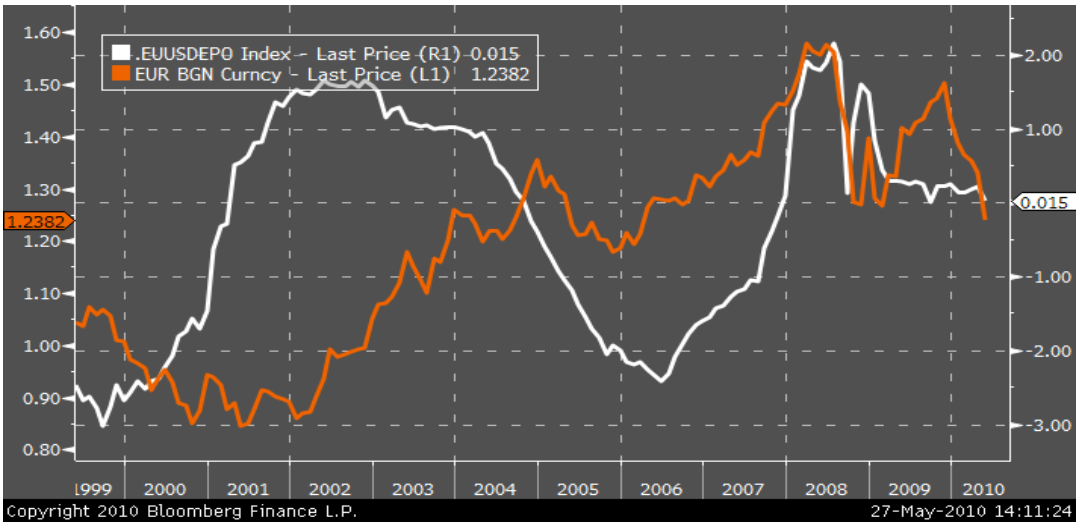
3-month EUR deposits: 4.92% Forward points: -.00715 Differential: **2.10%**

Using the formula, we can approximate the difference to be:

Differential = (.00715 x 100 x 360) / (1.4191 x 91) = **1.99**

Differentials and forward points are easily available in the marketplace. But understanding the formula helps us understand how changes in differentials will affect changes in rates. For example, in the section on Instruments, we learn that in the above example Euro is at a discount because rates are higher (and the USD is at a premium because the rates are lower) and so we subtract the points, in this case, 71.5. From this we can infer that if the ECB raised rates or if the Fed lowered rates (i.e. the differential *widens*), EUR would be at even more of a discount, the forward points would increase (numerically), and EUR/USD would become cheaper on a forward basis. Hence our outlook on interest rates would factor in to our decision of whether or not to hedge, invest or speculate in a currency.

Of course changes in the differential will impact spot also. In fact, spot will react immediately and then tend to chart a course, the duration and direction of which will depend on the market's conviction in the rates and the differential. Let's take EUR/USD for example. The chart below shows the dollar and euro 3-month deposit differential and the EUR/USD spot price over nine years:



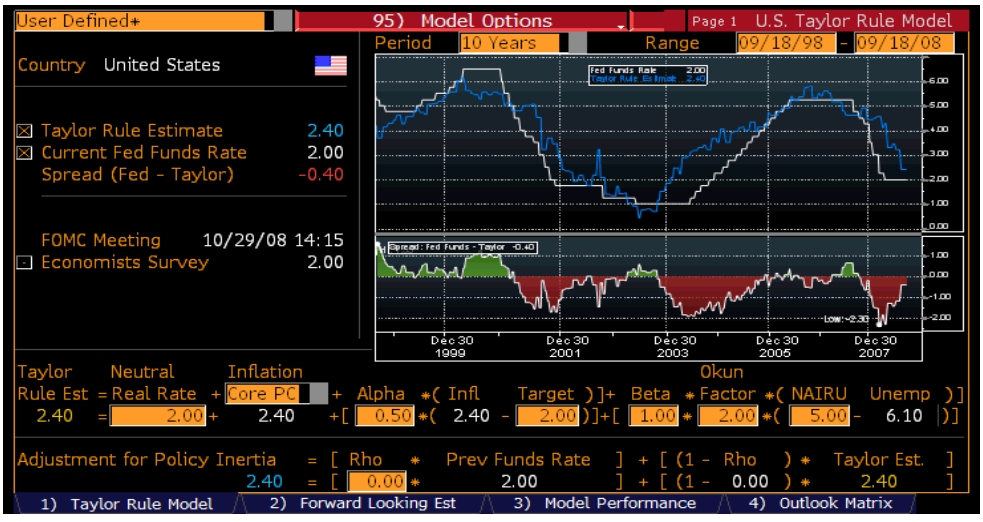
***{G <go>}** .EUUSDEPO index (white), EUR/USD (orange)*

The blue line represents dollar minus euro deposit rates, and the red is EUR/USD. Notice that as the USD lost its rate advantage, the EUR began rising (end of 2000). As the differential was restored in 2005 the USD rallied but a series of Fed cuts then helped the euro rebound from summer 2005 – 2008. As markets now expect a FED move to occur before the ECB rate differentials are now again in favor of the USD

The graph also shows that over time interest rates tend to move in **cycles**. These cycles correspond to monetary policy and are characterized as *tightening* or *easing* (more in Central Banks section) and the peaks and troughs are where they end. Peaks indicate the end of tightening: central bank stops hiking and starts decreasing rates. Troughs are the end of easing: they stop lowering and start raising.

The Taylor Rule

Another fundamental approach to forecasting interest rates is called the Taylor Rule. The idea behind the Taylor Rule is to find the rate of interest that satisfies a Central's bank's monetary policy. It is in fact a model that is often used in FOMC meetings. The model attempts to find the rate that in theory would put the bank's inflation target and output (growth) target in equilibrium. It starts with the assumption that the Fed sets its rate on some base "neutral" rate and adjusts (adds) it for inflation. From there, in order to forecast where the rate should be, it looks at the deviation from desired inflation (using CPI or Personal Consumption) and employment levels (using NAIRU, the non-accelerating inflation rate of unemployment). **{TAYL <go>}** allows you to view the model and track the performance of the Taylor Rule Estimate versus the actual Fed Funds. You can also enter your own neutral rate, target inflation, and employment assumptions and weight the relative importance of inflation and employment.



{TAYL <go>} to access the Taylor Rule and track its estimate against Fed Funds

Interest Rate Parity

The theory governing the relationship between FX and interest rates is known as **interest rate parity** (IPP). It states that borrowing in one currency, exchanging it for and investing in another currency, and simultaneously exchanging it back into the home currency should yield the same return as just investing in a similar instrument in the home currency.

Put another way, and similar to our example with cross-rates (in the section on Instruments), there should be no **interest rate arbitrage**. Recall that arbitrage occurs when there is a price mismatch between like goods. In its simplest form, you buy the under-priced good and sell the over-priced one.
For example, if concert tickets are selling for $100 on Craigslist, and $200 on StubHub, you buy the (undervalued) tickets on Craigslist and immediately sell the (overvalued) on StubHub, and pocket the $100 difference risk-free. It's similar with interest rates and currencies. Let's look at an example:

Assume that GBP/USD is trading at $2 in the spot market and interest rates are 4% in the U.K. and 2% in the U.S. Under these circumstances you would borrow dollars and sell them to buy pounds and earn the extra yield with no risk. The transactions are as follows:

Borrow $1 million dollars for 3 months, and buy:
£500,000 pounds [($1,000,000 / $2)]

Invest your £500,000 for 3 months at 4% and you'll have:
£505,000 pounds [£500,000 * (1 + 4/100 * 90/360)]

Convert your new pounds back to dollars at GBP/USD 2 and you get:
$1,010,000 dollars [£505,000 * 2]

Pay back the $1,005,000 you owe [(1,000,000 * (1 + 2/100 * 90/360)] and you have made:
$5,000 [($1,010,000 - $1,005,000)]

Note that the $5,000 would have been made **risk-free**. It could be done many times over, for much larger amounts, and you didn't even put up your own money! These conditions allowed for free money which we know does not exist in the market. If it had, the trade would be exploited until it was arbitraged away. The market would borrow so heavily in the U.S. that rates would rise, and would invest so much in the U.K. that they would fall, and they would converge to an equilibrium value where the conditions ceased and you would be indifferent to borrowing in USD or GBP.

In practice however, interest rates are set by central banks, not the market, and so they may never arrive at an equilibrium value. So what is determined by the market that prevents arbitrage and creates this equilibrium? In other words, what equates the two interest rates? The answer is the forward rate.

In our example, spot and the 3-month forward were the same, $2. We now know this can not be. So what should the forward rate be? Using interest rate parity, we can derive the forward from the formula:

$$\textbf{Forward} = \textbf{Spot} * \frac{(1 + R1/100 * days/360)}{(1 + R2/100 * days/360)} \qquad \textbf{(Eq. x.3)}$$

Where R1 = the term currency (USD) interest rate and R2 = the base (GBP) rate.
In our example the forward rate should be:

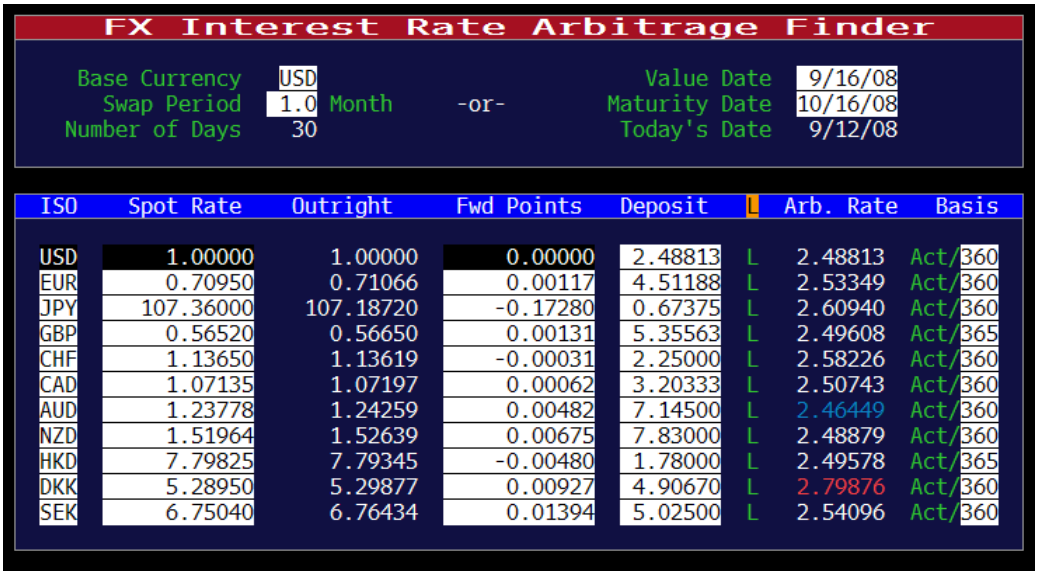
$$\textbf{Forward} = 2 * \frac{(1 + 2/100 * 90/360)}{(1 + 4/100 * 90/360*)} = 1.990099$$

*[*Note that for simplicity we use 360 throughout for day count. However some currencies, like GBP, use 365. You can check this for a currency on its description page. For example, {GBP <crncy> DES <go>}]*

Now if we did the above trade, we convert our pounds back to dollars at the new rate and receive £500,000 * 1.990099 = $1,005,000, exactly what we owed the bank, meaning no arbitrage profit was made. This is also the same amount of dollars we would have had if we just invested in the U.S. at 2%.

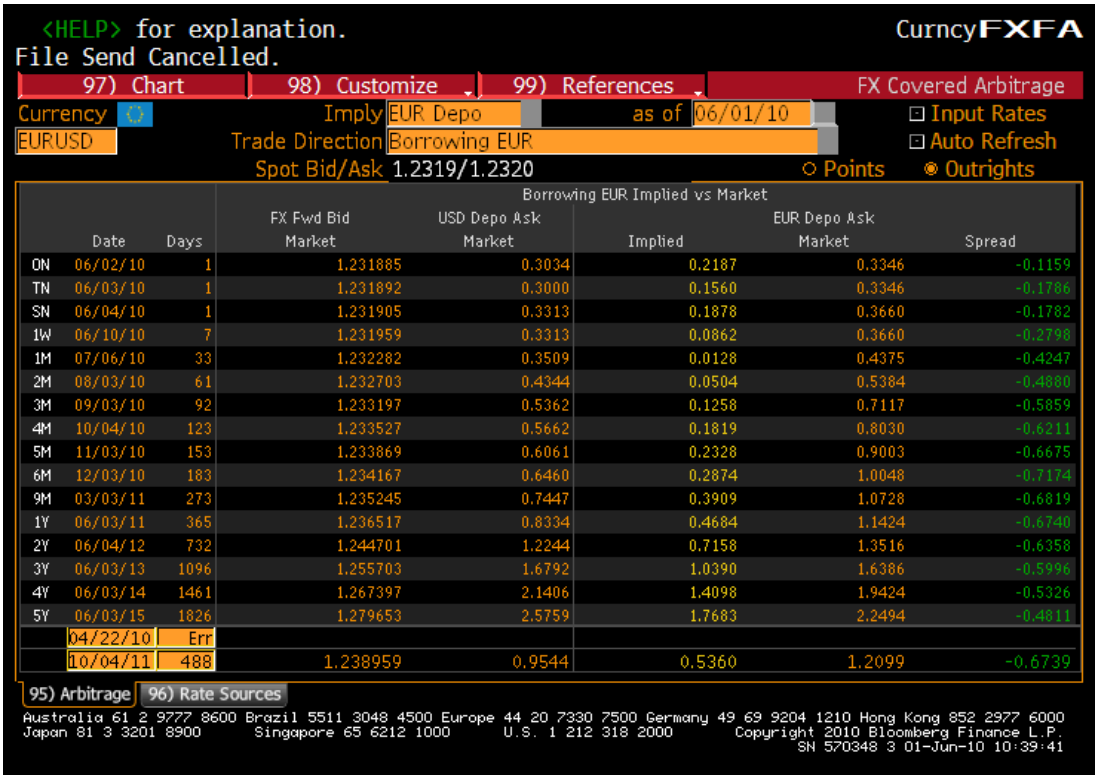
So because of interest rate parity, spot is adjusted by 2.00 - 1.990099 = .009901 to arrive at our forward rate and we should now be indifferent between the two scenarios (both yielded the same result). Note that since GBP is quoted to four decimals, the convention is to multiply the adjustment by 10000 and refer to them as 99.01 **forward points**.

Note that thanks to technology market participants do not calculate these rates by hand, and due to market transparency and efficiency the arbitrages are few and short-lived. However it's still important to understand where the rates come from and how interest rates relate to FX. In practice, banks have their own system for deriving forward rates, but rely on screens like {FRD <go>} to see what other market participants are seeing and quoting, to calculate broken-date points, and as a check for their own system.



ISO	Spot Rate	Outright	Fwd Points	Deposit	L	Arb. Rate	Basis
USD	1.00000	1.00000	0.00000	2.48813	L	2.48813	Act/360
EUR	0.70950	0.71066	0.00117	4.51188	L	2.53349	Act/360
JPY	107.36000	107.18720	-0.17280	0.67375	L	2.60940	Act/360
GBP	0.56520	0.56650	0.00131	5.35563	L	2.49608	Act/365
CHF	1.13650	1.13619	-0.00031	2.25000	L	2.58226	Act/360
CAD	1.07135	1.07197	0.00062	3.20333	L	2.50743	Act/360
AUD	1.23778	1.24259	0.00482	7.14500	L	2.46449	Act/360
NZD	1.51964	1.52639	0.00675	7.83000	L	2.48879	Act/360
HKD	7.79825	7.79345	-0.00480	1.78000	L	2.49578	Act/365
DKK	5.28950	5.29877	0.00927	4.90670	L	2.79876	Act/360
SEK	6.75040	6.76434	0.01394	5.02500	L	2.54096	Act/360

*{**FXIA <go>**} uses spot, forward, and deposit rates to search for interest rate arbitrage*



Borrowing EUR Implied vs Market

	Date	Days	FX Fwd Bid Market	USD Depo Ask Market	EUR Depo Ask Implied	EUR Depo Ask Market	Spread
ON	06/02/10	1	1.231885	0.3034	0.2187	0.3346	-0.1159
TN	06/03/10	1	1.231892	0.3000	0.1560	0.3346	-0.1786
SN	06/04/10	1	1.231905	0.3313	0.1878	0.3660	-0.1782
1W	06/10/10	7	1.231959	0.3313	0.0862	0.3660	-0.2798
1M	07/06/10	33	1.232282	0.3509	0.0128	0.4375	-0.4247
2M	08/03/10	61	1.232703	0.4344	0.0504	0.5384	-0.4880
3M	09/03/10	92	1.233197	0.5362	0.1258	0.7117	-0.5859
4M	10/04/10	123	1.233527	0.5662	0.1819	0.8030	-0.6211
5M	11/03/10	153	1.233869	0.6061	0.2328	0.9003	-0.6675
6M	12/03/10	183	1.234167	0.6460	0.2874	1.0048	-0.7174
9M	03/03/11	273	1.235245	0.7447	0.3909	1.0728	-0.6819
1Y	06/03/11	365	1.236517	0.8334	0.4684	1.1424	-0.6740
2Y	06/04/12	732	1.244701	1.2244	0.7158	1.3516	-0.6358
3Y	06/03/13	1096	1.255703	1.6792	1.0390	1.6386	-0.5996
4Y	06/03/14	1461	1.267397	2.1406	1.4098	1.9424	-0.5326
5Y	06/03/15	1826	1.279653	2.5759	1.7683	2.2494	-0.4811
	04/22/10	Err					
	10/04/11	488	1.238959	0.9544	0.5360	1.2099	-0.6739

*{**FXFA <go>**} uses spot, forward, and deposit rates to search for interest rate arbitrage*

Summary

Interest rates are one of the most important factors for valuing FX in both the short and long-term. They are the main tool for monetary policy, and set the stage for all of the other factors that play a part in determining FX values. They also tell us about inflation and risk. Finally it is imperative to not only know where interest rates are, but where the market expects them to be, and how they relate to and differ from each other.

FX INSTRUMENTS

The FX market has developed several products to meet the needs of market participants. The primary products are listed below. Their main uses include hedging, speculating, and cash management.

SPOT TRANSACTION

A "Single outright transaction involving the exchange of two currencies at a rate agreed on the date of the contract for value or delivery (cash settlement) within two business days" (*(BIS Triennial Bank Survey, Foreign Exchange and derivatives market activity in 2007)*.

Think of the spot market as where the currency is trading *now*, but where actual trade *settlement* or *delivery* takes place two business days later ("T+2"). There are some exceptions to this rule: USD/CAD, USD/TRY, and USD/PHP settle plus one business day, know as "today plus one", or simply, "T+1".

Spot trades comprise about a third ($1 trillion) of daily FX trading and are used often by speculators who buy or sell a currency to express their view and profit on direction. Hedgers like corporations also use spot trades to fund accounts, pay foreign payables or convert foreign receivables to their home currency.

Quoting conventions

A spot rate represents the price of one currency in terms of another, and is expressed as a ratio. Since currencies are always quoted in pairs, it helps to know that the currency on the left is always **fixed** (equal to 1) and that the one on the right is **variable**. Therefore an FX quote tells us how much of the variable currency it takes to buy/sell the fixed. In market parlance, the fixed currency is known as the **base** or **commodity** currency, and the variable is the **quoted** or **term** currency. For example:

> If EUR/USD is trading at 1.50**, it takes $1.50 USD to buy 1 EUR**.

So because EUR is on the left, we know it is the fixed or base currency, and that its value is being expressed in "terms" of dollars. You can also think of EUR as the "commodity" being traded.

The practice of quoting in terms of the *domestic* currency with the foreign as the base is known as **direct** or **American** terms. For example, the value of Japanese Yen could be expressed as JPY/USD

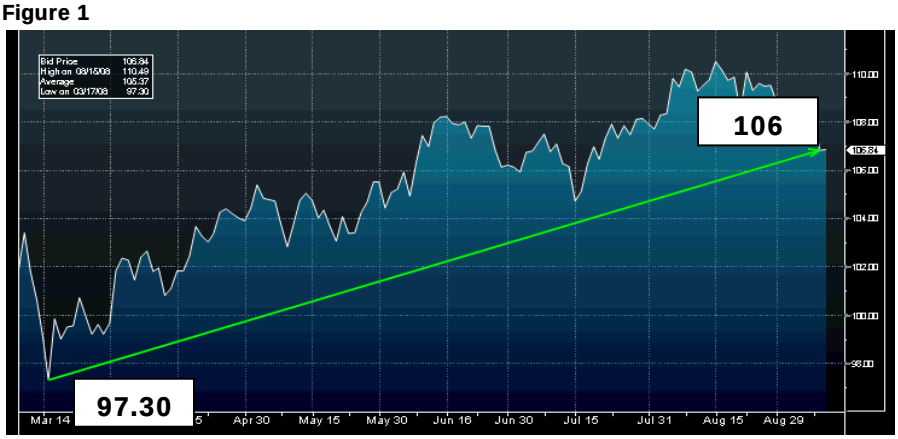
in the U.S. (you'd want to know how much yen would cost you in dollars), but USD/JPY in Japan. The opposite, quoting in foreign terms with the domestic as the base, is known as **indirect** or **European** terms.

The labels are largely academic, but they highlight the need for clarity in FX to correctly understand a quote. Fortunately, in the international FX markets, there is a convention to quote most currencies with ***USD as the base***, with the **NOTABLE** exceptions of the Euro, British pound, Australian dollar, and the New Zealand dollar, which are quoted ***EUR/USD, GBP/USD, AUD/USD,*** and ***NZD/USD*** respectively.

Reading a chart

Understanding how currencies are quoted helps us to look at a chart and correctly identify the trend. As currencies are quoted in pairs, when one goes up, the other necessarily goes down. A currency **appreciates** when it becomes worth more in terms of another, and it **depreciates** when it is worth less.

Figure 1



{JPY <Curncy> GP <GO}

This chart shows the U.S dollar against Japanese Yen. Quoted USD/JPY, it went from 97.30 to about 106.

The USD **appreciated** because it takes more yen to buy 1 dollar. For the same reason, the Yen depreciated.

Figure 2

{BRL <Curncy> GP <GO}

This is a chart of U.S dollars against Brazilian Real. Quoted USD/BRL, it went from a high of 2.09 to about 1.56.

USD depreciated: it now takes less real to buy 1 dollar. For the same reason, we can also say that the Real has appreciated.

Figure 3

{EUR <Curncy> GP <GO}

This is a chart of U.S dollars against the Euro. Quoted EUR/USD, it went from 1.1980 to 1.55.

The chart goes up, but the dollar went down. It has depreciated because it takes more dollars to buy 1 euro. Conversely, we can say the Euro has appreciated.

Reading the quote line

FX quotes come from banks that "make markets", meaning they are willing to both buy and sell currency. They provide a "two-way" quote: a price at which they are willing to *buy*, known as the **bid**, and a price at which they are willing to *sell*, known as the **offer** (or "**ask**"). Both prices refer to the base currency. The bid is always lower than the offer because the bank wants to pay as little and receive as much of the quoted currency as possible. The difference is the **bid-ask spread** and compensates them for making a market as they buy low and sell high. In a quote line, the bid will always come first. For example:

EUR/USD 1.4710 / 1.4712

The **bid** is 1.4710. The bank will **buy** euros for $1.4710 U.S. dollars.
The **offer** is 1.4712. The bank will **sell** euros for $1.4712 U.S. dollars.

The bid-ask spread is $.0002, or 2 "pips" which we'll come to later. This may seem small, but it amounts to $200 on a $1,000,000 trade and adds up quickly, underscoring how important volume is to a trader.

So how did we know that the bid and offer refer to euros and not dollars? Recall that the quote always refers to the base, which is the **commodity** being traded. Also the currency on the left is always fixed, and is expressed in terms of the right (the variable), so we have a number of *dollars per euro*.

Now what if you didn't want to buy/sell euros, but dollars? You will still see the same quote, because it is market convention, but we now know that this is a price in dollars, for euros. To get the price in euros for dollars, just take the reciprocal: 1 / 1.4712 = 0.67972 and 1 / 1.4710 = 0.67981. Recall the bid is always lower than the offer, and the new quote becomes:

.67972 / .67981. The bank will buy 1 USD for .67972 euros, and sell 1 USD for .67981.

This highlights an important **rule**: there *are always two sides* to an FX trade. If you are buying one currency, you are necessarily selling the other, and vice versa! Therefore, in our example:

1.4710 = the price where the bank will ***buy*** euros, *and* where they will ***sell*** dollars
1.4712 = the price where the bank will ***sell*** euros, *and* where they will ***buy*** dollars

This is illustrated graphically below:

Table 1

	MARKET MAKER	
Buys Base ccy Sells Quoted ccy		Sells Base ccy Buys Quoted ccy
	BID / ASK	
Sells Base ccy Buys Quoted ccy		Buys Base ccy Sells Quoted ccy
	MARKET TAKER	

Cross rates

Although any currency is technically a cross rate, the term generally refers to spot rates where the dollar is not one of the currencies stipulated. For example, if you are a company in the U.K. that imports goods from Europe, you are concerned with the value of the British Pound against the Euro, expressed as EUR/GBP. Here EUR is the base, GBP is the term, and there is no mention of USD. However, *the value of a cross rate **must** equate with the value of each of the two currencies against the USD*. For example:

If EUR/USD = 1.4344 and GBP/USD = 1.7719, than EUR/GBP *must* equal .809526 **(Eq. x.1)**

If it did not, the currencies would be mis-priced and there would be **arbitrage**. Arbitrage occurs when there is a price mismatch for like goods that can be exploited for risk-less profit. The like goods here are EUR/GBP and GBP/USD. Called *triangular* arbitrage here because three currencies are involved, it could go like this: say EUR/GBP was .75 instead of .80926. GBP would be considered overvalued vs. EUR, and hence undervalued vs. the USD. You could do the following:

Borrow 1 million USD, sell it and buy 564,365.93 GBP (1,000,000 / 1.779)
Take your 564,365.93 GBP and buy 752,487.91 EUR (564,365.93 / .75)
Take your 752,487.91 EUR and buy 1,079,368.66 USD (752,487.91 * 1.4344)
Pay back your USD for a **risk-less profit of 79,368.66** (1,079,368.66 – 1,000,000)

Since we know there is no free lunch arbitrage seldom lasts long. When it does exist, the trade is repeated, forcing the prices back in line and arbitraging the trade away. In this case, GBP/USD would go up and EUR/GBP would go down until the above equation was satisfied and equilibrium is achieved.

So how de we calculate cross rates? Here since we want to arrive at EUR/GBP and have the USD cancel out, and both quotes are the same convention (direct in this case), we *divide*: 1.4344 / 1.7719. However, when we have a direct and an indirect quote, like a company in Canada paying for their euros in Canadian dollars, we would multiply:

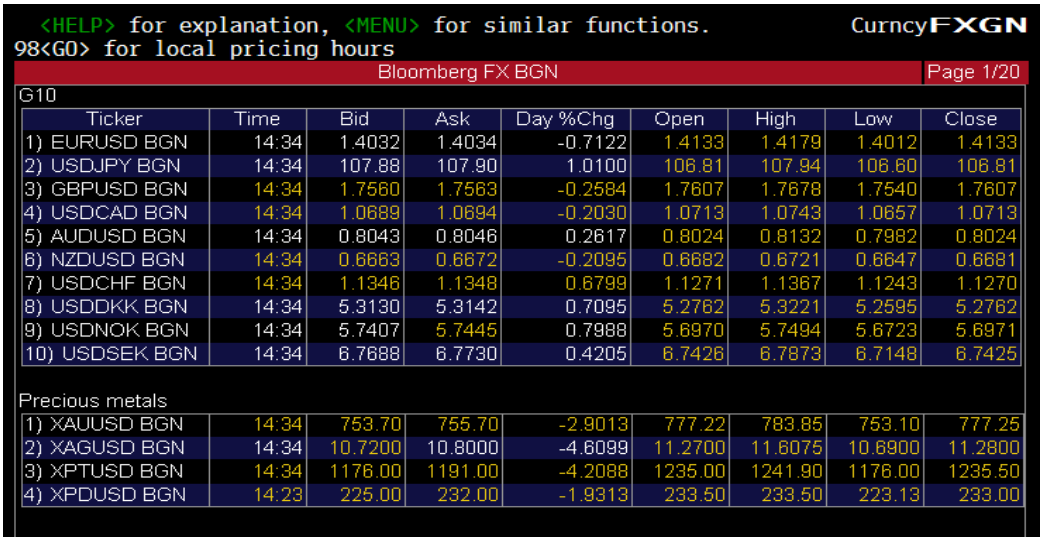
If EUR/USD = 1.4344 and USD/CAD = 1.0692, EUR/CAD = 1.53366 (1.4344 * 1.0692) **(Eq. x.2)**

Rule: To calculate cross rates when both currencies are quoted the same (both are indirect or direct), cross bids and offers and divide. When they differ (one direct one indirect) keep same side and multiply.

Spot quotes also introduce us to two other concepts in the FX market: the **pips,** which are the last two significant digits in the quote; and the **big figure**, which are the digits in front of the pips. In our example, "10" and "12" are pips, and "7" is the big figure. The distinction is made largely for quoting convenience. In the inter-bank market, only the pips are quoted as the counterparty is expected to know the big figure. Also, a customer may be quoted "1.4710-12" to signify the spread as well.

Two valuable Bloomberg screens for spot and cross-rates are shown below:

Figure 4



G10

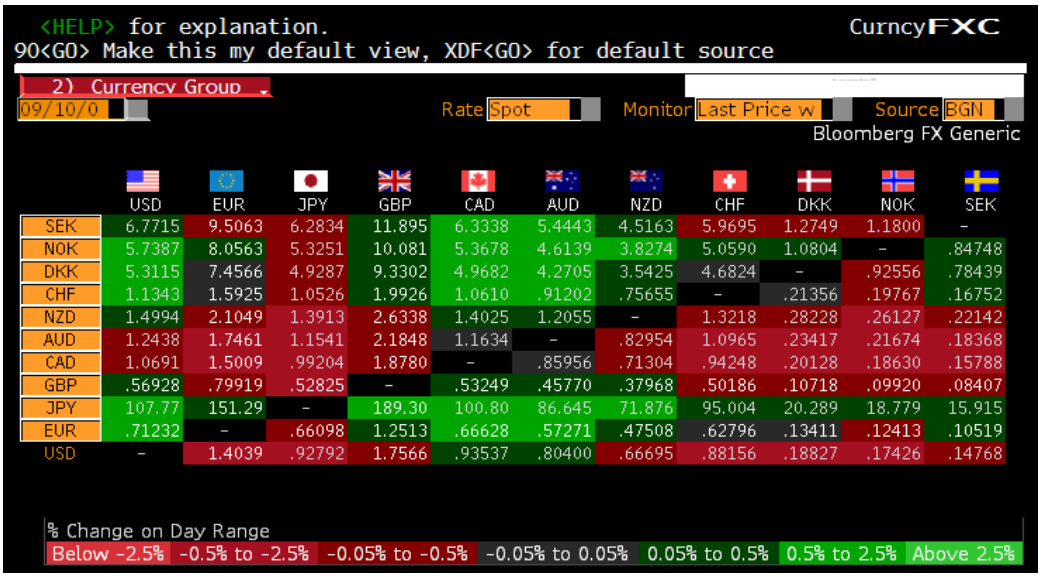
Ticker	Time	Bid	Ask	Day %Chg	Open	High	Low	Close
1) EURUSD BGN	14:34	1.4032	1.4034	-0.7122	1.4133	1.4179	1.4012	1.4133
2) USDJPY BGN	14:34	107.88	107.90	1.0100	106.81	107.94	106.60	106.81
3) GBPUSD BGN	14:34	1.7560	1.7563	-0.2584	1.7607	1.7678	1.7540	1.7607
4) USDCAD BGN	14:34	1.0689	1.0694	-0.2030	1.0713	1.0743	1.0657	1.0713
5) AUDUSD BGN	14:34	0.8043	0.8046	0.2617	0.8024	0.8132	0.7982	0.8024
6) NZDUSD BGN	14:34	0.6663	0.6672	-0.2095	0.6682	0.6721	0.6647	0.6681
7) USDCHF BGN	14:34	1.1346	1.1348	0.6799	1.1271	1.1367	1.1243	1.1270
8) USDDKK BGN	14:34	5.3130	5.3142	0.7095	5.2762	5.3221	5.2595	5.2762
9) USDNOK BGN	14:34	5.7407	5.7445	0.7988	5.6970	5.7494	5.6723	5.6971
10) USDSEK BGN	14:34	6.7688	6.7730	0.4205	6.7426	6.7873	6.7148	6.7425

Precious metals

1) XAUUSD BGN	14:34	753.70	755.70	-2.9013	777.22	783.85	753.10	777.25
2) XAGUSD BGN	14:34	10.7200	10.8000	-4.6099	11.2700	11.6075	10.6900	11.2800
3) XPTUSD BGN	14:34	1176.00	1191.00	-4.2088	1235.00	1241.90	1176.00	1235.50
4) XPDUSD BGN	14:23	225.00	232.00	-1.9313	233.50	233.50	223.13	233.00

{***FXGN <go>*** Live spot pricing for majors, emerging markets, and crosses. Notice the bid-ask spread, and % change, open, high, low, and close which are important to traders}

Figure 5



{***FXC <go>*** live updating cross rates, shown in both direct and indirect terms. Crosses available by region and by tenor, and has a heat-map color feature for gains and losses as shown above}

FX FORWARD

"Transaction involving the exchange of two currencies at a rate agreed on the date of the contract for value or delivery at some time in the future (more than two business days later)." (BIS 2007).

Like spot, an FX forward is a transaction involving the exchange of one currency for another at a price agreed to now. The main difference is the value date is in the future, beyond the spot date. They are also called *forward outrights* because the currency is traded "outright" to a specific date and also to distinguish them from an FX or *forward swap*

It is important to understand that forward rates are not forecasts nor an indication of where markets think an FX rate is headed. Rather, they are a reflection of the **current interest rate differential in the two currencies involved. Specifically, they are the FX rate that *neutralizes* this difference due to **interest rate parity** (more on this in the section on Interest Rates).

Because of the added time involved, forwards have increased *settlement* risk because more time means a greater chance of a counterparty defaulting, and *interest rate* risk which we'll come to later. Though not as liquid as spot, forwards are widely traded (about $362 billion daily), are available for many currencies from most major banks, and can be for a period of days to even years. They are also the most popular ***hedging*** tool, because they require no payment up front, provide the ability to lock in a price for a specific date, and eliminate the risk of unfavorable FX moves (more in the section on Hedging).

At any given time, forwards are actively quoted in the market for what are known as "even" or "calendar" dates. Terms like 1-week, 1-month, 2-month, etc. This is partly because of convenience (it's easier to post and update monthly quotes than a quote for every day), but also because of the close link between FX and money markets which are quoted this way as well. These dates are determined by settlement calendars (*like* **{CDR <go>}**) that show valid business days. This is essential because if a country has a banking holiday, you can not settle that currency on that day. It is also important to know that spot is the starting date. So if today is September 8th, value spot is September 10th (two business days from the 8th), and value 1-month is October 10th (one month from Sept. 10).

Reading the quote

Theoretically, spot and forward prices can be equal, but because interest rates vary they almost never will be. Therefore, to derive a forward price, *spot is adjusted higher or lower by a currency amount equivalent to the difference in interest rates* (more in the section on Interest Rate Parity). This value is known as the **"forward points"** and they are how forwards are quoted in the market.

For example:

EUR/USD		**Bid**	**Ask**
SP	**09/10/08**	**1.4133**	**/ 1.4135**
1M	**10/10/08**	**-22.91**	**/ - 22.61**
2M	**11/10/08**	**-46.76**	**/ - 46.27**

In the above quote Euro is trading at 1.4133 / 35 for spot, but -22.91 / - 22.61 points for value one month and -46.76 / - 46.27 for two-month. What does this mean? It means we can calculate our forward rate, also known as the "**all-in**", simply by taking spot and adding or subtracting the points. The formula is:

Forward rate = Spot +/- Forward Points

So in our example, the rate for the 1 month is (keep in mind that EUR is quoted to four decimals):

1.4133 - .002291 = **1.411009** bid and 1.4135 - .002261 = **1.411239** offer

This quote means that the dealer will buy (you can sell) euros for 1.411009 and that they will sell (you can buy) euros for 1.411239, for delivery in one month's time. Notice also in the above that we *subtracted* the points. But how do we know whether to add or subtract? Some dealing screens are not as kind as Bloomberg's **{FRD <go>}** and do not show "+/-" signs, nor will you *ever* hear "plus" or "minus" in a dealing room. Therefore we apply the following rule:

Rule: If the bid-ask points go numerically higher (reading left to right), then you *add*. If they go numerically lower (like they do here, 22.91 – 22.61), you *subtract*.

Premiums and discounts

One reason points are quoted instead of the all-in price is because the all-in changes constantly with movements in spot. The points however are almost solely dependent on interest rates so they can remain stable for longer periods of time. The points also tell us something important about the interest rates involved. If they are being subtracted, the base currency is said to be trading at a **discount**, e.g. it is trading lower or more cheaply on a forward basis. This also tells us that its interest rate is *higher*. Conversely, if the points are being added, it is more expensive on a forwards basis, and is said to be trading at a **premium**. This means its interest rate is *lower*. It is also correct to say that if the base currency is at a premium (discount), then the quoted currency is at a discount (premium).

This makes intuitive sense when you think about buying a currency now (spot) versus buying it forward. Take EUR/USD for example. Euros currently have a higher interest rate (4.25%) than dollars (2.00%). Therefore the forwards points are subtracted, and they trade at a discount, and they are cheaper if you buy them forward. Why exactly is this? Because if you bought them forward, in the meantime you are still invested in dollars and are earning the lower USD interest rate until the forward value date. You are foregoing the higher interest rate and are therefore compensated by a lower EUR/USD price in the future (you "earn" the points). If you bought euros spot, you earn the higher interest rate (and stick the counterparty with the lower one). Consequently, when you sell them forward you will get a lower rate and get less dollars back (you "pay" the points).

Broken dates

Forwards are commonly quoted for even dates as discussed previously, but many customers like corporations will require the currency on a specific date. When the date falls in between the calendar dates they are known as *odd* or *broken* dates. This is a common occurrence as corporations often know when they have payables or receivables coming due on a specific date. A simple way to calculate points (and thereby the forward rate) for a broken date is to interpolate between the two nearest even-dates. For example, assume we want to buy Euros for value 10/27/08 and have the information below:

Example:	Spot: 1.4135	Days to 1 month: 30
	1-month points: - 22.61	Days to 2 month: 61
	2-month points: -46.27	Days to 10/27/08: 47

What will the forward points be, and what will the all-in forward rate be?

First we need the points per day that accrue between the 1 month and 2 month:

(-46.27-22.61) / (61 – 30) = **-.76323**

Next we multiply points per day by the number of days from the 1-month to 10/27/08:

-.76323 * 17 = **-12.9748**

We then combine these points with the one month points:

-12.9748 - 22.61 = **-35.58**

Finally, we adjust spot by the points to arrive at the forward:

1.4135 - .003558 = **1.409942**

In sum, we can buy euros for value October 27, 2008 for $1.409942

In this example, the points were provided and we interpolated between them. *But how do the banks derive them to begin with?* By using the interest rates in each currency and the following formula:

$$\textbf{Forward points} = \textbf{Spot} * \frac{(R2 - R1 / 100) * (days / 360)}{(1 + R1 / 100 * days / 360)} \qquad \textbf{(Eq. x.x)}$$

Where R2 = the term currency (USD) interest rate and R1 = the base (EUR) rate. At the time of this exercise, 1 month rates were approximately 2.58% in the U.S. and 4.48% in Europe, which means:

$$\text{Forward points} = \frac{1.4135 * (2.58 - 4.48 / 100) * (30 / 360)}{(1 + 4.48 / 100 * 30 / 360)} = \textbf{-22.30 points}$$

Which is roughly equal to what was being quoted in the market, -22.61.

Trading before spot

In addition to spot and forward value dates, it is common for FX to trade for dates prior to spot. That means for delivery today (known as **value today** or "cash") or tomorrow (known as **value tom**).

These tenors are quoted the same as normal forward outrights, but deserve special mention because you don't simply add or subtract the points from spot. First you ***reverse*** the bid and offer pips, and then follow the normal rule for adding or subtracting. For example, you see the following quote:

	Bid	/	Ask	
ON	**-.65**		**-.55**	*(Value Today*)*
TN	**-.84**		**-.79**	*(Value Tom*)*
SP	**1.4157**		**1.4159**	

*(*ON and TN are swap terms which we'll come to in the next section. Since points are calculated the same for outrights and swaps, they are the same as value Today and value Tom respectively)*

Example: Value TOM

To calculate the rate for value tom outright, we reverse the points so they are -.79 - .84. Since they are now in ascending order we take spot and add:

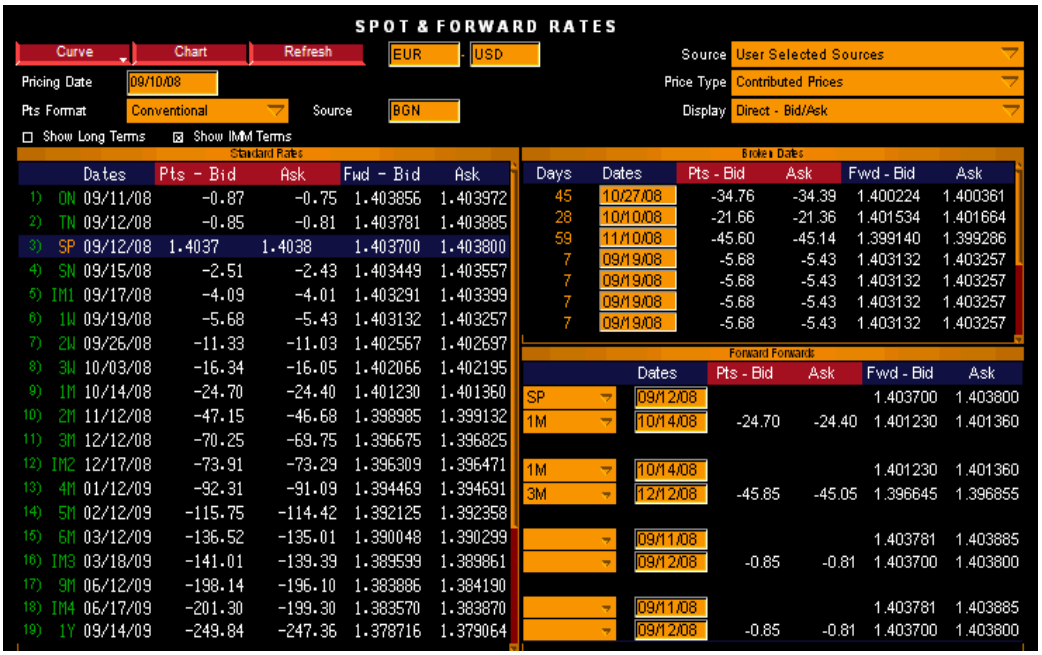
1.4157 + .000079 = **1.415779** for the bid
1.4159 + .000084 = **1.415984** for the offer

Example: Value Today

To get to value today, we still start at spot and reverse the points, but we have to include the points adjustment for value tomorrow. Therefore we get:

1.4157 + .000079 + .000055 = **1.415834** for the bid
1.4159 + .000084 + .000065 = **1.416049** for the offer

Figure 6



{***FRD <go>***} benchmark page for forwards pricing. It includes spot, points and all-in rates for even and broken dates, swaps, and forward forwards with choice of pricing source

FX SWAP

"Transaction which involves the actual exchange of two currencies (principal amount only) on a specific date at a rate agreed at the time of conclusion of the contract (the short leg), and a reverse exchange of the same two currencies at a date further in the future and at a rate (generally different from the rate applied to the short leg) agreed at the time of the contract (the long leg)." (BIS 2007)

FX swaps are really two transactions in one. Usually comprised of a spot and a forward, they can also be two forwards (a "forward-forward"). You buy (sell) currency for one date (the *near leg*) and simultaneously agree to sell (buy) it back at a later date (the *far leg*). Swaps are commonly used for extending or "rolling" a position, to obtain funding in another currency, and to speculate on interest rates. With a swap you are essentially borrowing and lending currency for a period of time. The majority of FX trading is in the form of swaps, with $1.7 trillion estimated to trade daily.

As a swap involves a forward date, it is also quoted by points, and the calculation is the same as in the previous section. An important difference is that an FX swap has two cashflows. For example take a euro swap. Say you want to buy 1mm euros for spot, and sell them forward in one month's time. This is a "buy/sell" swap (buy on the near leg, sell on the far). Staying with our example, we have:

EUR/USD		**Bid Ask**
SP	**09/10/08**	**1.4133 / 1.4135**
1M	**10/10/08**	**-22.91 / - 22.61**

At spot, you buy the euros for €1,000,000 * 1.4135 = $1,413,500, and simultaneously sell them forward at 1.4110090 (1.4133 - .002291) * 1,000,000 = $1,411,009. **Note the use of the correct side of the market for each trade: we use the ask side on the near leg and the bid side on the far.*

This is called an "even" swap because the near and far amounts are the same. However note that you appear to lose $1,413,500 - $1,411,009 = $2,491. This is not really the case because you would have invested the euros and in 30 days would have additional euros to offset the loss in dollars. For example:

You earn: €4,000 in interest (€1,000,000 *4.8/100 * 30/360) for a total of €1,004,000. Convert back at 1.4110090 and you have $1,416,653, thereby recouping the original loss and the USD interest you gave up. If you had kept the dollars, you'd have ($1,413,500 * 2.58/100 * 30/360) = $1.416,539*

**Note: The 1,416,539 and 1,416,653 are not be exact because the points and the interest rates come from different sources. The key here is that both sides offset each other. As mentioned in the section on forwards, the points neutralize the difference in interest rates. More in the section on Interest Rate Parity*

Because of this interest, market participants may decide on the far leg to include the interest in the amount they are selling. Thus the two legs will have different amounts in what is referred to as an "uneven" swap. In this case, you would buy €1,000,000 near and sell €1,004,000 far.

NON-DELIVERABLE FORWARDS (NDFs)

Non-deliverable forwards, or "NDFs", are very similar to regular forwards. You lock in a rate now for a date in the future. The main difference is that there is *no exchange of the local currency*. Instead the contract is *cash-settled* in dollars or euros, using a rate set two days prior to the settlement date. This rate is known as the **fixing** rate (more on fixings in the section on pricing).

NDFs developed as a result of government regulations or banking controls that exist in certain markets. These controls restrict the local currency from being delivered offshore and inhibit the use of regular forward contracts. For companies that do business in these countries, NDFs evolved as a way for them to hedge their exposure without taking delivery of the currency. They therefore help to encourage foreign trade and investment in developing economies. NDF trading exists for many emerging countries, and is especially active in Korea, Brazil, Thailand, Russia, China and India.

Example:

A company in the U.S. imports ethanol from Brazil. Their next payment is due in three months, in the amount of 1,000,000 Brazilian real. USD/BRL is currently at 1.78 and the company is concerned about the real strengthening against the dollar. They decide to do a 3-month NDF and lock in a rate of 1.83 for value December 12. Assume our fixing (on December 10) is 1.75.

The settlement amount is calculated by the formula:

$$\textbf{Cash settlement} = \frac{(\text{contract forward rate} - \text{fixing rate}) \times \text{USD amount}}{(\text{fixing rate})}$$

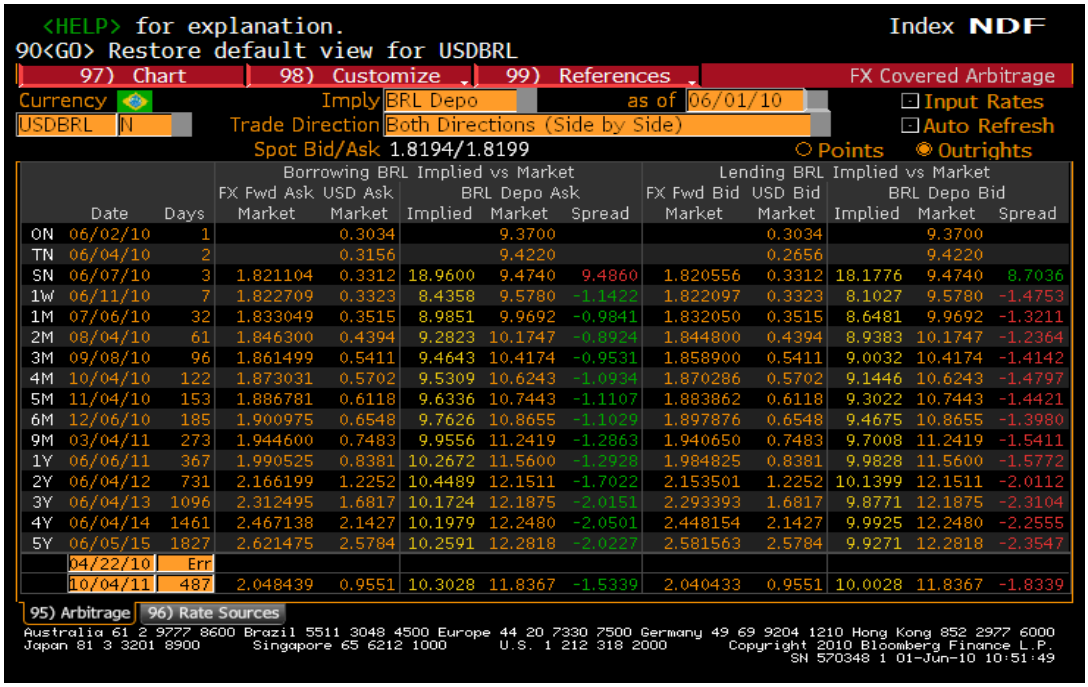
So in our example:

$$\text{Cash settlement} = \frac{(1.83 - 1.75) * (1{,}000{,}000 / 1.83)}{(1.83)} = \textbf{\$24,980.48}$$

The positive amount indicates that the customer, as the forward buyer of real and *seller* of dollars, will *receive* this amount from the bank to compensate for the added dollar cost of the real. The customer had originally agreed to pay the bank 1,000,000 / 1.83 = $546,448.09. Since the fixing was 1.75, the customer had to pay 1,000,000 / 1.75 = $571,428.57. In effect, an NDF is closed out by a spot trade and in this case it cost the customer $571,428.57 - $546,448.09 = $24,980.48 more, hence he is reimbursed by that amount. Note that had the real depreciated, say to 1.90, the payment would be reversed: the customer would have to pay the bank to compensate them for the

reduced dollar amount. So was the company's hedge effective? Yes, the real appreciated and the company was protected.

Figure 7



{NDF <go>} Most widely used page for pricing NDFs

Note that {FRD <go>} can also be used to price NDFs. However many market players will use {NDF <go>} because it displays the implied yield. This is useful because since with NDFs you don't actually take delivery of the currency, you don't earn or pay the quoted (onshore) interest rate as you do with a forward. However, using interest rate parity we can easily *imply* it. We can rewrite formula x.3 from the section on interest rates, to come up with:

$$\text{Implied yield} = \left[\frac{\text{Forward} \times (1 + R2/100 \times \text{days}/\text{basis2})}{\text{Spot}} - 1 \right] \times \frac{\text{basis1}}{\text{days}} \times 100$$

**note here that R2 still equals the base ccy interest rate and that R1 is our implied yield. Basis2 is the daycount for the settlement currency and basis1 for the NDF currency*

Using the 3 month in figure 7, and we have:

$$\text{Implied yield} = \left[\frac{1093.15 \times (1 + 2.8188/100 \times 91/365)}{1091.55} - 1 \right] \times \frac{360}{91} \times 100 = 3.45\ \%$$

CURRENCY FUTURES

Currency futures are similar to forwards. They enable you to lock in a rate for a date in the future, and their price is governed by interest rate parity. However the similarities end there and they have several important differences. Unlike forwards, FX futures are one of only two FX instruments that are exchange-traded. Exchanges provide regulation, standardization, and clearing for futures trading:

Regulation: In the U.S., FX futures trade on the International Monetary Market (IMM) division of the Chicago Mercantile Exchange (CME), which is regulated by the Commodity Futures Trading Commission (CFTC). Cash FX (spot, forwards, swaps) has no central regulatory authority.

Standardization: futures contracts are standardized in terms of the currencies, the amounts, and dates being traded. They are also subject to the trading rules of the exchange. Forwards are customizable.

Clearinghouse: "marks-to-market" (values) your positions and guarantees the trades. Also performs margin and netting maintenance (futures require margin posted) and cash is settled daily. In contrast, forwards require no payment until maturity but have counterparty (credit) risk.

Note that the differences between forwards and futures do not imply that one is better than the other. Rather, they lead to each of the markets being used differently and they can even be complimentary. Hedge funds and money managers for example use futures to speculate and also to hedge portfolio values. Corporations however find forwards the more useful tool for hedging transaction exposures.

Figure 8

{*JYZ8 <Curncy> DES <Go>* Description pages for futures are great for viewing the price and the terms of the contract, including margin limits, expiry dates, and tick values}

A note on pricing for currency futures: Notice here that the Japanese Yen contracts are priced in terms of cents per 100 yen. That is, it is quoted in *dollar* terms (i.e. direct). All currency futures on the CME are traded this way so as to make it easy to calculate your profit and loss in U.S. dollars. Let's look at an example using the information in the above description page:

The **{JYZ8 <Crncy>}** December contract for USD/JPY is currently trading at $0.9332 per 100 JPY. The contract is denominated in a notional value of 12,500,000 JPY, and so it is presently worth:

Example:

$$12{,}500{,}000 \text{ JPY} \times \frac{\$0.9332}{100 \text{ JPY}} = \mathbf{\$116{,}650}$$

If the contract goes up a point, to 94.32 cents, it becomes worth:

$$12{,}500{,}000 \text{ JPY} \times \frac{\$0.9432}{100 \text{ JPY}} = \mathbf{\$117{,}900}$$

It increases by $1,250, as we'd expect from the "Value of 1.0 pt" line on the DES page.

Finally, if you were long 100 contracts, you would have made:

100 * ($117,900 - $116,650) = **$125,000 USD**

In sum, being standardized and exchange-traded make futures easy to trade. They also have minimal credit risk and provide the ability to trade on margin which is ideal for hedge funds and speculators. However futures limit you to the currencies available and to four quarterly maturity dates. They are also useful to hedgers, and positions are easy to unwind by executing an offsetting trade (98% of trades are "closed out", only 2% result in delivery). Forwards however require credit with the banks you want to trade with, but are also customizable by currency, amount, and date (and can go beyond a year). You can also execute larger trades with forwards, while futures contracts are about $125,000 per contract. Forwards come with counterparty risk, and can be expensive to offset or extend (roll). Futures are a small but growing part of the FX market, with an average of about $26 and $14 billion in Euro and Yen contracts respectively trading each day.

EXCHANGE-TRADED CURRENCY OPTIONS

Exchange traded options provide the right but not the obligation to buy or sell an underlying asset. In the U.S they trade on the Philadelphia Exchange (where the underlying is spot) and on the CME (where the underlying is an FX future). They are very similar to equity options but make up a very small, almost negligible fraction of the FX market at present. That's not to say options aren't important to FX. They are very important and are very widely used, but the vast majority of them trade OTC (see next section).

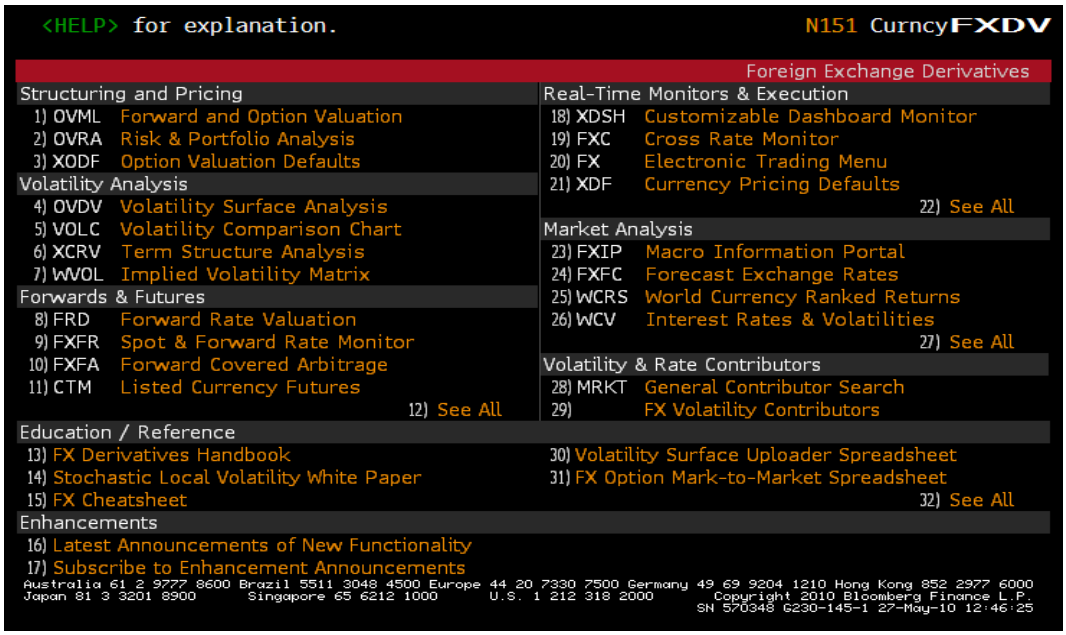
OTC CURRENCY OPTIONS

Currency options are contracts that provide for the **right but not the obligation** to buy or sell spot foreign exchange. Unlike forwards, this right generally has an upfront cost associated with it, known as a **premium**. However options are highly customizable, and can be tailored so as to reduce or even eliminate this cost.

A key feature of an option is that you can specify the rate, known as the **strike**, at which you'd like to buy or sell. This is unlike a forward, where the value is negotiable but set in the marketplace. At expiry, the strike will be above or below the market, and you will either exercise your right to buy or sell at a profit, or the option will expire worthless and you lose the premium paid. The premium is comprised of two types of value: **intrinsic**: the difference between the strike and the market price, and **time**: the more/less time to expiry, the greater/less a chance of the option expiring "in-the-money" (profitable).

Because of the many variables involved in valuing options, strike, time to maturity, interest rates, and volatility (the movement in the underlying and a crucial input), it wasn't until the advent of the Black-Scholes formula that options could be properly and easily valued. This formula and many subsequent models combined with the spread of technology in dealing rooms and at customers have helped options to become a big part of FX and the marketplace in general. The degree to which you can customize and structure options make them very versatile and widely used as both hedging and speculative tools. They trade almost entirely over-the-counter where average daily volume is estimated at $212 billion. Options will be covered in more detail in the section on FX Options and Volatility.

Figure 9



{*FXDV <go>* Bloomberg's option homepage, complete with access to an option pricer, monitors, volatility contributors, and other resources}

CURRENCY SWAPS

"Contract which commits two counterparties to exchange streams of interest payments in different currencies for an agreed period of time and to exchange principal amounts in different currencies at a pre-agreed exchange rate at maturity." *(BIS 2007)*

Currency swaps (also called cross-currency swaps) are ***not*** to be confused with an **FX** swap. They are in fact closer to an interest rate swap, as they involve the exchange of a stream of fixed or floating interest payments in the two currencies. Principal may or may not be exchanged at inception (depends on agreement), but will be at maturity. They are traded OTC and are customizable. You can stipulate the amount, maturity, payment frequency, and the interest rate you want to receive (pay). Using a model similar to Bloomberg's Swap Manager below **{SWPM <GO>}**, the bank will determine the rate you would pay (receive).

A common use of currency swaps is to borrow or fund in different currencies. For example, a firm may have debt in a particular currency that it issued to fund operations in that country. If the firm can achieve a low borrowing cost in a different currency, it may consider a currency swap to attain a lower cost of funds and exchange rate protection, and effectively change the currency of its debt. If ABC Corp issued debt in the U.K. at 5%, it may consider a currency swap that pays it a U.K. interest

rate of 5% in exchange for paying a floating rate in another currency, like USD or JPY, depending on its interest rate outlook and FX outlook.

Currency swaps are popular because they allow a user to hedge out their *interest rate* risk, but when it is agreed to exchange notionals at maturity you have an FX risk that you have to sell the currency you've been receiving at a worse rate.

Structurally, currency swaps are similar to a series of forwards over various dates – each forward covering an interest payment for that date. Instead of exchanging each payment in its entirety, it is common to net them and only have one payment between payor and receiver.

Figure 10

{***SWPM <go>*** Bloomberg's interest rate swap calculator, supporting dozens of swap types including currency swaps, with full pricing, risk, and mark-to-market capabilities}

Summary

There are several instruments useful for trading or hedging foreign exchange. They include: spot, forwards, non-deliverable forwards, FX swaps, currency swaps, futures, and options. They each have different characteristics but most of them trade over the counter, with the exception of exchange-traded futures and options. Therefore most of the trading is conducted bank to bank or bank to customer. FX swaps are the most widely traded, followed by spot, forward outrights, OTC options, and futures. As discussed in the section on interest rates, all of these instruments are highly interest rate sensitive

FX Options and Volatility

Currency options are contracts that provide for the **right but not the obligation** to buy or sell spot foreign exchange. This differs from a forward where each party is obligated to fulfill the contract. Also unlike forwards, this right generally has an upfront cost associated with it, known as a **premium**. However options are highly customizable, and can be tailored so as to reduce or even eliminate this cost. They are traded over-the-counter, and are highly popular hedging as well as speculative tools.

Some Basics

There are two fundamental types of options, known as *calls* and *puts*, and myriad types of structures that can be created by combining them and adding various features which we will discuss later.

A **call** option is the right, but not the obligation, to BUY the underlying currency.
A **put** option is the right, but not the obligation, to SELL the underlying currency.

Note that unlike equity or index options, currency options always have two opposite sides. For example, a *call* option on euros is also a *put* option on dollars. This is consistent with spot foreign exchange, where when you buy euros you are necessarily selling dollars and vice versa. It is for this reason that when buying or selling an option, it helps to specify the currency the option is referring to. For example, "EUR/USD, *call on EUR*".

There are two parties to an options trade: the options purchaser is the holder or **buyer**, and owns the right to exercise or sell the option. The options seller is also known as the **writer**, and collects the premium. Note that a buy-side customer could just as easily be a buyer or a writer.

Options also have two basic styles of expiry: **American**, where the option can be exercised at any time prior to expiry, and **European**, where the option can only be exercised on the expiry date. In FX, European options are more common.

FX options have broad appeal and usage because of their flexibility and customization. They provide many ways to manage risk as well as to make a profit. A user of options can specify the currency, amount, date, and type of option. They can also specify the rate at which you'd like to buy or sell, known as the **strike**. This is a key feature of an option and is different from a forward, where the value is set in the marketplace. At expiry, the strike will be above or below the market, and you will either exercise your right to buy or sell at a profit, or the option will expire worthless and you lose the premium paid.

Strike prices are looked at in three ways:

In the money (ITM): When the strike price is more favorable than the market rate
At the money (ATM): when the strike is equal to the market rate
Out-of-the-money (OTM): when the strike is less favorable than the market rate

Whether your strike is ITM or OTM depends on whether the option is a call or a put. The example in the table 1 below demonstrates:

Table 1

Strikes for a **call** on EUR	*Assume EUR/USD is 1.3*	Strikes for a **put** on EUR
1.2	**In the money**	1.4
1.3	**At the money**	1.3
1.4	**Out of the money**	1.2

Valuation

An option premium is comprised of two parts: *intrinsic value* and *time (extrinsic) value.*

Intrinsic value is the difference between the strike price and the current market price.

For example: You have a call option on EUR/USD, call on EUR, struck at 1.30, and EUR/USD is 1.35, your option has 1.35 – 1.30 = .05 cents of intrinsic value. On a notional of 1 million EUR that equals $50,000 (0.05 x 1,000,000). The reason it has this intrinsic value is because you can buy euros at 1.30, which is cheaper than the market price of 1.35. You can therefore exercise at 1.30 and sell at 1.35 and pocket the difference, so the option at a minimum would be worth this amount.

Time Value: the option's price minus intrinsic value.

Time adds value to an option because the more time left until expiry, the greater the chance of the underlying moving into the money and increasing the value of the option. The opposite is also true: as you have less time remaining, the option will be worth less. Time value is therefore positive, but declines over time in what is also called time *decay*. All things equal, a 3 month option will have more time value than a 1 month option, a 1 month option more than a 1 week, and so on.

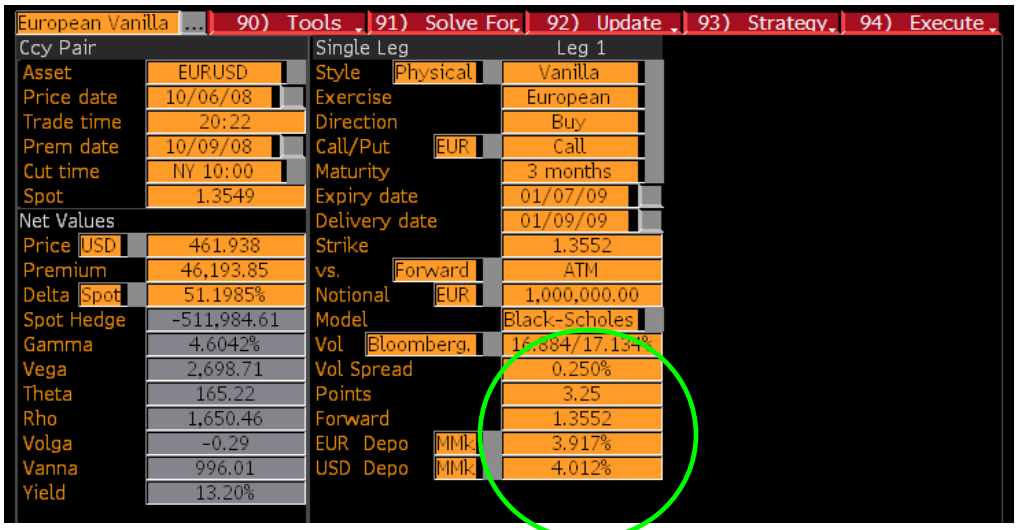
As you can see, intrinsic value is simple to calculate, but in order to know time value and arrive at the option's price, we need to know the *likelihood* of the underlying ending up in, at, or out of the money. This is because what an option value represents is what is known as *expected* value. Expected value means how much the option might pay if the underlying reaches certain values, adjusted for the probability of it reaching those values. Or simply stated: Expected value = value x the chance of getting that value. If there is a lotto that gives a 1% chance of winning $100, that value of that chance (the premium), is worth 0.01 * 100 = $1.00.

At expiry, all an option has is intrinsic value, and it is either positive, or zero. However at all times before expiry we are very concerned with time and expected value, and deriving this value depends on several specific variables, including:

Strike
Price of underlying
Time to expiry
Interest rate differential (the forward)
Volatility

The actual value of the premium can be calculated by taking these variables and using a complex formula like the Black-Scholes model or some modified version thereof. **{OVML <go>}** on Bloomberg uses a modified Black-Scholes as well as three other model types, and has the added advantage of using current data for the market inputs when generating an option's price (Figure 1)

Figure 1



{EUR <Crncy> OVML <go>}

Notes on Delta

Delta measures an option value's sensitivity to movement in the underlying. So for FX, it measures how much an option's premium would change for a 1-unit change in spot.

It may be stated as a whole number but is understood as a percentage term, meaning if an option has a delta of 50 and spot move 1%, we expect the premium to move by .50 * .01 = .5% of the notional. Put another way, if delta is 35%, and spot moves 100 basis points, we would expect the premium to move about 35 basis points (.35 * 100).

The percentage is always between 0 and 100 and is thought of as the option's "**moneyness**", the probability that the option will expire in the money. A delta between 0 and 49 is out of the money (OTM), 50 is at the money (ATM), and 51-100 is in the money (ITM).

Delta has a **1-to-1** correspondence to strike levels for a particular option. Every strike will have its own corresponding delta. In other words, a for 50 delta option, there is only one strike. Change the strike and the delta will change, change the delta and the strike will change. (Try this on OVML)

Delta signifies our **hedge ratio**: the amount of spot foreign exchange that needs to be bought or sold to hedge the option from movements in spot, and remain spot or "delta neutral". This is known as delta hedging. It is a constant process, but the amounts are simple to calculate.

Delta hedge ratio: = Delta x notional amount

Note that you need to sell the hedge amount of base currency if you are long a call on the base currency, and buy this amount of base currency if you are long a put. For example: if you are long a 25 delta EUR/USD call option on and the notional is 1 million EUR, you need to sell 250,000 EUR.

Very low deltas have low probability of exercise and hence low value (0 delta has 0 value). High deltas have high probability of exercise and hence high value (100 delta trades like the underlying).

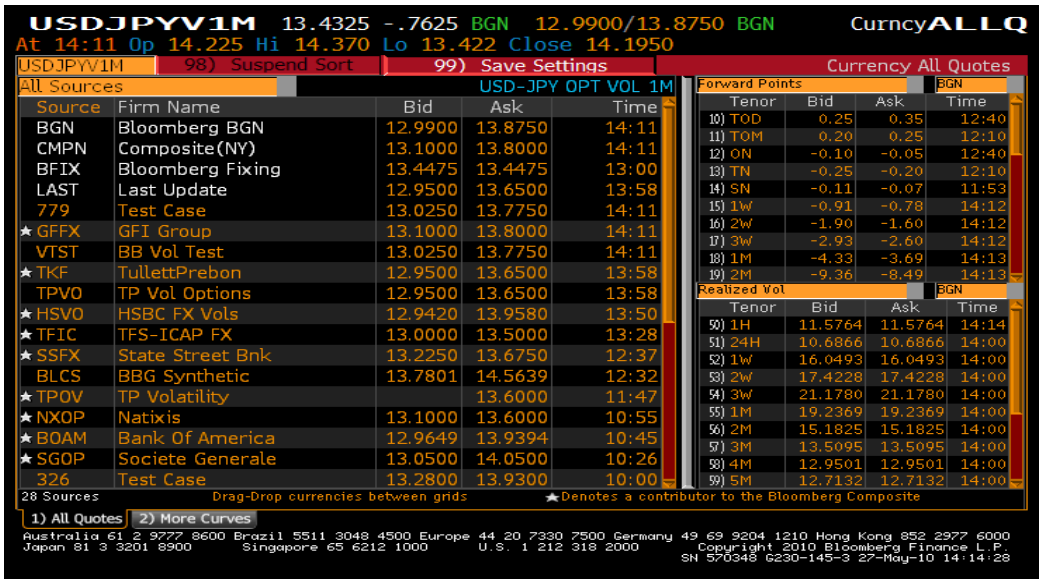
A **call delta = 100% minus the put delta**, and vice versa. For example, a 25 Delta call option is a 75 delta put option (100 – 25).

Volatility

The most important variable when valuing an option is volatility. Defined as the *annualized* ***standard deviation*** *of the log-returns*, volatility is simply a measure of variability in the underlying. It answers the question: how much is the underlying expected to move in percentage terms? It says nothing about the *direction* of movement, but the *degree*. The more volatile spot is, the greater the chance of the option becoming in-the-money and having its value increase. All things equal, a higher volatility will mean a higher option price, and a lower volatility will have a lower option price.

It is important to understand where volatility comes from. We can calculate it as defined above, but this is *historic* vol and tells us only about the past. Therefore the market will find prices of similar options that have traded, and use these premiums in an options model to imply the vol. It may also take historic volatility into account. In either case, market-makers then adjust this estimate based on expectations about the future, current supply and demand, and other factors. The resulting volatility is known as **implied volatility**, and it is **how options are quoted in the market**. Bloomberg receives implied volatilities as price contributions from various banks and inter-bank brokers. We then take the data and display it on pages like **{OVDV <go>}** and **{ALLQ <go>}**, Figure 2 below.

Figure 2



{USDJPYV1M <Crncy> ALLQ <go>}

Historic vol: annualized standard deviation of the log-returns; the actual movement in the underlying, and also known as *realized* volatility

Implied vol: market's estimate of what volatility will be in the future; the forecasted movement in the underlying, *the input used in pricing the option, and how options are quoted*

{VOLC <go>} is unique in allowing a user to compare these two figures. Figure 3 shows that historic and realized vol track each other to a degree. However they diverge when markets over- or underestimate spot movement. These divergences tell us whether it was a good or bad time to be long volatility. Since realized volatility will always lag implied, we can set VOLC to reflect this and make comparisons between where vol was priced, and where it was realized. The light blue arrows indicate times where volatility ended up substantially higher than where it was priced.

Figure 3

{EUR <Crncy> VOLC <go>}

Reading the quote

Like spot and forwards, options are quoted bid-ask. The bid is where the bank is willing to buy the option, and the ask where they are willing to sell. However, recall that options are traded on vol, so here the bid-ask are not prices but *implied volatilities*. Since all of the other variables (delta, maturity, notional) are known, it is more efficient to just quote the one unknown and the only parameter options traders have influence over, volatility. This is convention in the inter-bank market. Hedge funds and corporations are quoted this way as well, and then spot is set after the deal is agreed and the price is backed out and provided by the bank, usually by using their own proprietary or purchased options-pricing system.

A customer of FX options may see quotes like the one below, on **{OVDV <go>}** or from their bank:

EXP	ATM	
	Bid	Ask
1W	23.50	24.41
2W	21.40	21.93
3W	19.65	20.07
1M	19.25	19.75

Since volatility is quoted as an annualized percent, we can interpret the above quotes (using the 1M) as the market pricing in expectations that EUR/USD will move about +/- 19.5% over the next year. Since volatility is also a function of time, to translate this to expected moves for other time periods, we need to take vol and divide it by the square root of time. For example:

19.5 / SQRT 260 = +/- 1.24% is the expected daily move (260 trading days in a year)
19.5 / SQRT 12 = +/- 5.77% is the expected monthly move (12 months in a year)

This volatility can then be put into a calculator like OVML (along with the other parameters) to value the option and determine the dollar price. However how can a user tell if this price is high or low? We can't compare it to previous closing prices like with a stock or exchange-traded instrument. However VOLC enables users to see the implied volatilities historically, which helps a user determine if options are trading rich or cheap relative to historical norms. In fact, the above graph shows that EUR/USD volatilities are near 20%, at an all time high. Normally in this scenario, people would sell options in order to short volatility and bet that it would decline in order to profit.

The Volatility Surface

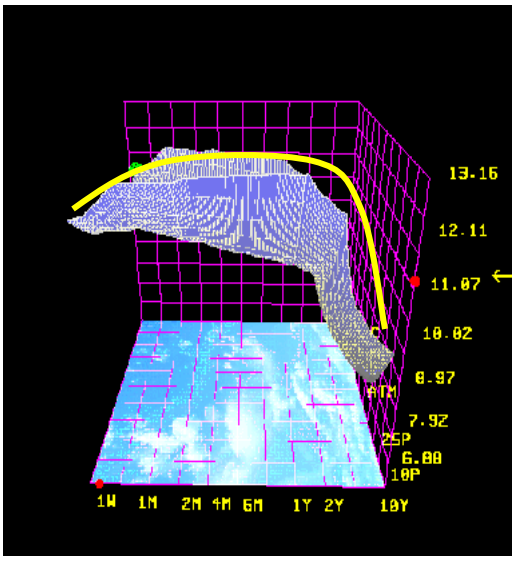
Notice in the above quote that we had a volatility quote for 1 week, 2 week, 3 week, etc. That is because **volatility will vary over time**. This makes sense when you think about what volatility is implying: an estimate of how much the currency will move over time, and that estimate will tend to

differ for different periods. For example, if the market is very volatile, implied volatility will be higher over the short term to reflect this and may decrease over time to "normal" levels. If the market is calm, volatility will be lower in the short term and increase over time as the option provides a greater chance to expire in the money. As the markets are constantly changing, so does implied volatility.

Volatilities will also vary with different deltas (strikes). Mathematically this is because most option models assume a normal distribution of FX returns. However in reality these returns can exhibit skewness (a probability of greater up or down returns) and kurtosis (a greater probability of extreme returns, i.e. "fatter tails") which are discussed below. The market therefore "corrects" this by using volatilities that account for the skewness and kurtosis to arrive at option's price.

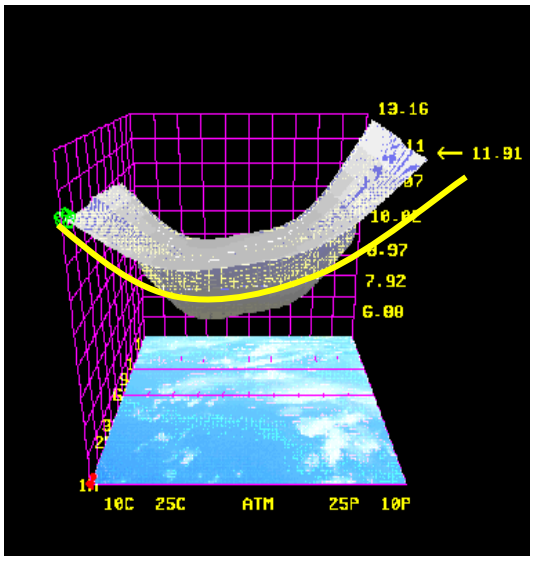
Note now that we have three parameters: time, delta, and volatility. The market uses these three parameters to construct what is known as the **volatility surface**. Bloomberg's **{OVDV <go>}** allows users to view and manipulate this surface and also provides the crucial volatility inputs for **{OVML <go>}**. Figures 3 and 4 (below) show the surface from two angles, showing how volatility changes with both time and delta.

Figure 3



Term structure: implied vol over time

Figure 4



Volatility Smile: implied vol across deltas

Figure 4 shows that not only does volatility vary across deltas, but it helps us make a couple of key observations:

1. **OTM options usually have higher volatilities than ATM**.

2. **Puts and calls usually have different volatility**.

The first observation reflects the skewness (a greater chance of up (or down) moves) discussed above. Here the right side of the image shows that volatility is skewed towards puts, meaning puts have higher volatilities than calls. Theoretically, the same puts and calls should have the same vol. However, the market's perception of direction and supply and demand factors will make one more valuable. For example, if the market was bearish on EUR, puts on EUR would be more valuable than calls (as in the above instance) because the market is expecting EUR to depreciate. Skewness is captured by a strategy traded in the market known as the **risk reversal** (RR).

Risk Reversals

Risk reversals measure the difference in volatilities for calls and puts of the same delta:

25 Delta RR = Implied vol of 25C – Implied vol of 25D put

For example, if 25D calls are 15 and 25D puts are 14, the RR is 1. They are quoted as a spread and indicate the markets preference for calls or puts, and are therefore construed as an indicator of sentiment. A high positive RR shows a strong bullish sentiment, a low negative RR shows a strong bearish sentiment, and the closer to 0 shows no sentiment. This sentiment can be tracked over time using {VOLC <go>}. Convention is for the RR to be quoted as calls minus puts *on the base currency*. Risk reversals are a popular hedging and speculative tool as discussed in the section on strategies below.

The second observation reflects the kurtosis (greater chance of larger moves) as discussed above. OTM options will have higher vols to reflect the "fatter tails" in the distribution. They also have a more practical cause and interpretation: OTM options tend to have more leverage and may also represent key levels in the market that cause them to have more demand and be richer (more expensive) than the ATM. Kurtosis is also captured in a strategy in the market known as a **butterfly**.

Butterflies

A butterfly (BF) is a combination of a straddle and strangle (all three of which are discussed in the strategies section below). How they are calculated (and quoted) is a measure of the difference between an average of OTM volatilities and the ATM volatility:

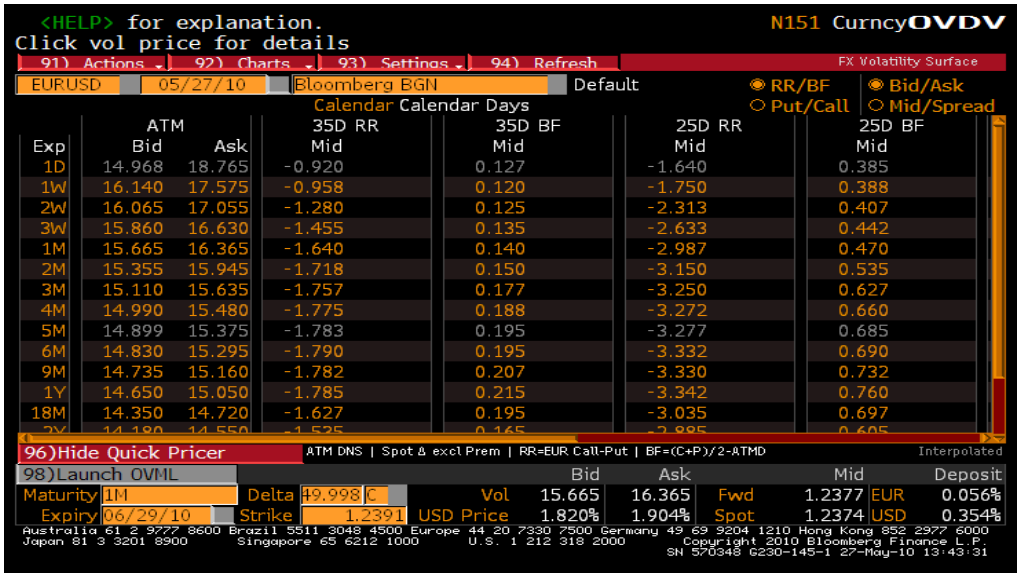
25D BF = (Implied vol of 25C + Implied vol of 25D put) / 2 - ATM Imp Vol

For example, if calls are 15, puts 14 and ATM 13, the butterfly is (15 + 14)/2 – 13 = 1.5. In simple terms, it measures how curved, or "happy", the volatility smile is. The higher the butterfly quote the further away the OTM option vols are from the ATM. Mathematically this means kurtosis is higher and the market is pricing in a higher probability of larger moves. However it's also a good indicator of the market's demand for these deltas (strikes).

Summary of Volatility

Volatility is a measure of movement in the underlying and *the* crucial input when pricing options. There are two main types of volatility, historical and implied. Historical is actual but backward looking, and implied is a forward estimate. Implied is how options are traded and quotes are regularly available for common maturities (1 month, 2 month, etc) and deltas (10, 25, 50). Volatility can be represented in a surface that tells us things about option pricing and market sentiment in the form of risk reversals (skewness) and butterflies (kurtosis). When you have a sufficient number of volatilities, the surface is adequate enough to interpolate vols for any option. This means that a robust volatility surface is crucial for any options pricer and is why OVML relies on OVDV. Figure 5 shows the tabular version of OVDV, from 1 week to 10 years, and for 50, 25, and 10 deltas. You can also tab into Format and select to view the Risk Reversal and Butterfly format.

Figure 5



{EUR <Crncy> OVDV <go>}

A note on Black Scholes

Named after its creators, Fischer Black and Myron Scholes, the model was a breakthrough in the valuation of options in the 1970's. Besides its math it became highly useful as setting a standard for participants to trade options and helped the markets grow substantially. However some limitations of Black-Scholes are worth noting. Firstly, it assumes a normal distribution with a constant skew (0) and kurtosis (3). However as we discussed FX market behavior frequently does not exhibit these characteristics. It also assumes volatility and interest rates are constant through time, which we know also is not the case. Finally, it uses a single interest rate to represent cost of carry, but for FX, we are concerned with the rate of each currency (Garman-Kohlhagen used on OVML model makes this adjustment). These limitations aside, it is still fairly accurate for plain vanilla FX options and its widespread use make it the standard for getting price indications.

Put-call Parity

Put-call parity is an arbitrage relationship that governs the relationship between puts and calls and the underlying forward contracts. In its simplest form, it demonstrates that a combination of a put and call (with the same strike) creates the same profit and loss profile as a forward, known as a "synthetic forward". It also implies parity of implied volatility, meaning call and put volatility should be the same. One way that put call parity can be demonstrated as follows:

Long call + short put = long forward (figure 6)
Short call + long put = short forward (figure 7)

Figure 6

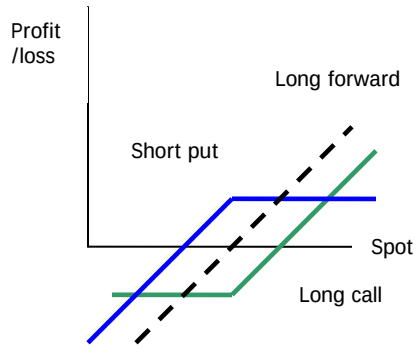
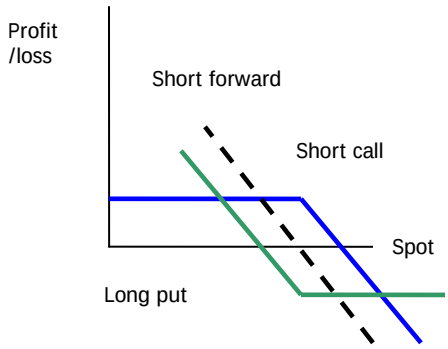


Figure 7



The Greeks

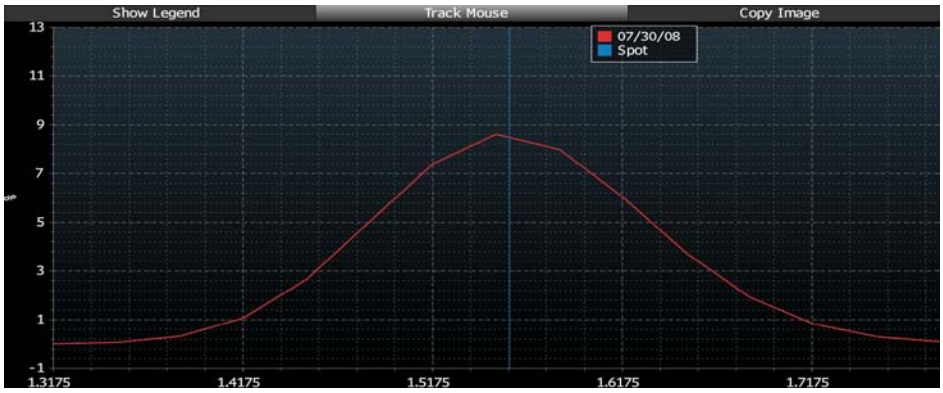
Because options require several inputs to be valued (time, volatility, price of underlying, interest rates), it makes sense that their value is sensitive to these inputs. This means that as the variables change, so too will the value of the option. These sensitivities therefore quantify the many risks of an option, and are collectively known as the "Greeks" because of their names:

Delta: in technical terms delta is the partial derivative of the option price with respect to spot. It is probably the most significant greek because of its many interpretations and uses. Figure 6 uses the OVML scenario graph to show how as options move ITM, delta approaches 100 (begins to trade like the underlying) and as they move OTM, approaches 0 (the option becomes worthless).

Figure 6

Gamma: In technical terms gamma is the partial derivative of delta with respect to spot (the only greek that does not measure a sensitivity of the option premium). Instead gamma measures how the option's delta will change based on a one percent change in spot. Essentially, delta is the option premium's speed and gamma the acceleration. It reflects how frequently an option portfolio will be re-hedged (delta hedged) and how fast you can make (or lose) money. You generally want to be long gamma. Figure 7 shows that gamma is higher when the option is ATM.

Figure 7



Theta: measures the change in the value of an option as time passes. Theta is negative, and so the premium decreases as time goes by. This is known as *time decay*. Figure 8 shows that theta is generally highest for ATM options and it accelerates as times passes and therefore will erode gamma.

Figure 8

Vega. Vega is the change in the option premium for a 1% change in implied volatility. For small changes in vol, the relationship is linear (same move up or down will result in the same premium change up or down) as shown in figure 9. Vega is widely used in portfolio risk management. Long term options have more vega (are more sensitive to changes in vol) and narrower volatility spreads and short term options have less vega (are less sensitive) and wider volatility spreads.

Figure 9

Strategies and payouts

In this section we will talk about some of the various ways that options can be used to manage risk or make a profit. But first, it would help to illustrate why someone would use an option in the first place.

For example:

Assume you are a U.S. corporate treasurer and you have to pay a supplier in Germany. You owe 1 million euros and payment is due in three months. EUR/USD is currently 1.36. The 3 month forward is 1.3635. You basically have three options: do nothing, buy a forward, or buy an option.

If you do nothing, you risk that EUR/USD moves against you. Say it moves to 1.40. Your 1 million euros that would have cost 1.36 * 1 million = $1,360,000 now costs $1,400,000. A loss of $40,000!

If you buy a forward, you lock in 1.3635 so if EUR/USD moves to 1.40, your euros cost $1,363,500, instead of $1,400,000. A gain of $40,000! *However* if EUR/USD moved to 1.30, euros should cost $1,300,000. But because a forward is an obligation, they cost you $1,363,500. A "loss" of $63,500!

If you buy an option at the same 1.3635, and EUR/USD goes to 1.40, you enjoy the same protection of the forward, and buy at 1.3635. However since an option is a right, and not an obligation, if EUR/USD goes to 1.30, you don't exercise the option, and get to buy at 1.30!

Of course, the catch is that this right will have a cost, known as the premium. Still, the flexibility and customization of options make them a very compelling hedging and speculating strategy. We will discuss some of the common strategies below.

Call Option

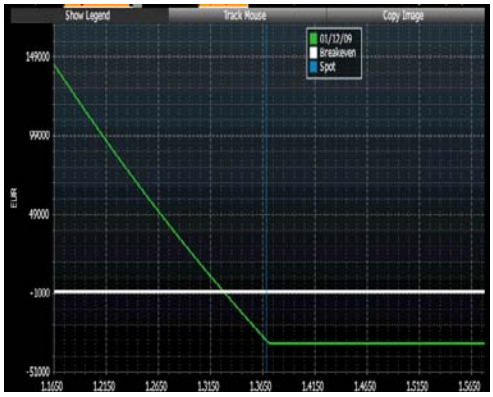
- Buyer of CALL has the right but not obligation to purchase underlying security from writer
- Writer of CALL has the obligation to sell underlying to buyer if option is exercised
- Maximum loss of buyer = Maximum gain of writer = Premium
- Maximum gain of buyer = Maximum loss of writer = infinite
- Breakeven point for buyer and writer = Strike price + Premium
- Buyer profit = MAX [Underlying price –strike –premium ; -premium] = Writer loss
- Buyer gains when the underlying value climbs over the strike price plus premium

Put Option

- Buyer of PUT has the right but not obligation to sell underlying security to writer
- Writer of PUT has the obligation to purchase underlying from buyer if option is exercised
- Maximum loss of buyer = Maximum gain of writer = Premium
- Maximum gain of buyer = Maximum loss of writer = limit
- Breakeven point for buyer and writer = Strike price –Premium
- Buyer profit = MAX [Underlying price –strike –premium ; -premium] = Writer loss
- Buyer gains when the underlying value falls below the strike price minus premium

Figure 10. Long call payout

Figure 11. Long put payout

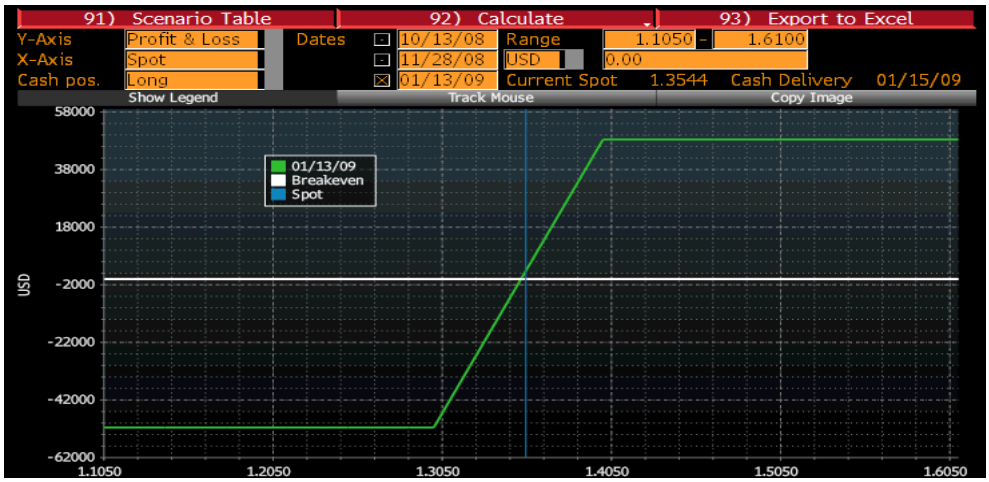


Spread strategy

Call/Put Spreads

One of the most popular types of spreads is a bull spread. This is used by traders that are moderately bullish who want to lower their premium. It can be created by buying a call option with a certain strike and selling a call option on with a higher strike. Both options have the same expiration date. The maximum upside potential is the difference between the strike prices minus the net debit (Figure 12). Since a call price always decreases as the strike price increases, the value of the option sold is always less than the value of the option bought. Therefore, a bull spread requires an initial investment. Call spread can also be an attractive way to gain carry via options.

Figure 12



Volatility strategies

Straddles and Strangles

Straddles and strangles are used by traders to place bets on volatility. Long strategies will profit from large moves in spot (in either direction), whereas short strategies are bets that vol will remain low and profit from the premium. Both strategies involve a premium.

Long Straddle

A long straddle consists of buying one call option and one put option at the *same* strike price with the same expiration. This is volatility play; you profit from any large spot rate movement (figure 13) and your delta defaults to zero. A trader might buy a straddle (and be long gamma), when volatility is cheap (historic volatility > implied volatility). Upside is unlimited, downside is premium.

Figure 13

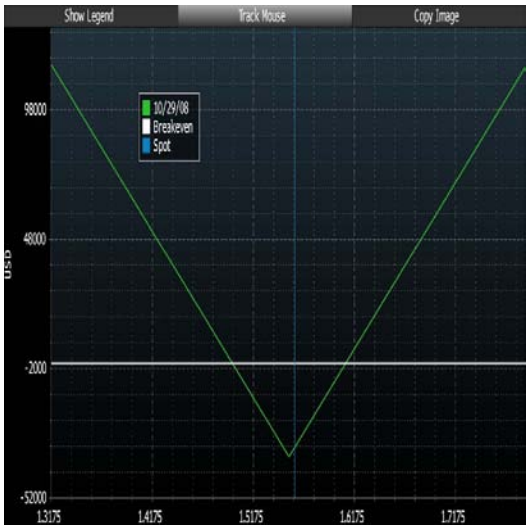
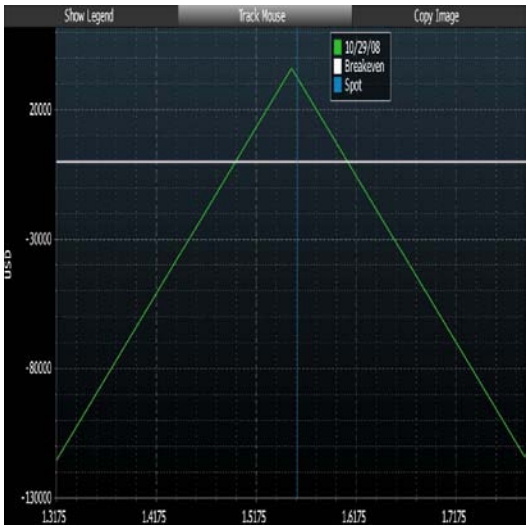


Figure 14



Short Straddle

A short straddle is an inverse play to the long straddle, where you short volatility (and hence gamma and vega). The trader is expecting low volatility and would like to profit from writing premiums. This consists of writing one call option and one put option at the *same* strike. The upside potential is limited to the premium (figure 14). Downside is open and occurs when the underlying price moves dramatically in either direction. A trader might want to short volatility when it is expensive (implied > historic).

Long Strangle

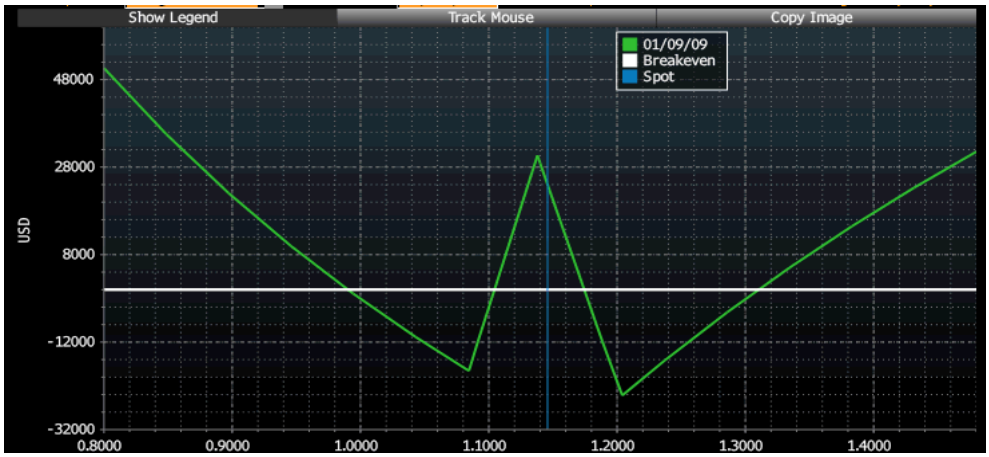
A strangle is similar to a straddle. The trader is betting that there will be a large price move but is uncertain of direction. A long strangle consists of buying one call option and one put at a lower strike price. The extra strike helps reduce the premium but also requires more volatility to be profitable. You have unlimited upside during large moves, and downside is limited to the premium paid.

Figure 15

Butterfly

The long butterfly strategy is a four-leg strategy, long strangle and short straddle. Somewhat conservative volatility play for when you expect very little movement in spot over the life of the option. By selling the straddle you are normally short vega (volatility) and gamma and long theta. Note however the butterfly is often done vega (volatility) neutral by adjusting the amounts of the wings, allowing you to profit if spot makes large moves (figure 16). The long strangle hedges the position with its "wings" - the two strikes - that limit the downside. As discussed above, butterflies capture the smile, or the level of kurtosis, on the volatility surface.

Figure 16



Forward-style strategies

Risk Reversal

The Risk Reversal strategy consists of purchasing an out-of-the-money call and selling an out-of-the-money put (or vice versa). Both options have the same expiration date and typically equal notional, but different strikes. It is a directional play, rather than a volatility play. At inception this has much less gamma and vega exposure. Also, as discussed above the Risk reversal spread may be viewed as an indication of market sentiment.

Risk reversals (also known as zero-cost collars) are widely used by corporate hedgers. They lock in protection with the purchased option, and offset its cost with the funding option. It provides full protection on the downside and some participation if the market remains between the two strikes. If at expiry spot passes the purchased strike, you have full protection. If spot passes the sold strike, you buy/sell at this strike (better than your protection). If spot ends up in between the strikes, you buy at market (again, better than your protection). All at zero or low cost (Figure 17).

Figure 17a (RR without underlying position)

Figure 17b. (RR with underlying position)

Let's look at a specific example. You are a corporate hedger that needs to purchase 10 million euros in 6 months time. Spot is currently 1.35. You have a budgeted rate of 1.42, meaning you can afford to pay up to $1.42. You are concerned that EUR/USD may go higher and decide to look into a risk reversal. You call up a bank and say you want to buy a RR with a EUR/USD call on EUR with a strike of 1.42, expiry of 6 months, and notional 10 million EUR. Note that the strategy is typically done at zero cost, where the unknown is the strike of the option you need to sell to offset the call (run {OVML RR <go>} and input the above parameters to have the screen do this for you). This strike is important because it defines your limit of upside participation, i.e. the other end of the "collar"
In our example, you buy the call and sell a put with strike 1.2858 (figure 17b). At expiry, you have three possible outcomes:

EUR/USD goes above 1.42: You exercise the call and buy at 1.42; the put expires worthless, and you enjoy your protection
EUR/USD goes below 1.2858: The put is exercised against you & you buy at 1.2858; you do not participate in any favorable move but you bought better than 1.42; the call expires worthless
EUR/USD remains between 1.42 and 1.2858: You buy at market, better than budgeted rate and possibly better than current spot. The options expire worthless but had cost you nothing.

Forward Extra

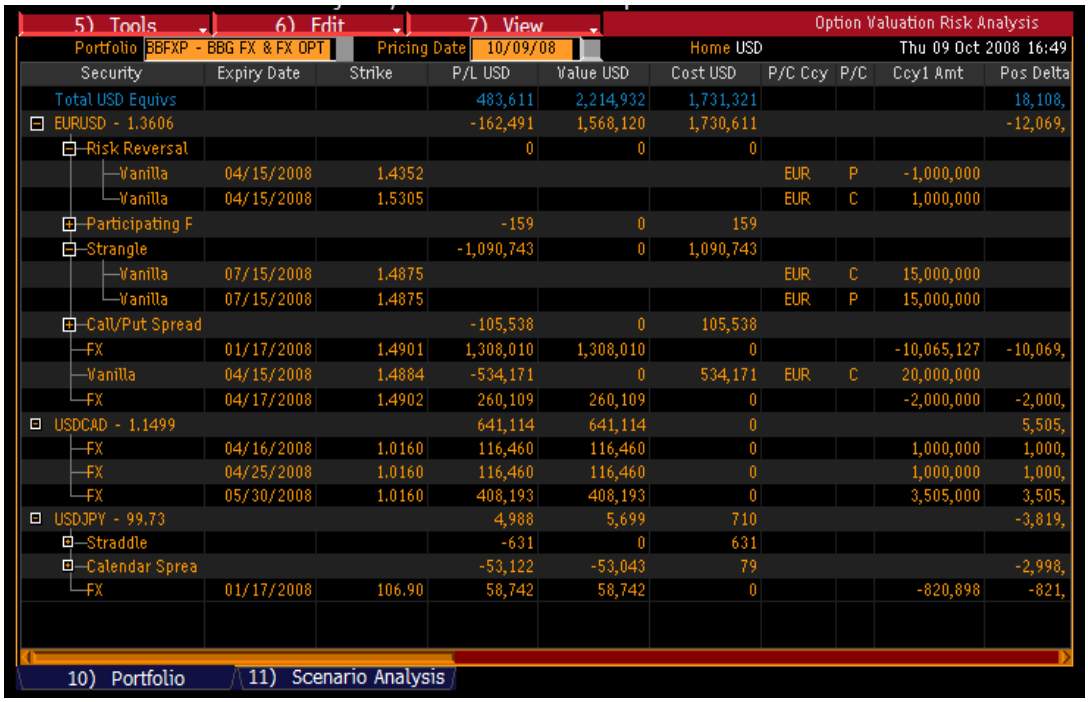
A forward extra is a low-risk hedging strategy that combines the protection of forward contracts with the flexibility of options. Similar to a risk reversal you buy a call (put) and reduce the premium by selling a put (call). However with a forward extra each have the same strike and the funding option has a **barrier**, a price level which if spot breaches will activate or "knock-in" the option. If the spot does not trade at the barrier or the strike, you can buy/sell the spot at a better rate than the strike. If the spot trades at the trigger, it knocks in the option and you are then long/short a synthetic forward at the strike rate (a worse rate than the market). If spot trades past the strike, you buy/sell at strike and enjoy the protection (figure 18).

Figure 18

Options portfolio analysis

Typically a hedger or speculator will have several or even dozens of options positions on at any give time. This can be a corporate hedging a series of cash flows or a hedge fund making multiple bets. In either case, we have seen that options have many moving parts, and many risks. Therefore managing the positions and their risks becomes increasingly complicated as the amount of positions increase. A corporate will need to know his mark-to-market value on a periodic basis. A hedge fund or a bank will be concerned how adding different positions to the portfolio affect delta, gamma, vega, theta, and of course profit and loss. It is for these reason that Bloomberg developed {OVRA <go>}. A Bloomberg user can create an option structure in OVML for pricing, and then instantly book it – with or without delta hedge - into a portfolio of their choice. They can even create the portfolio on the fly right from OVML! These portfolios are normal <Client> key portfolios. So either from PRTU or right from OVRA, a user can select the portfolio and do a proper and robust currency option analysis (note that OVRA can handle cash FX like forwards and spot as well). This includes monitoring aggregate greeks and profit and loss, as well as doing scenario analysis by clicking on that tab and running a volatility, spot, time, or spot x vol scenario. These scenarios are known as "ladders" because you can move the parameters up and down, and see how the different parts of the portfolio react. Specifically, where your risk will lie and how your P&L will behave. For different spot and vol levels, and time horizons, OVRA will tell you which greeks you are (or become) most exposed to, and where is your greatest profit and loss potential (figure 19)

Figure 19



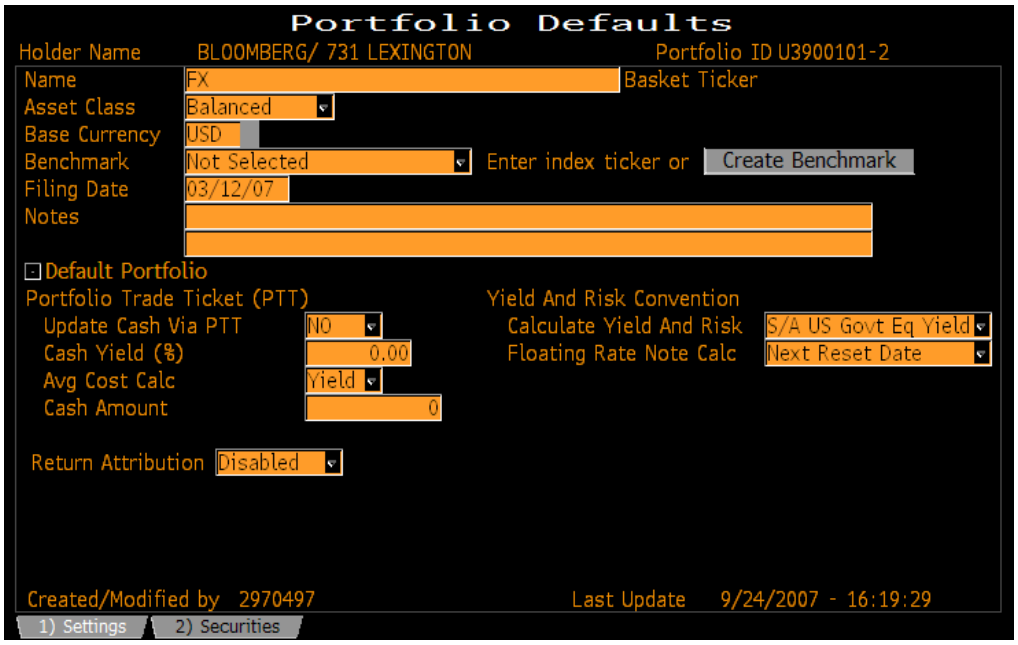
{OVRA <GO>}

Currency in Portfolios

Currency positions can be managed and analyzed in Bloomberg's <Client> key portfolio functions. Once a portfolio is created or uploaded, you can run tools like {VAR <go>} to analyze your value-at-risk or {OVRA <go>} to monitor your profit and loss and your risk (as measured by the delta, vega, gamma, and theta) as well as conduct scenario analysis.

You can create and manage a portfolio by typing {PRTU <GO>}. Select "Create a new portfolio"; give it a name and a base currency (Figure 1).

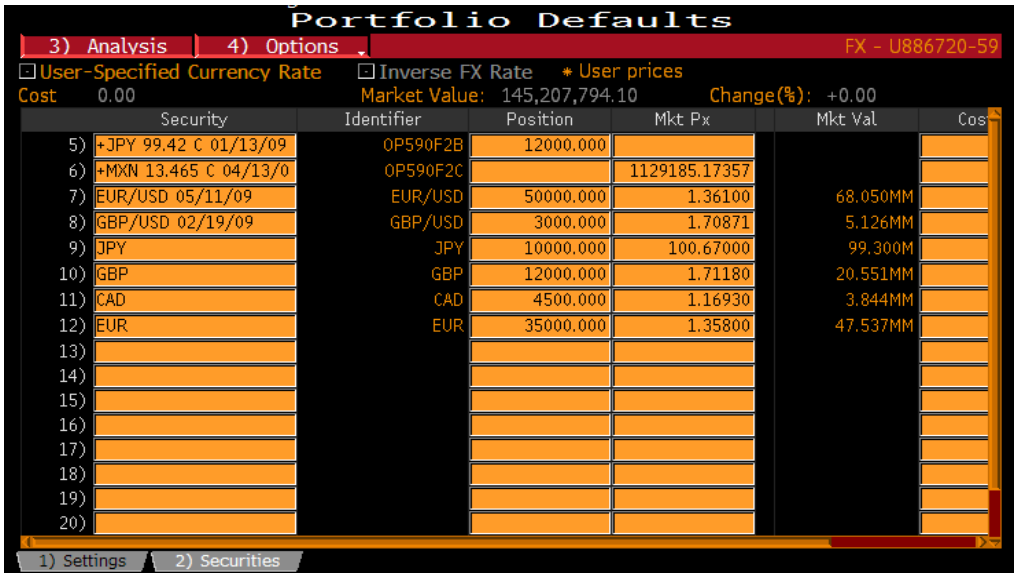
Figure 1.



On page 2 you can begin entering your securities (Figure 2). Note that for spot positions, you just use the standard ISO codes, like: EUR <Crncy> or CADJPY <Crncy>. For forwards, you use the complete 6-letter ISO codes with a "/" in between and then the forward value date. For example: EUR/USD 05/11/09 <Crncy> or GBP/USD 02/19/09 <Crncy>. The easiest way to enter FX options is to save the option on OVML, and then enter its identifying OP number.

Note that you can also upload the portfolios, using either BBUP, PUD <go>, or a simple drag and drop from excel.

Figure 2



Once the portfolio has been successfully loaded, you can analyze it using any number of our portfolio functions. PRTU is useful as a means of getting the portfolio on the system, but is not well-suited for currency valuation. Instead the more popular and useful types of analysis for FX would be VAR for Value-at-Risk and OVRA for Options Valuation and Risk Analysis (note that OVRA also works great for spot and forward positions).

Note that you can book an option directly into a <Client> key portfolio right from OVML <go>. After you set up the option, click on TOOLS -> BOOK. You will simultaneously save the option and enter it into a portfolio. This is the preferred way to get FX options into a portfolio. By clicking in the "Style" field, you can choose "FX Hedge". This will enable you to put a spot or forward FX deal into the portfolio as well.

Value-at-Risk (VAR)

Value-at-risk is risk management tool originally developed by JP Morgan, which quantifies the maximum amount of money a bank can expect to lose given a specified confidence interval. In other words VAR estimates the maximum daily loss a portfolio might face, based on measures of past data. The crucial component of VAR is volatility. And as we are already aware: the lower the volatility, the greater amount of risk banks will take.

VAR is an essential tool for risk management and has its uses, but it comes with several pitfalls. First, it assumes that market returns are predictable and can be encapsulated into a pattern. That means that VAR is based on a confidence interval of a probability of distribution from 95% - 99%, but the real trouble lies in the 1% of the distribution, commonly referred to the "fat tail" or "black swan." The black swan events are rare but are also potentially catastrophic, and can blow-up an entire portfolio or, in recent times, even an entire industry: investment banking.

A second drawback of VAR is that as time passes with low volatility the more complacent the model becomes. This is risky because in actuality the further away you get from a financial catastrophe, the closer you are to one. Once you apply this logic to the current financial crisis, you can see how banks piled on too much risk; mismanaged that risk; and relied too much on their models that did not account for the black swan, i.e., the precipitous drop in home prices.

The last issue that stems from VAR models is the idea of a herd mentality. Since VAR models are based on the same concepts, volatility and correlation, investors tend to react in changes to VAR in much the same manner. They sell-off their portfolio to reduce their VAR exposure in a flight to safety. This herd effect creates manic and forces investors to liquidate their positions at the same time, thus creating more volatility and more selling.

For all of these downfalls VAR is still a ubiquitous risk management tool. And with the once-in-a-lifetime financial crisis of 2007-08 quants will have much more data and will be able to fill the gaps in their models.

For risk managers in all asset classes Bloomberg has created a powerful VAR tool that uses three separate methodologies to generate a portfolio's VAR. The first is historical, which is a scenario-based VAR that uses past observations to generate new portfolio values. This method scans three years of data and uses the days over day percentage changes in risk factor to apply to today's factors. Historical is a simple model to use past data to predict the future.

The second method is called Monte Carlo. Monte Carlo is what is commonly referred to as a "black box" of random scenarios, not based on historic prices, to evaluate the value of the portfolio. Each scenario represents a change in specific risk factor data that, when shifted, impacts all the risk factors supported with the correlation matrix. This change makes it possible to re-price all securities with a portfolio.

The last scenario is parametric VAR and is not scenario-based, but rather calculates the change in value for a security based on its sensitivity to changes in specific risk factors. A risk factor can be an exchange rate, an equity index or interest rate to name just a few. Based on the changes to these factors, the securities in the portfolio are revalued and VAR can be generated.

A VAR model is easy to create with Bloomberg using the PRTU function to create a portfolio. There is one disclaimer that should be duly noted: VAR only covers the following securities: Cash, FX forwards, equity stocks, equity index futures, single stock options, equity index options, OTC plain vanilla options and some other basic OTC derivatives such as swap and CDS. VAR does not support exotic options, such as barrier or digital options, and multi-leg options. But to create a portfolio on any of the aforementioned assets you can create a PRTU; enter your securities; run VAR; and volia you have yourself a VAR risk model (Figure 1). To read more about the methodology and mathematics of VAR please refer to IDOC 203789 and IDOC 2037900.

Figure 1. VAR on FX portfolio

OVRA <Go>

For more information on OVRA, the FX Options Valuation and Risk Analysis portfolio tool, please see the discussion in the chapter on Options and Volatility in this manual and you may also refer to {IDOC 2041085 <go>}

FX Pricing

This section will describe the different types of pricing in foreign exchange and their sources. It will also explain the rationale for the differences in pricing and Bloomberg's own pricing methodologies.

Inter-bank

Recall that since there is no exchange, all FX prices originate in the inter-bank market. Banks are responsible for making markets and they trade with each other every day, making the market extremely liquid, transparent, and dependent on reciprocity. Therefore the best bids and offers (the tightest spreads) are available here in the **inter-bank** market. You can think of it as the *wholesale* market.

Customer pricing

The customer market therefore can be considered somewhat retail. This is because when a client wants to deal FX, the bank will likely add a ***spread*** to the inter-bank price (like a mark-up at a retail store). Compounding the issue is that most clients deal with a salesperson, who gets the price from a trader, meaning there is possibly not one but two mark-ups passed on to the customer.

Note that not all spreads are created equal either. They depend on many factors, including:

1. **Size** of the trade: dealers may add larger spreads to small deals to make it worth their while, and also to very large deals which may be difficult for the bank to manage position
2. **Liquidity** of the currency involved: currencies that don't trade actively will tend to have inherently wider bid-ask spreads, and may be undesirable and result in larger mark-ups
3. **Credit**: how likely is the customer to default on the transaction?
4. Time to maturity (if a forward or swap): longer dated deals will tend to have larger spreads
5. **Customer's business** at the bank: how valuable the customer is and whether or not the bank is making money off of the customer in other ways (like lending or M&A advisory) will affect the spread
6. **Sophistication** of the customer: the more market savvy a customer is and the more tools they have for price discovery or electronic trading will help them achieve lower spreads

As discussed earlier, most trading occurs inter-bank, via EBS, Reuters, and brokers, which means that most of the pricing comes from these sources as well. Because of this there existed a real need for the buy-side to have access to price discovery (where prices are) and transparency (who the prices come from).

Bloomberg Pricing

To help fill that need, Bloomberg began aggregating FX prices through various data feeds in the nineties and disseminating them to our users on both the buy and sell-side. We now have hundreds of sources providing us with FX data, including major banks, brokers, and trading platforms. In 2004

we added EBS, which gave us the market standard price in EUR/USD, USD/JPY, USD/CHF and their crosses. We now offer both **real-time** and **historic** FX pricing on hundreds of currency pairs and have become a major force in price discovery in the FX markets. See **{WCV <Go>}** for a full list of currency data.

Bloomberg applies four different methodologies to the prices we receive and makes available four different types of prices for our customers: the Bloomberg Composite (**CMPN**), the Bloomberg Generic (**BGN**), Bloomberg Last (**LAST**), and the Bloomberg Fix (**BFIX**). As you will see, each price serves a distinct purpose. You can run ALLQ (for example: ***{EUR <CRNCY> ALLQ <GO>}***) on any ticker to compare all four prices. Run ***{XDF <go>}*** to set your currency pricing defaults.

Composite

The composite is considered a "*best efforts*" price, as it make an effort to show the best possible market price to our users. It employs various quality control methods, like frequency of pricing and determining if a bank is open to filter out ineligible prices. From the eligible prices that remain, the composite determines and will display the *best (highest) bid* price and the *best (lowest) ask* price. It is designed to show users the tightest possible price the market is trading around and for many years was the default FX price on Bloomberg. Note that as a result of always trying to show the tightest spread, sometimes the composite bid and ask will be the same, a state known in the market as "*choice*".

The composite is priced 24 hours a day, starting Sunday afternoon and closing Friday at 5pm New York time. Because currencies trade 24 hours, we also offer regional composites. Note that there is only one composite *price*. The regional tickers and the New York, London, and Tokyo defaults on **{XDF <go>}** *only* affect your open, high, low, and close price for that day, *not* the price trading at any point in time.

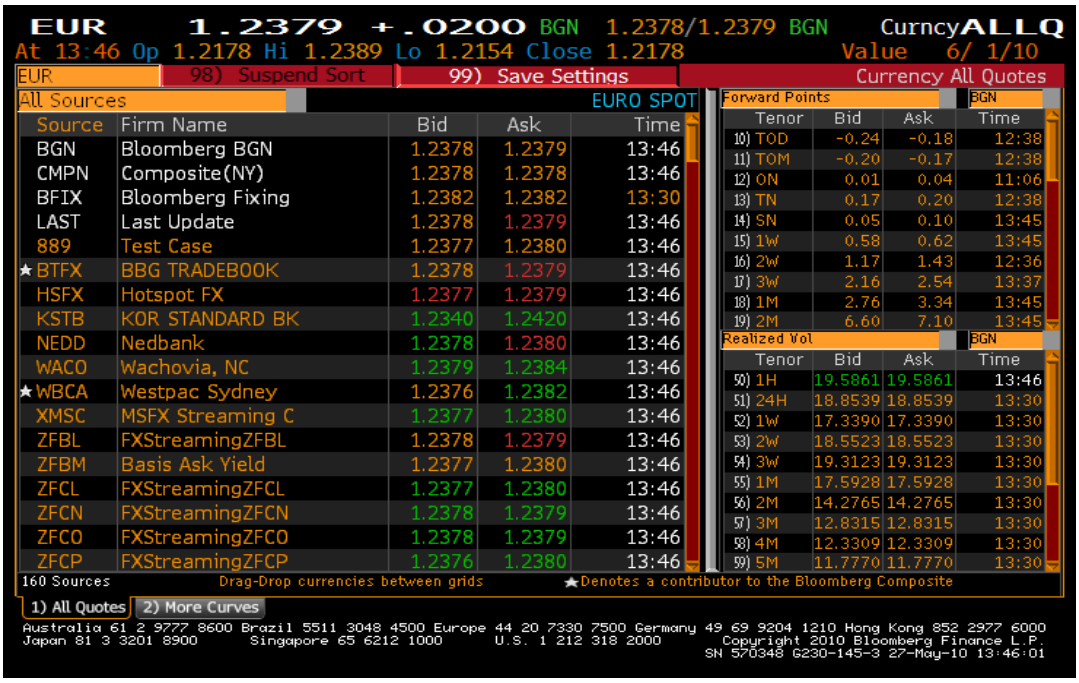
Bloomberg Generic

BGN differs from the Composite in that it does not just take the best/bid offer from selected contributors. It is a more complex algorithm that assigns each contributor a quality score based on numerous factors including update frequency and spike frequency. The algorithm then uses this information to generate better prices and more accurate market *spreads*, and is almost guaranteed to never show choice. It also respects local market trading hours. The key benefit to the BGN is that it is the *best indication of the spread where good credit quality customers can expect to execute*. Note that here "best" does not necessarily mean the tightest, as that would be inter-bank pricing which most customers can not execute on. For example, EUR/USD trades consistently in the inter-bank market with a 1-2 pip spread. Therefore it is likely for the EUR/USD BGN to show a 2-3 pip spread. Overall, BGN is now considered our highest quality price when available.

Bloomberg Last

The Bloomberg LAST offers customers our most frequently updated price. It was designed as a way to help keep pace with fast moving markets, and offered customers an alternative to the Composite. As its name implies, the price it displays is simply the **last**, *most recent* price we received from

amongst our contributors, helping users to see how the market trades during volatile times. For example, around economic releases the market may quickly and widen or become skewed on the bid or offer, and the composite wouldn't reflect this well because it tries to show the best, tightest price. LAST however would move in lock-step with this, making a screen like **{LSTQ <go>}** very valuable. However, once the market calms down, this value diminishes, and with the advent of BGN and its high-frequency algorithm, it is advisable to use BGN in place of LAST in most circumstances.



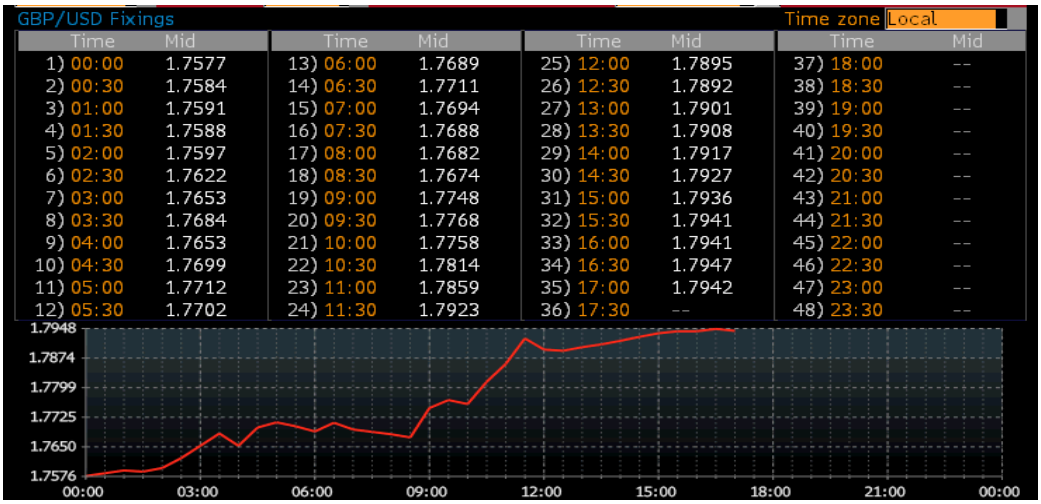
{EUR <Crncy> ALLQ <go>} to see all pricing sources for a currency pair

Bloomberg Fix

In contrast to the other pricing sources, BFIX is not intended to be a live, updating price. Instead, it is what's known as a **fixing**: a price that is published in the market at set times, derived from multiple banks, and intended to be an accurate, *independent* reflection of the market at the published time. The most widely used fixings in FX come from authorities like central banks, but major FX banks and providers like Bloomberg offer them as well. Fixings are very important in FX for several reasons: they provide transparency and consistency for determining settlement amounts for NDFs; they are needed to value certain types of FX options; and they are used as a benchmark by asset managers.

The Bloomberg BFIX is unique in terms of its transparency, history, speed, and flexibility. You can see possible contributors to the BFIX, you can access it historically, it is published within seconds of the fixing time, and it is published every thirty minutes allowing users to choose a fix that meets their needs. The BFIX is also perfectly invertible and unsusceptible to market manipulation. The BFIX methodology uses a short-term time-Weighted Average Price (TWAP) of geometric mid-rates of BGN prices leading up to and following the fixing time.

Other useful screens for accessing fixing rates on Bloomberg include: **{APFX <go>}** for fixings on Asian pacific currency pairs, **{NDFL <go>}** for Latin American NDF fixings, and **{CFXN <go>}** for all other fixings.



{BFIX <go>} for Bloomberg BFIX fixings.

EBS (Electronic Broking Services)

As mentioned in previous sections, EBS is an inter-bank trading platform for spot FX. Formerly owned by an alliance of banks, EBS is now owned by ICAP, a large, inter-dealer broker in FX and other products. EBS is *the* market standard for trading and pricing in EUR/USD, USD/JPY, USD/CHF, and the crosses between them. According to their website: "...2,800 traders on 800-plus floors in 50 countries around the world use EBS to transact more than USD 210 billion in spot FX every day." To put this in context, whenever a customer buys or sells any of the above currency pairs, the price they are quoted is always EBS plus a spread. Because of their dominant position in FX trading, and Bloomberg's dominant position on the buy-side, EBS pricing is now available on the Bloomberg terminal. It comes in two forms, **EBS Rates**, for inter-bank players, and **EBS FX**, a price derived from and intended to be an indication of EBS Rates, for customers. It is available within its own Launchpad component and also as a tail (EBS, EBSF) for use in charts, monitors, and Bloomberg API.

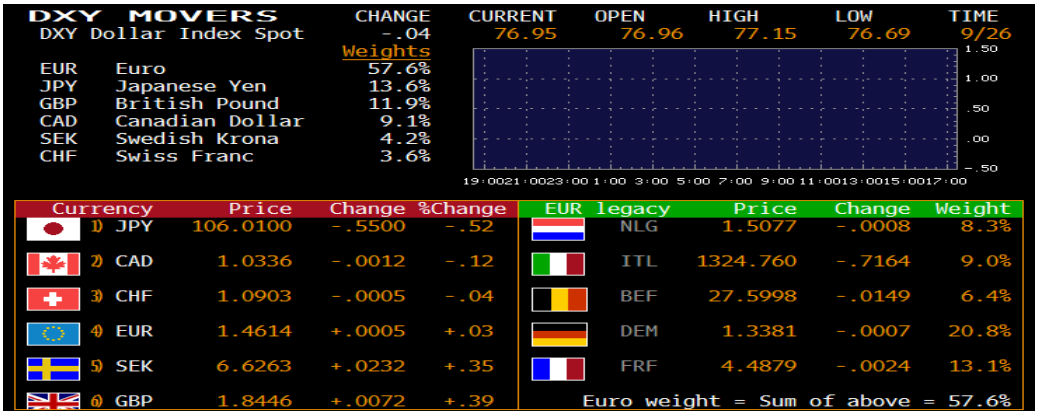
*{**EBS Rates** pricing component in Launchpad}*

Indices

Because currency values represent the relative competitiveness of countries that trade with one another, it helps to measure a currency collectively against its trading partners. For the US dollar, the Federal Reserve created the U.S. Trade Weighted Major Currency Dollar Index, **{USTW$ <Index>}**.

This is an index compromised of the six "**major**" currencies, so named because they trade actively outside their borders and are major trading partners of the United States. They include: Europe, Japan, Canada, United Kingdom, Sweden, and Switzerland. This index is published once a day at the market close by the Federal Reserve and represents the dollar's relative strength or weakness compared to that of our trading partners. To measure value against our other trading partners, like Mexico, Taiwan, Korea, and Brazil, the Fed also publishes the Trade Weighted Other Important Trading Partners Dollar Index, **{USTWOITP <Index>}**.

To track the major index throughout the trading day, the New York Financial Exchange (now owned by the Intercontinental Exchange, or "ICE") developed the U.S. Dollar Index, **{DXY <Index>}** which is comprised of real-time values of the above six currencies. To speculate on or hedge movement in the dollar, there is also a futures contract, **{DXY <Crncy>}**. There are also similar indices for Asia, **{ADXY <go>}**, and Latin America **{LACI <go>}**, produced jointly by Bloomberg and JP Morgan.



Summary

In summary, the FX market is traded over the counter and so there are many different sources of pricing. The inter-bank market tends to have the tightest spreads, and trades primarily on Reuters and EBS. Customer pricing depends on several factors. Bloomberg has four types of live, updating pricing, all of which have distinct advantages. Finally, there exists benchmark indices to track the value of the dollar.

Global Macro Analysis

In this section we will examine some of the types of FX trade and hedging analysis that users can conduct using Bloomberg analytics. We will divide them into the following sections: Positioning and Sentiment, Carry Trades, Correlation and Regression, Hedging, Implied Interest Rates, Volatility, and Relative Value.

Positioning and Sentiment

One of the keys to understanding direction in any market is to understand how the players in that market are positioned. What is meant by this is are more people in the market long, or short? It would also help to ascertain to what degree and at what price level. Finally, it is also important to ascertain market sentiment towards future direction, in order to determine if the market will remain long (or short) or if the buying (or selling) trend is exhausted and about to reverse?

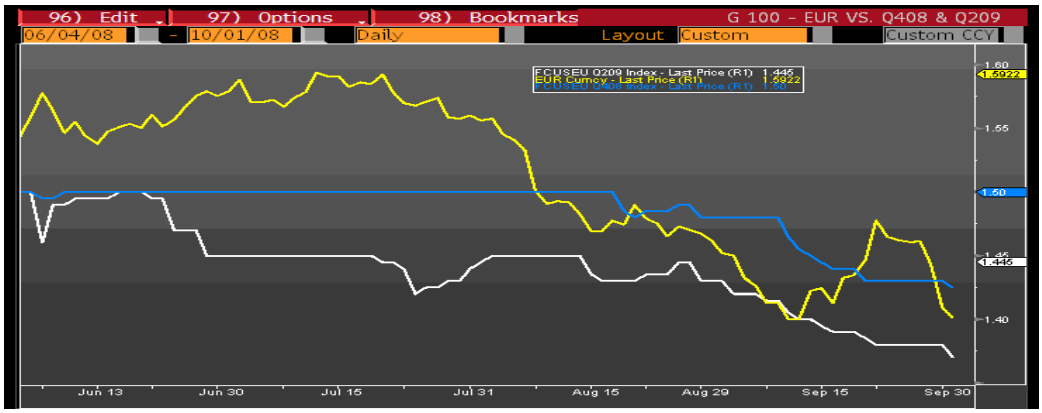
This information is especially valuable in the FX markets, but it is also inherently difficult to attain because it is an over the counter market without any meaningful dissemination of volume. However, the market does provide some useful tools for this analysis and Bloomberg collects them all on **{FXIP <go>}** under the section for "Positioning". Alternatively the function is **{IPSP <go>}**.

Positioning and Sentiment: FX Forecasts

The simplest way to get the market's view is by accessing FX forecasts from banks and research firms. These forecasts are the result of fundamental research that includes analyzing a currency's economic picture, interest rate outlook, relative valuation to other currencies, and other methods to determine near, short, and long-term forecasts for FX values. Bloomberg is unique in aggregating forecasts from multiple banks, displaying the median (consensus) forecast along with a distribution of all the forecasts, and allowing our users to compare these forecasts to FX forwards when facing the question to hedge or not to hedge? We also assign tickers to each of the forecasts by bank, currency, and period, so that users can evaluate the accuracy and validity of these forecasts by comparing them to each other and to actual movement in spot.

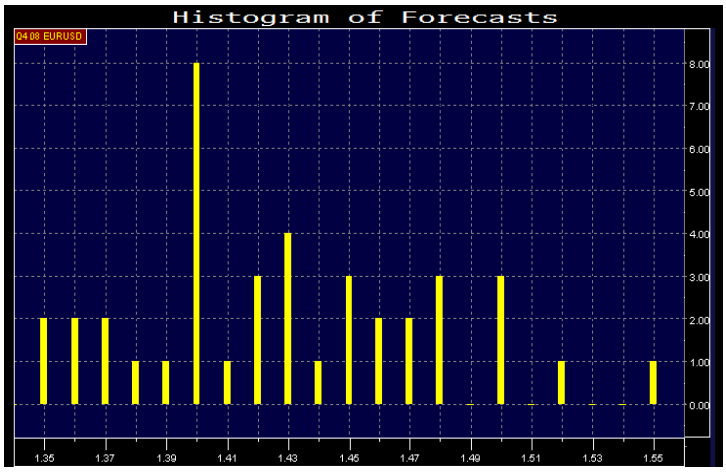
Figure 1 shows a clear indication of sentiment on the EUR/USD. Mid summer 2008 the median forecast was for EUR/USD to reach 1.50 by the end of Q4 2008, and 1.43 by the end of Q2 2009. Euro had just breached 1.50, and the market expected it to maintain that level by the end of 08. However as the USD rally continued, and conditions in Europe deteriorated, the EUR/USD declined and there was an almost parallel shift in the forecast, resulting in a call for 1.4250 by the end of 08, and 1.37 by the end of 09.

Figure 1



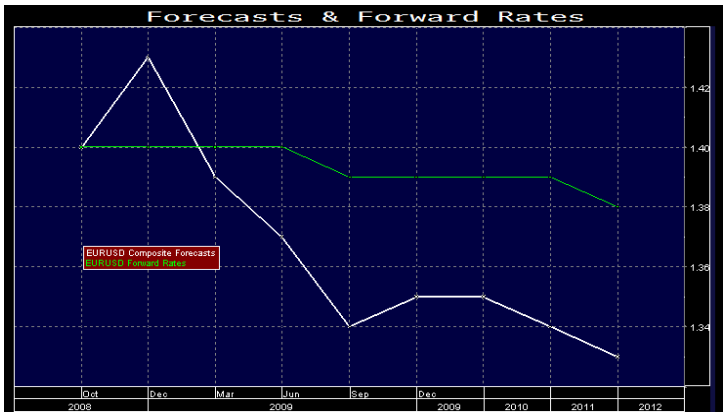
Q209 forecast in white, Q408 forecast in blue, EUR/USD in yellow

Figure 2



You can further analyze the sentiment by clicking on a period heading and viewing the distribution of the forecasts (Fig. 2), to see where the consensus is but also to see if there are any outliers, where are they, how many firms are behind them and which ones are they?

Figure 3

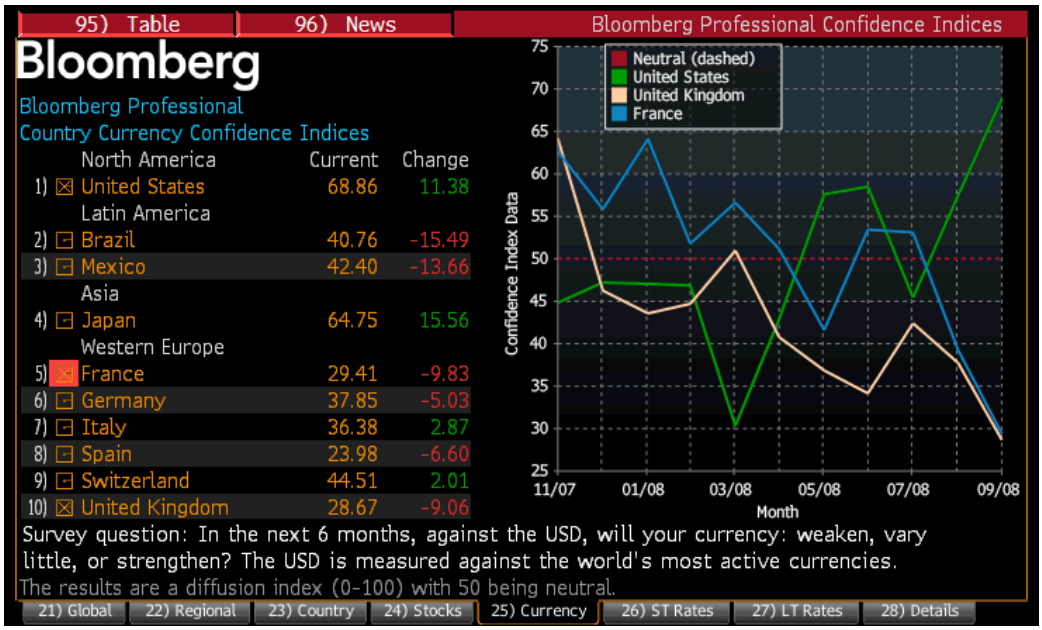


FXFC also plots the current forward curve against the forecasts (Fig. 3), to help when deciding whether or not to hedge. All else equal, if you are long euros in 2009, and the market expects the EUR/USD to drop to 1.34, you might decide to lock in a forward now at 1.39

The FX forecasts on {FXFC <go>} can be used in conjunction with a suite of other market forecasting functions, including {CPF <go>} for commodities, {ECFC <go>} for economic data, and {BYFC <go>} for interest rates.

A second way to assess sentiment is through surveys. This is a qualitative approach that gauges confidence. It's usefulness is that it reaches a broader yet more targeted audience, and includes sentiment on not just currency but rates, equities, and economies. These surveys can be found on **{BPGC <go>}**, and are updated monthly. The survey is unique in that it polls market professionals on the first full business week of each month who are also Bloomberg users. They rate their outlook on the above areas as optimistic, pessimistic, or neutral. An index value of 0-49 is negative, 50 is neutral, and 51-100 is positive. The survey helps to take the pulse of those that are in the market on a regular basis, and you can see from the latest poll results (below) that the market has turned markedly bullish on the dollar while at the same time Germany is bearish on the Euro and the U.K. is bearish on the Pound.

Figure 4

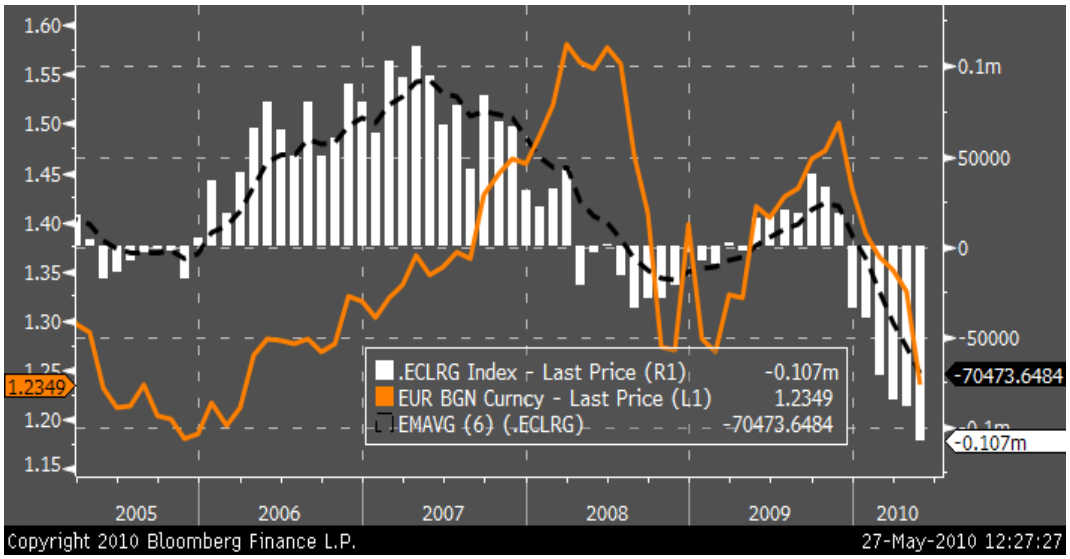


Positioning and Sentiment: Commitment of Traders

The Commodity Futures Trading Commission (CFTC), a regulatory authority for futures trading, publishes a weekly report called the Commitment of Traders (COT). This report includes the amount of long and short futures positions including FX contracts and serves as a way to measure market positioning. It is broken down between non-commercial (speculators) and commercial (hedgers) users of the futures market. The drawback to the data is that it has a 3 day lag (published on Fridays and reflecting the prior Tuesdays' data) and that the volume on the exchange is far less than the overall cash market. Still, by giving a read on market positions, it can be useful in assessing direction and sentiment at extreme price levels. For example, if the market becomes overwhelming long or short, and approaches a top or bottom, we might expect to see a reversal as traders cover their positions. For example, if the market becomes overwhelming long or short, and approaches a

top or bottom, we might expect to see a reversal as traders cover their positions. The graph below shows the net speculative positions in the EUR/USD. In the wake of the Greek debt crisis, investor sentiment turned sour and led to a massive selloff of the euro. The negative sentiment seemed to multiply, as net shorts reached a record high in early 2010. This forced the European government to coordinate a rescue package, totaling nearly $1 trillion, to stop the spread of contagion.

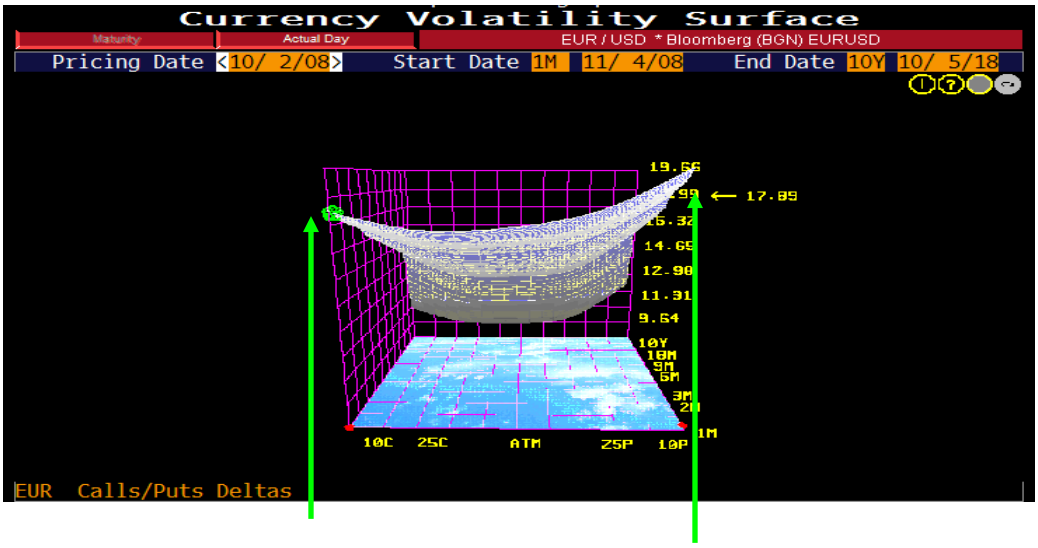
Figure 5



Risk Reversals

In addition to the futures market, we can also look to the OTC currency options market for indications of sentiment. We do this by looking at the **risk reversal**, which measures the difference in implied volatility between call and put options of the same maturity and delta for a currency. Recall that mathematically two identical options should have the same implied volatility. However because of supply and demand and the different banks' outlooks on the markets, this is rarely the case. For instance, when the market expects a currency to rise, calls on that currency would be considered worth more and therefore have a higher implied volatility relative to puts, and vice versa. One could also say that the market is *skewed* in favor of the puts or calls. The volatility surface function on Bloomberg shows this skewness three-dimensionally on **{OVDV <go>}** (Figure 6). Notice how the 10-delta puts (x-axis, bottom-right) are higher than the 10-delta calls (x-axis, bottom left) causing the surface to skew up to the right. This is also what's known as the *volatility smile*. Since we are speaking in terms of the base currency, we can say that EUR puts (USD calls) are bid or are higher than EUR calls (USD puts). This means the market is expecting a greater chance of a downward move in EUR/USD than of an upward one; a bearish sentiment for the Euro.

Figure 6



Bloomberg also makes it easy to track this value, the risk reversal, over time (Figure 7). This helps market participants determine if the difference is significant in relation to historical norms and what the trend has been. **{VOLC <go>}** is an excellent tool for this as is **{IPSP <go>}**

Figure 7

{EURUSD251M <Curncy> and EUR <Crncy>}

Risk Reversals are often looked at on an intraday basis, but the above historical chart shows the anecdotal relationship perceived in the market between movement in spot and the risk reversal premium. Notice how the risk reversal was positive throughout the EUR/USD rally from June 2005 to March of 2006. The relationship was then proven to be tenuous as the rally continued even after the risk reversal turned negative. However after the sharp move down in September, the options market became extremely bearish on euro, with the risk reversal reaching new lows.

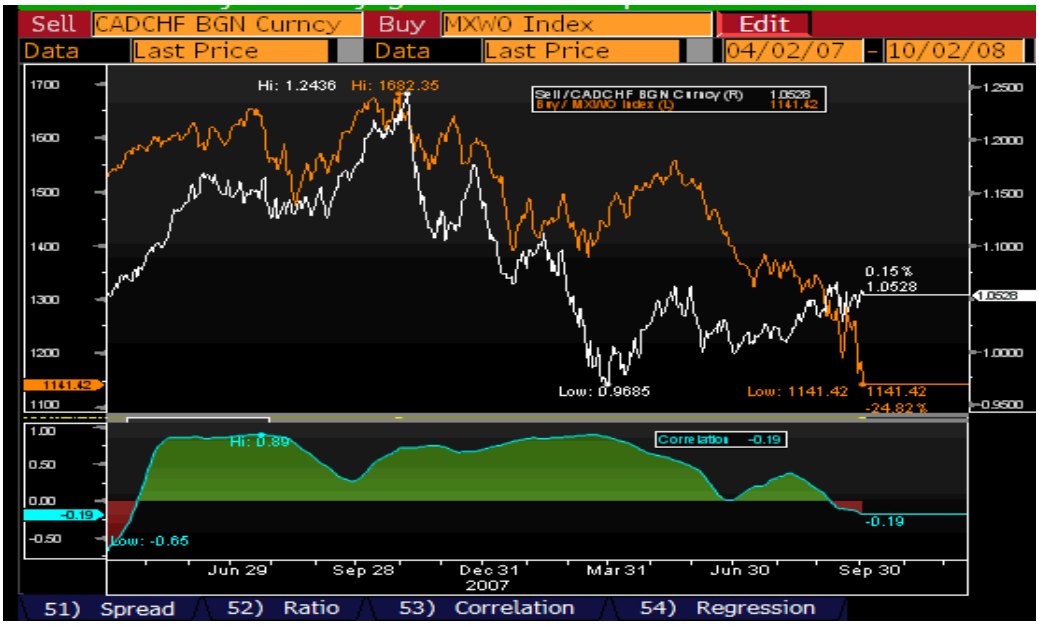
Correlation and Regression

Correlation quantifies the degree to which data moves together over time. It plays a fundamental role in financial markets because of its usefulness in *diversification*, *speculating*, and *hedging*. If you want to minimize risk in your portfolio, you want to diversify into assets that are uncorrelated. This is logical because if some go down, they don't all go down, and some may even go up. If you are speculating, you can use correlation to profit on the relationship between two assets that are moving together, by betting if that relationship will continue or widen or narrow.

This was the case with the very popular long oil / short dollar trade earlier in 2008 and discussed in our section on "Other Factors That Affect FX". Finally, if you are long an asset you may want to find a correlated asset to hedge your position. You can short this asset and thereby reduce some of your downside risk. If your long position declines in value, your short position will gain, and offset some of the loss.

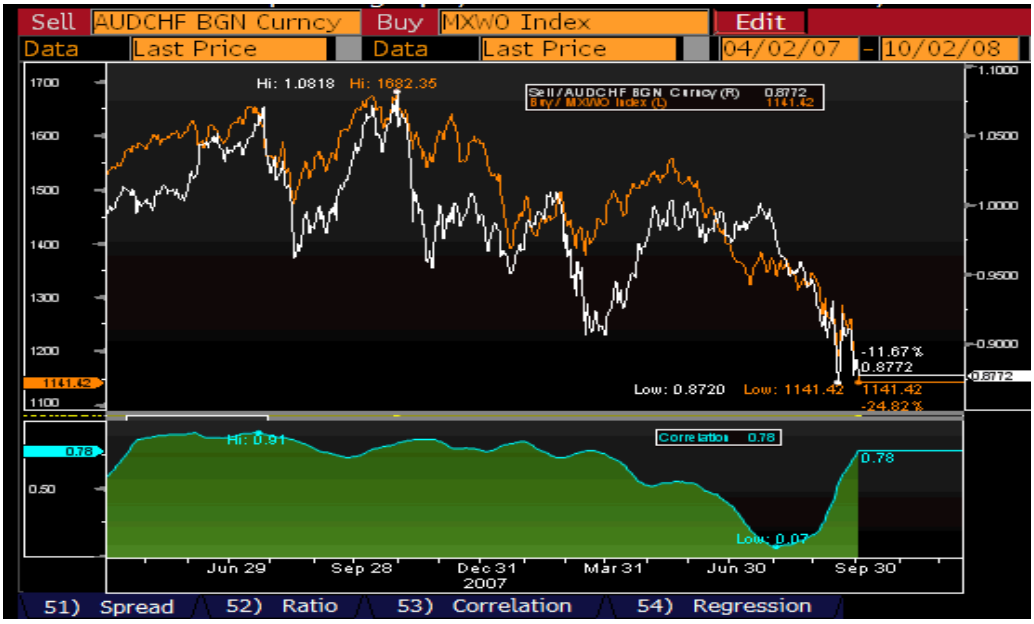
An example of this is the hedging of equity positions with FX. The use of which has gained as positioning and sensitivity to risk heightened since the credit crisis. Using the historical spread function **{HS <go>}** and the Morgan Stanley World Index as a proxy for equities, we have found CAD/CHF (figure 8) and AUD/CHF (figure 9) to exhibit extremely high correlations to the equity market. The figures below show the correlations, topping out at .91 for AUD/CHF (Figure and .81 for CAD/CHF. This means that an investor long the index may want to hedge with a short Australian Dollar, long Swiss Franc, or short Canadian Dollar, long Swiss Franc, position.

Figure 8



{CADCHF <Crncy> MXWO <Index> HS <go>}

Figure 9



{AUDCHF <Crncy> MXWO <Index> HS <go>}

Having identified these relationships, one of the keys here will be choosing a period of high correlation and determining whether to short AUD or CAD. Let's say we were fortunate and started hedging 10/08/07 through 11/27/07. Our equity position would have declined 5.6% (figure 10)

Figure 10

Using the FX carry trade basket function, **{FXCT <go>}** however, we would have examined both baskets and find out that the CAD/CHF would have returned +7.73% and the AUD/CHF would have returned +8.12%. Covering and actually resulting in a small gain in our position. The success of the hedge can be attributed to the correlation between the currencies and the equity index. The correlation might be reasoned to be that equity declines correspond to risk aversion. As riskier trades are unwound, currencies like the AUD sell off, and currencies like the Swiss Franc gain.

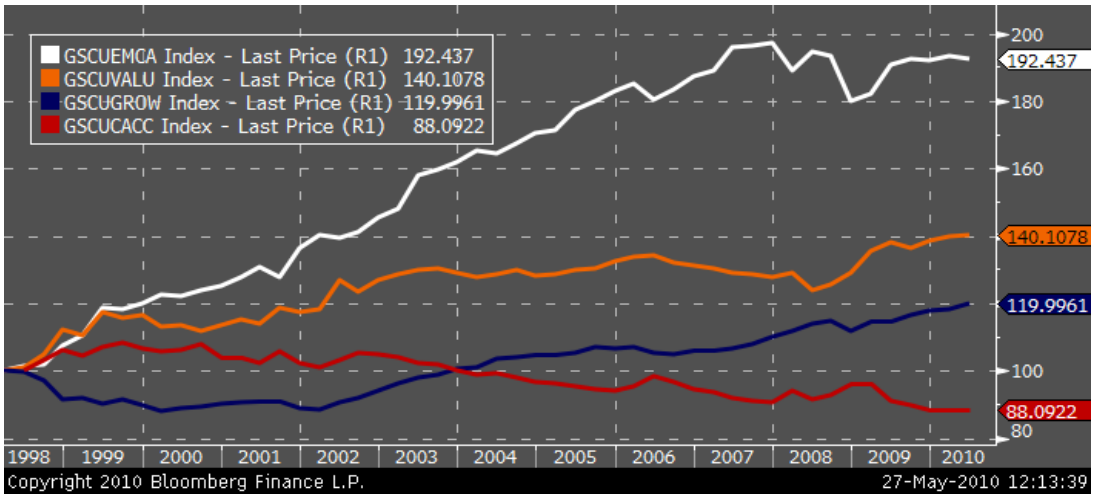
Food for thought: AUDCHF has both a higher correlation and higher return. Yet a trader may choose the CADCHF to continue this hedge. *Why*? Because when we short a currency we have to pay its interest rate, and the AUD rate is higher. It will add up over time and increase our transaction costs. This is called the *cost of carry*, and is part of a popular strategy that bears its name.

Carry Trade

In basic terms, a carry trade involves borrowing a low-yielding currency to purchase a higher yielding currency or asset. This trade is executed by borrowing or shorting currencies with low-levels of interest, such as Japanese Yen or Swiss Franc, to purchase higher-yielding assets around the world, notably Australian or New Zealand Dollar, Icelandic Krona and Turkish Lira. The trade is done in order to capture the yield differential or "carry".

Carry trades have been very popular as empirical studies overwhelmingly find that these strategies— particularly diversified carry trade strategies— have been highly profitable over the long run. Carry trades benefit from the tendency of high-yield currencies to outperform lower-yielding ones. Figure 1 illustrates this point: since 1997 the carry has been the most profitable FX strategy and has generated a profit of nearly 127.8%, but not without consequences.

Figure 1. FX Comparative Analysis



Source: Goldman Sachs. Carry (white), Valuation (orange), Growth (blue), Current Account (red)

Bloomberg has two powerful tools for analyzing the carry trade. The first is {FXCT <go>}. FXCT allows a user to model their own carry trade baskets, with any combination of long and short currencies. FXCT will then build an index to compute both the spot gain or loss and the interest rate differential for the currencies used. It then combines these indices and plots them as a return, letting the user analyze the performance of the trade over time. (Figure 2)

Figure 2

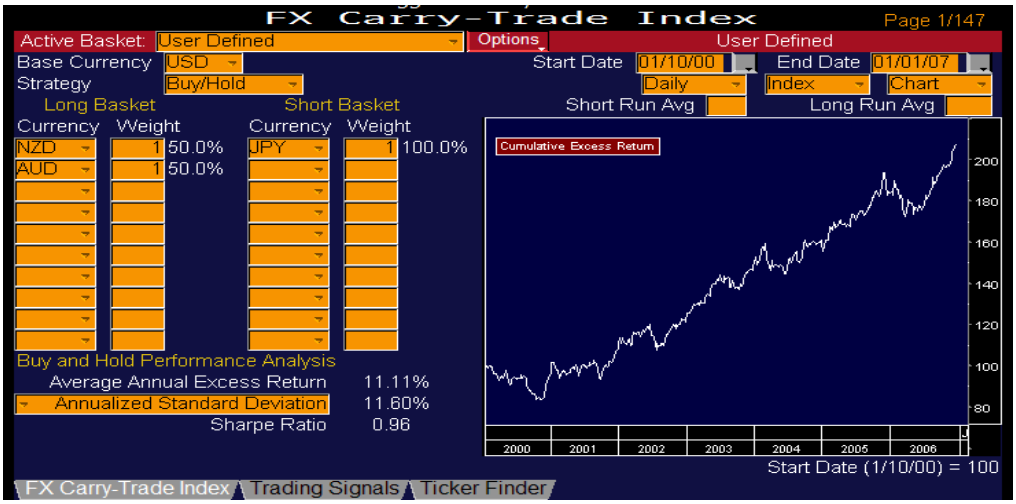


Figure 2 illustrates a profitable carry trade from January 2000-2007. The trade is long AUD/USD and NZD/USD, and short USD/JPY. The result was an average annual return of 11%.

The second way to analyze a carry trade on Bloomberg is to use {FXFB <go>} (Figure 3). The concept is the same as FXCT, only here we do not pick the currencies. Instead we define a universe of acceptable currencies, and the number of desired long and short positions. From there the screen will do the rest of the work, and pick out the currencies with the highest and lowest yields to construct the basket. The basket will then change over time as interest rates change (you can click on the currency basket history tab to see this) and FXFB continues to select the optimal currencies.

Figure 3

Figure 3 shows that if we model a G10 carry trade, long the two highest yielders and short the one lowest yielder, which our days of 11% gains are over despite having made "optimal" currency selections. For reasons discussed below, the future of the carry trade is on hold.

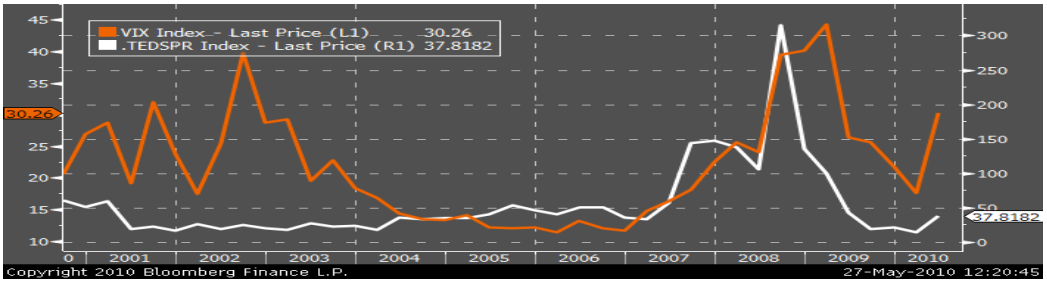
Despite the above example, the strategy proliferated in recent years partly thanks to global liquidity and easy monetary policy. As currencies are a global, 24 hour market, so long as banks are willing to lend and investors willing to use leverage, very large amounts of money get devoted to this trade.

On the other end of the spectrum, volatility is detrimental to the carry trade. The strategy benefits only if the low-yielding currency remains weak. If it appreciated, it would increase the repayment cost and offset the interest rate differential. Volatility and liquidity work are inversely related. When the market experiences low-levels of volatility, it can be attributed to a rise in liquidity. Conversely, if liquidity tightens up, the market may move in larger (more volatile) increments.

Let's look at the market cycle of 2003 – 07. These years were largely characterized by a high risk appetite, where global investors were in search of yield above that provided by most rich-country returns. Low global interests coupled and low inflation were the fuel for this market. Globalization also played a role by enabling rich multinationals' to utilize Adam Smith's specialization of labor and outsource low paying jobs to Asia. This allowed businesses to pay lower wages and thus the price of imports dropped, and helped keep a lid on inflation, which helps interest rates stay low. On a side note, the protectionist rhetoric that resulted in US is quite ironic since this low-cost business model allowed American workers to buy goods at cheaper prices and in turn increased their wealth.

With easy access to credit and little worries about a global slowdown investors took on riskier positions, seeking yield from carry trades and investments in emerging markets. In the summer of 2007, Citi's former CEO, Chuck Prince's ignominious remark: "that we will continue to keep on dancing until the music stops," marked the end of this credit bubble. The TED spread and the VIX index showed that risk aversion was high and liquidity was dry (Figure 4). These were just two of the harbingers of the end credit bubble and the subsequent unwind of the carry trade. At time of writing this the Yen has appreciated by 15% since it multiyear low; the Krona has depreciated by 91%; the Lira by 14%; and much the same for other high yielding currencies. Based on recent currency performance, it seems the music has stopped.

Figure 4. SPX Volatility Index & the Ted Spread



{G <GO>}: Ted Spread (white), VIX INDEX

FX TRADING

Although one of the first markets to trade electronically (on Reuters Dealing in the 70's), the complexities of the FX market allowed it to resist modern-day e-commerce for many years. However, starting in the early part of this decade, FX began to get commoditized and banks looked for ways to increase their volumes, and the market started migrating towards electronic trading on the customer side. Although clients still primarily transact over the phone, this trend is shifting as electronic volumes continue to increase. Greenwich Associates estimates that 56% of FX users traded online in 2007, and today there are myriad online trading platforms that do substantial amounts of volume. The platforms can be distinguished by their features and ways of trading. Some of these, like Bloomberg, are considered multi-bank, some are anonymous ECNs, and many banks have developed their own, "single-dealer" platforms as well.

Multi-bank: electronic trading platforms that offer liquidity from and attributable to multiple liquidity providing banks. Usually includes the ability to request a quote (**RFQ**) from multiple banks simultaneously which is very popular with corporations and money managers.

ECN: stands for "electronic communication network" and is a prevalent way of trading in the equity markets. This type of platform allows users to post bids and offers at prices they want to buy or sell at, and get matched up with other counterparties anonymously. Often used by hedge funds and banks (EBS and Reuters Matching are types of ECNs).

Single-dealer: refers to a bank's own, online e-commerce platform. Generally offers executable pricing and other features but only from the bank whose platform it is. Most major FX banks offer their own platform as well as participate in other types of platforms.

Bloomberg FX <GO>

Bloomberg's strength has always been our data, news, and analytics. In recent years however we've been able leverage those strengths and add communication and electronic trading to that list. When it comes to FX, the Bloomberg Professional Service offers the new **FX <GO>** trading platform. Complete with streaming, executable pricing, multi-bank request-for-quote, and orders functionality, it offers something for all modes of trading. All FX products – spot, forwards, swaps, options, NDFs, and even deposits are supported, as are all currency pairs. Add to this workflow tools like blotters, connectivity to our order management systems, and a fully flexible straight-through-processing solution and **FX <go>** becomes a robust FX trading solution for almost any market participant.

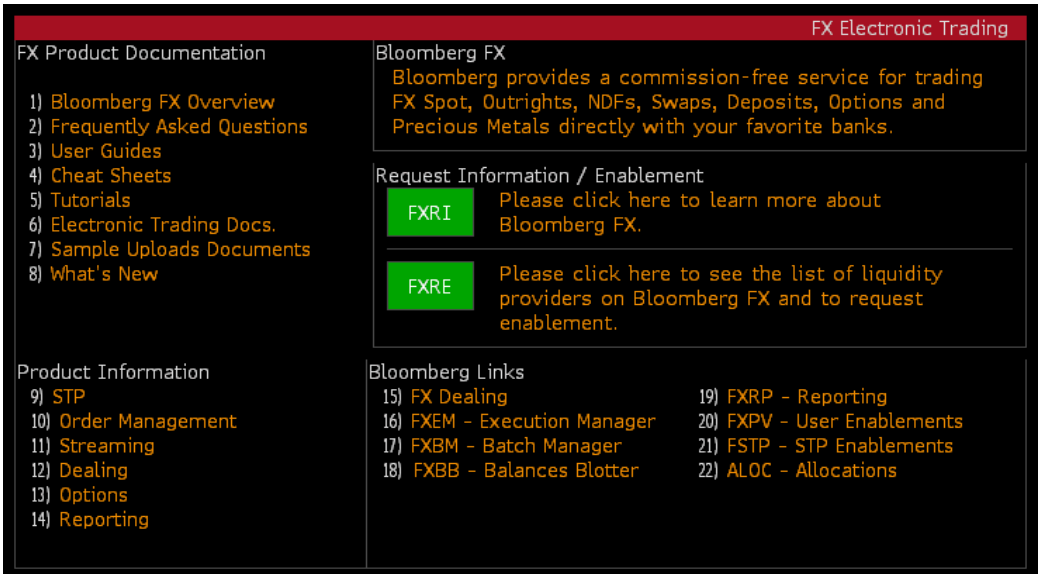
In the pages that follow we will describe FX <go> and the trading tools available on Bloomberg.

As discussed, the FX market trades over-the-counter. This means that liquidity is provided by various major banks, there is no central exchange, and hence it is somewhat fragmented. Although banks trade with each other primarily on Reuters and EBS, and concentrate their liquidity on those platforms, customers do not have access to these systems. Therefore, they have to rely on banks to provide the FX pricing. This has lead to the typical customer, be they a corporation, hedge fund, or money manager, having to call up their banks on the phone for an FX price. If they had access to good indicative pricing, from Bloomberg for example, they would check the screen to see how close the bank's price is from the market before dealing. Some customers even have a requirement to call at least two or three banks to shop around and compare prices (as we discussed in the section on Pricing, there is no one FX price, and not all pricing is created equal!) As you might infer, this is an onerous and inefficient process, especially in fast moving markets, but for a while it was the only option. As the FX market evolved however solutions providers like Bloomberg began offering the buy-side valuable price discovery and trading tools that helped clients save both time and money.

FX <GO>

The main menu for FX trading, this page is where a current or prospective Bloomberg electronic trading user can see our list of liquidity providing banks and request enablement **{FXRE <go>}**. It is also full of resources for both Bloomberg customers *and* employees, including:
user guides, tutorials, cheatsheets, FAQs, and other product information, and they can request additional information **{FXRI <go>}** right from the FX Applications Specialist or FX Business team.

It also contains links to the main FX trading applications, like: **{FXRP <go>}** for reporting, **{FXEM <go>}** the FX Execution Manager, **{FXPV <go>}** User privileging, **{FXBM <go>}** the FX Batch Manager, **{FSTP <go>}** Straight-through-processing setup, and **{ALOC <go>}** for allocations.



***{FX <go>}** FX Trading homepage*

There are three primary ways to trade FX on FX <go>: ***streaming executable rates, request-for-quote***, and ***orders***. All three come free as part of the Bloomberg. All three require the customer to sign the Bloomberg ETORSA (Electronic Trade Order Routing Service Agreement), and users must then be set up with a deal code by the FX Applications Specialist or FX Business team.

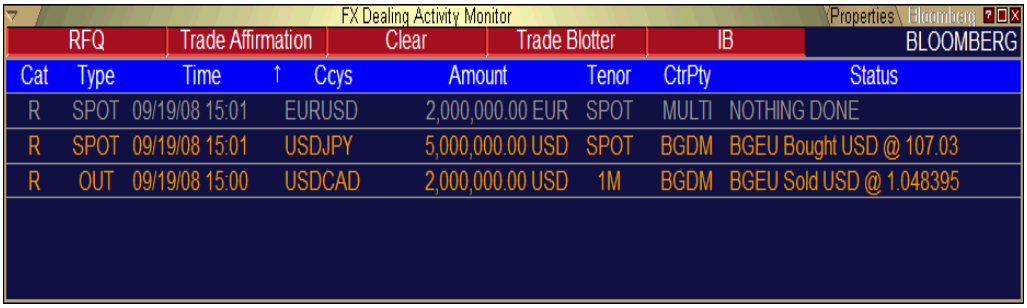
Streaming FX <GO>

Once set up by Bloomberg and permissioned by the banks (via FXRE), a user may access live FX rates and just point-and-click to do a trade. It is an easy way to trade that also enables a user to get maximum price discovery by having a Launchpad component open for each bank that he/she is enabled for. To access a bank's streaming platform (shown below) after being enabled, run Launchpad, click *Launch -> Currency -> FX Trading*

{Streaming FX <GO> component for Bloomberg Demo Bank}

FX Dealing / Request-for-quote

This mode of trading allows users to fill out an FX RFQ ticket, with their currency, amount, and settlement date of the trade, and send it to multiple counterparties (banks) for pricing. The RFQ can be directed to a bank's automated pricing system, or directly to the customer's sales coverage for manual pricing. We show all of the prices together in one widget, and highlight the best price, helping the user to get the best execution for their trade. Note that for technical or business reasons many banks do not stream exotic currencies or products like forwards, swaps, or NDFs. This makes FX Dealing an excellent way for customers of FX to trade these instruments.



{FX Dealing} is accessible under *Launch -> Currency -> FX Trading.* I

Orders

In addition to clicking on streaming rates, or sending out a request for a price, many people who trade FX leave orders. An order is a set of instructions that a customer leaves with a bank for how to execute a trade. The instructions would include the amount of currency, whether to buy or sell, the price to buy or sell at, and how long the order is in force. Orders are often used as a way of protecting oneself from loss when the market goes against you (a *stop-loss* order), or locking in profit (a *take-profit* or *limit* order) when the market moves in your favor. To leave an order on Bloomberg you would use **{FXEM <go>}.**

The FX Execution Manager {FXEM <go>}

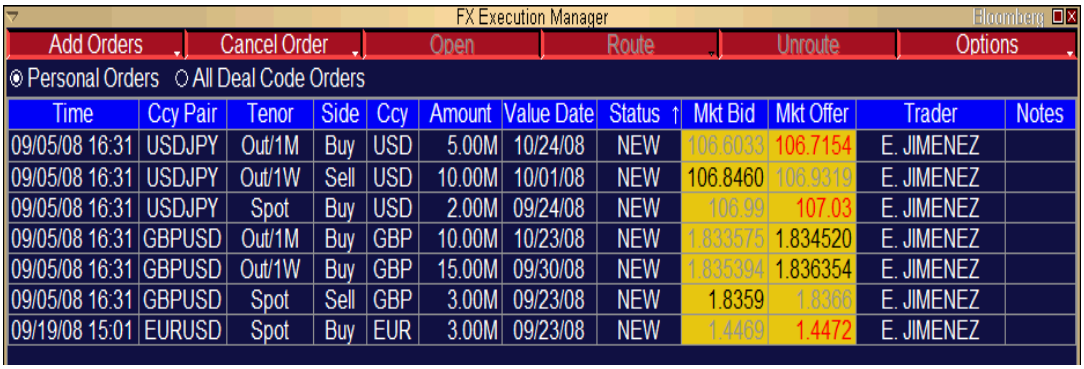
FXEM is our central FX trading application and is available in-panel and in Launchpad. It provides the ability to stage multiple trades at a time, and view live indicative pricing for each of your trades prior to execution. It enables users to upload trades from other systems or Excel spreadsheets easily, and gives a user full control on how to execute the trade.

From the "Route" dropdown on FXEM, a user has multiple options, including the ability to send an RFQ (same as FX Dealing), to send them to FXBM (discussed below), or to use the following:

Local Order: allows a user to stipulate a currency, amount, and level to buy or sell at that is more favorable then the market. This may be to take profit or establish a position at a more favorable level. The user will designate a streaming **FX <go>** bank to leave the order with, and when that bank's pricing hits the level, the order will get filled and the trade is consummated. The name "local" refers to the bank never actually seeing the order. Instead, it is kept "local" on the user's Bloomberg.

Autotrade: allows a user to choose a bank and leave an order "at market". Wherever that bank's stream is trading, is the price the customer will execute at. It's similar to simply having clicked on that bank's streaming price window.

Order Book: this option currently allows a user to place an algorithmic order with Credit Suisse. An algorithm is a more sophisticated way of executing an order. It employs different types of rules depending on the algorithm selected and grants a user access to pools of liquidity that the bank (in this case CS), has access to. *Note: Algorithms generally cost a fee assessed by the bank and are the only type of FX trade on Bloomberg that does.* In the future the Order Book option will include various other order types, including the stop-loss and take-profit as discussed above.



Time	Ccy Pair	Tenor	Side	Ccy	Amount	Value Date	Status	Mkt Bid	Mkt Offer	Trader	Notes
09/05/08 16:31	USDJPY	Out/1M	Buy	USD	5.00M	10/24/08	NEW	106.6033	106.7154	E. JIMENEZ	
09/05/08 16:31	USDJPY	Out/1W	Sell	USD	10.00M	10/01/08	NEW	106.8460	106.9319	E. JIMENEZ	
09/05/08 16:31	USDJPY	Spot	Buy	USD	2.00M	09/24/08	NEW	106.99	107.03	E. JIMENEZ	
09/05/08 16:31	GBPUSD	Out/1M	Buy	GBP	10.00M	10/23/08	NEW	1.833575	1.834520	E. JIMENEZ	
09/05/08 16:31	GBPUSD	Out/1W	Buy	GBP	15.00M	09/30/08	NEW	1.835394	1.836354	E. JIMENEZ	
09/05/08 16:31	GBPUSD	Spot	Sell	GBP	3.00M	09/23/08	NEW	1.8359	1.8366	E. JIMENEZ	
09/19/08 15:01	EURUSD	Spot	Buy	EUR	3.00M	09/23/08	NEW	1.4469	1.4472	E. JIMENEZ	

{FXEM <go>} The FX Execution Manager or *Launch -> Currency -> FX Trading.*

The FX Batch Manager {FXBM <go>}

FXBM allows you to trade multiple deals as one "batch" deal. This helps reduce the time spent on doing separate trades, and reduces transaction costs by doing large trade instead of many. A batch may consist of trades in different currencies, as well for different dates, like in the case of hedging a series of cash flows with a strip of forwards. The entire batch is routed like an RFQ for pricing, and Bloomberg highlights the best price overall as well as by currency. You can access FXBM directly or stage trades to it from FXEM.

Ccy Pair	Amount	Side	Ccy	Tenor	Val Date	BGAS	All In	Tol	BGFF	All In	Tol	Ref Rte
TOTAL						-28,957,735.70			-28,957,623.60			
USDJPY	6.00M	B	USD			-5,994,435.70			-5,995,413.60			
	2.50M	B	USD	SPOT	10/05/07	116.53	116.53		116.55	116.55		116.56
	2.50M	B	USD	1W	10/12/07	-9.72	116.4328		-9.83	116.4517		-9.86
	1.00M	B	USD	1M	11/05/07	-43.54	116.0946		-43.87	116.1113		-43.96
GBPUSD	5.00M	B	GBP			-10,194,834.00			-10,194,772.00			
	3.00M	B	GBP	SPOT	10/05/07	2.0395	2.0395	x	2.0395	2.0395	x	2.0383
	2.00M	B	GBP	1M	11/05/07	-13.33	2.038167	x	-13.64	2.038136	x	-13.75
EURUSD	9.00M	B	EUR			-12,768,466.00			-12,767,438.00			
	2.00M	B	EUR	SPOT	10/05/07	1.4173	1.4173	x	1.4172	1.4172	x	1.4169
	3.00M	B	EUR	1M	11/05/07	11.26	1.418426	x	11.26	1.418326	x	11.32
	4.00M	B	EUR	3M	01/07/08	23.47	1.419647	x	23.15	1.419515	x	23.08

{FXBM <go>} The FX Batch Manager or *Launch -> Currency -> FX Trading*

As you can see, Bloomberg offers a full set of tools for executing trades. But what happens after the trade? Where does it go?

FX Trade Blotter

Each Bloomberg FX Electronic Trading (FXET) user will have a centralized blotter. No matter how they trade: by RFQ, on streaming, or by leaving orders, and no matter which bank they trade with, all of their trades will be stored in one place, their FX Trade Blotter, **{FXNB <go>}**. The blotter is sortable, searchable, and exportable to Excel. It also has a trade view that lists your deals, and a positions view that shows your *net position* and *average price* by currency. Finally, there is a personal view that lists only your deals, and an "All Deal Code Trades" view, that shows you trades by other traders in your same deal code.

Time	Trader	Ccys	Side	Value Date	Ccy	Amount	Deal Code	Rate	Points	Allocated
09/19/2008 15:01	E. JIMENEZ*	USD/JPY	BUY	09/24/08 SPOT	USD	5,000,000.00	BGDM	107.03		
09/19/2008 15:00	E. JIMENEZ*	USD/CAD	SELL	10/22/08 1M	USD	2,000,000.00	BGDM	1.048395	-8.05	
09/19/2008 13:39	G. EDWARDS	EUR/USD	BUY	03/23/09 6M	EUR	10,000.00	BGDM	1.435039		
09/19/2008 13:39	G. EDWARDS	EUR/USD	SELL	07/23/09 10M	EUR	10,000.00	BGDM	1.425783	-92.56	
09/19/2008 13:38	G. EDWARDS	EUR/USD	BUY	03/23/09 6M	EUR	100,000.00	BGDM	1.435038		
09/19/2008 13:38	G. EDWARDS	EUR/USD	SELL	07/23/09 10M	EUR	1.00	BGDM	1.426840	-81.98	
09/19/2008 13:33	G. EDWARDS	EUR/USD	BUY	09/23/08 SPOT	EUR	100.00	BGDM	1.4432		
09/19/2008 13:33	G. EDWARDS	EUR/USD	SELL	10/07/08 2W	EUR	100.00	BGDM	1.443099	-1.01	

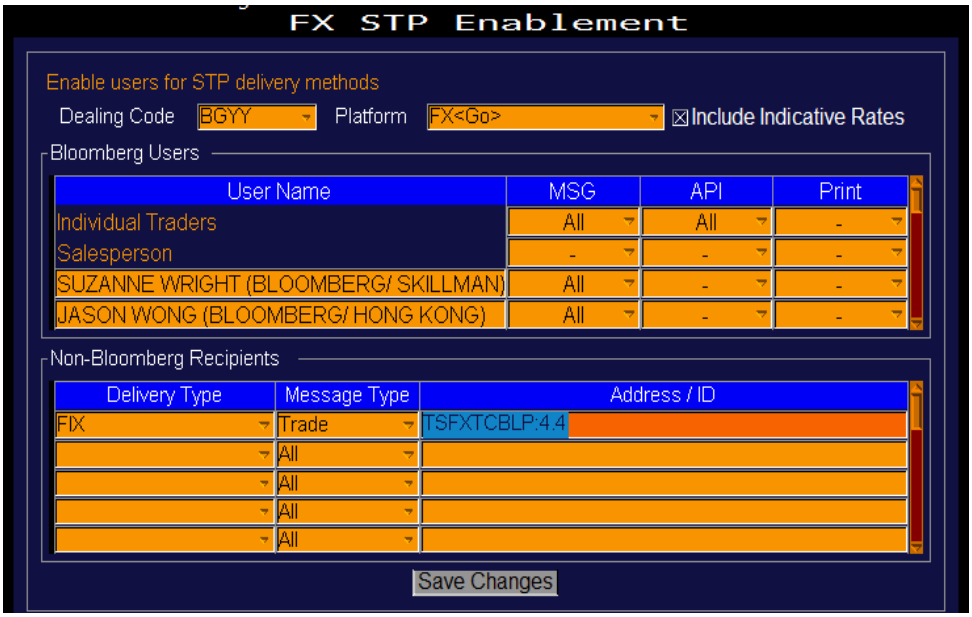
{FXNB <go>} The FX Trade Blotter, also accessible under *Launch -> Currency -> FX Trading*

FX Straight-through-processing

The trades however don't just stop there. Once the trade is done, the details will need to be confirmed or agreed to before the trade is settled and money changes hands. This normally takes place by the bank's back office contacting someone on the customer's side to review the details. Note that the person confirming the trade is almost never the same as the one who executed it. Therefore, the trader has to pass the trade information to that person somehow. Bloomberg helps with this process by allowing the client to set up automatic emails that include all of the trade details and get generated the moment a deal is done and routed accordingly. These emails can be set up on the FX Straight-Through-Processing, **{FSTP <go>}** function.

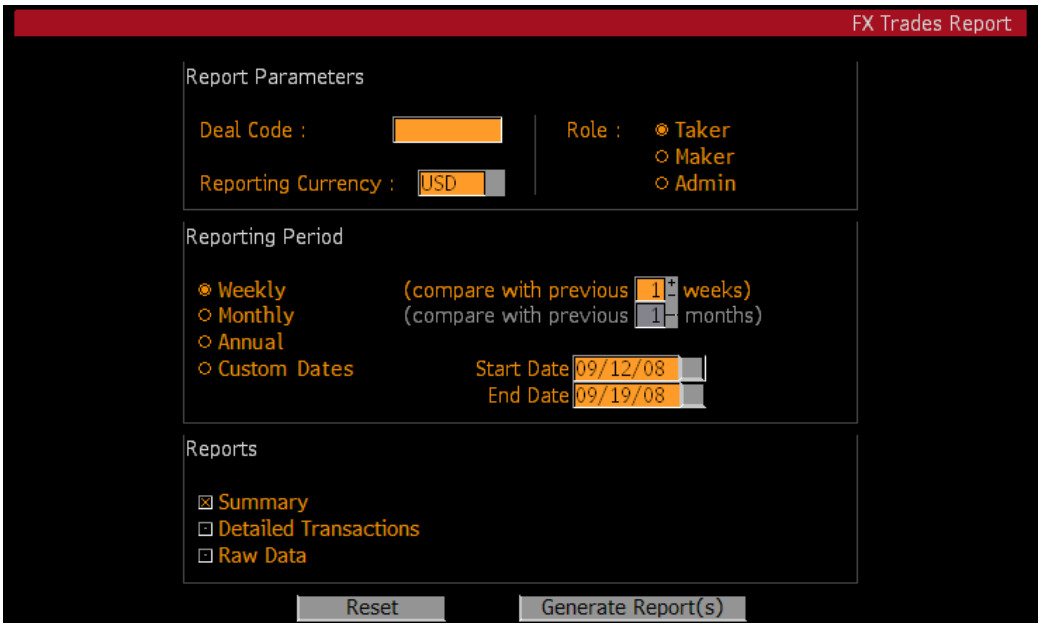
In addition to the email that will help confirm the trade, most traders have other systems that require the trade details. For example, a trader may need to book the trade into an order management system that helps keep track of positions and profit and loss. Bloomberg's own **POMS** and **TOMS** are prime examples of such systems. Also, back-office personnel may need to book trades into an accounting system that serves as their book of record, and a treasury person may need to book it

into a treasury management system that serves as their book of record and also helps them manage FX exposures. **{FSTP <go>}** addresses this as well by allowing for the configuration of various straight-through-processing options, that will send the trade into another system or a file format that the customer can work with, reducing the amount of manual entry and the likelihood of errors.



FX Reporting

FX traders and traders in general, are very concerned about their transaction costs and their execution quality. With FX, we are able to generate a report that shows the win/loss percentages by banks, which shows how many requests-for-quote were sent, how many were priced by the various banks, and how many trades each bank won. This helps a user identify those banks who have provided them with the best or worst prices in the various currency pairs they traded. They can use this information in deciding how to allocate their future business accordingly. Users can access this information in a presentation-ready report by running **{FXRP <go>}**



Summary

In sum, Bloomberg offers a complete and robust foreign exchange trading platform. It is a free service as part of the Bloomberg terminal, and offers trading in spot, forwards, swaps, NDFs, options, and even precious metals. All currency pairs are supported and over 100 banks participate and provide liquidity. There is also a full range of connectivity and straight-through-processing options. The platform is widely used by regional and international banks, hedge funds, asset managers, and corporations. All relevant information including full user guides for the functionality can be found on **{FX <GO>}**. In addition **{FXRC <go>}** is the FX Resource Center that will elaborate on the market, player types, frequently asked questions, and procedures for technical issues.

Market Players

As discussed in previous sections, FX is a truly global market and affects a wide range of economic actors, including banks and corporations, money managers like insurance companies, mutual and pension funds, central bank and government entities, and a growing segment of hedge funds. These groups are hedging foreign exchange exposures and/or speculating on foreign exchange moves for profit. Some of these organizations and the FX players within them will be discussed in this section.

Banks

As we've discussed, inter-bank trading accounts for a large portion of FX transactions. Banks trade FX for three basic reasons: funding positions as a result of commercial transactions and balance sheet needs; facilitating FX transactions on behalf of their customers; and for pure profit in what's know as *proprietary* trading. *Examples: Deutsche Bank, Barclays, UBS*

Corporations

Big users of the FX markets tend to be corporations. Any firm that operates in foreign markets incurs revenues and expenses in foreign currencies. They may sell products in those markets, and receive payment in the foreign currency, or they may buy raw materials or have labor costs denominated in the foreign currency. For these companies, FX is not their primary focus but is a very important byproduct of their main businesses. They execute FX trades to remit payment for invoices in foreign currency and to convert receivables to the home currency. Because of the adverse effect that changes in FX may have on a companies' balance sheet and income statement, they may also engage in FX hedging transactions in the form of forwards, swaps, and options. *Examples: Apple, IBM, Boeing.*

Money Managers

Insurance companies, pension and mutual funds, and sovereign wealth funds make up this next group that plays a big role in the FX markets. This group is known as ***"real money"*** by their banks, as they represent actual assets under management, in contrast to hedge funds which are heavily levered. Combined, this group has trillions of dollars under management, and they generate waves in the FX market as they are constantly seeking to diversify and seek returns in higher yielding assets abroad. The resulting bond or stock transaction requires an FX transaction, and the ensuing (and large) FX positions result in an FX exposure that needs to be managed. They may also invest in the currency markets outright our source money managers that do, it what's known as currency overlay strategy to generate excess return. As many of these firms have gone global, they have experienced an influx of

foreign investors (customers) and the conversion of these assets creates FX exposure as well. *Examples: Fidelity, Pimco, New York Life.*

Hedge funds

A fast growing segment in the financial markets and the FX markets in particular, these are levered, speculative, investment pools. Hedge funds trade FX to buy or sell foreign bonds or stocks or other investments, as well as an asset class unto itself. The term Global Macro Fund is the most commonly associated with foreign exchange, but there are also many Long-short equity and Credit arbitrage funds that are international and as a result trade FX as well. *Examples: Renaissance, SAC, Highbridge,*

Retail

This sector represents the smallest volumes but a high frequency of trades. It's comprised mainly of individuals and small businesses that travel, speculate, have some FX exposure, and make wire transfers. *Examples: tourists, Western Union, Travelex*

Central banks

Central banks affect foreign exchange in its managing of currency reserves and in intervening in the FX markets to influence (strengthen, weaken, or stabilize) its currency's value (discussed in more detail in the section on Central Banks). *Examples: Federal Reserve Bank, European Central Bank, Bank of Japan*

FX Players

Buy-side FX trader

- May trade FX exclusively, but more likely is to fund trades in other asset classes, as a currency overlay, or for hedging
- May be responsible for identifying FX exposures or generating ideas
- Likely has an order management system and execution system. Need: STP
- Usually takes orders from portfolio managers and executes them with a bank
- Passes executed trades to back office for confirmation and settlement
- Uses Bloomberg for market information
- Talks to salespeople for market color and information on order flow
- Usually has several salespeople and tries to allocate his business between them
- May leave fixing orders to benchmark their execution
- *Goals are best execution and efficient workflow*

Sell-side FX Traders (spot or forward)

- Responsible for spot *or* forwards
- May specialize in certain currencies or groups of currencies
- Manage bank's FX positions, what they need funding in, what they want to be long in, etc
- Spot traders may want to be "flat" (have no position) at day's end
- Monitors news and economic events
- Uses charts to monitor key technical levels
- Talks to sales about order flow
- Makes prices for salespeople
- Makes money on bid/ask spread and order flow

FX options trader

- Makes structures and prices for salespeople for customers
- Monitors volatility and spot levels throughout the day
- Hedges options positions with spot trades
- Monitors charts, news, eco throughout the day
- Concerned about spot risk (delta), delta risk (gamma), volatility risk (vega), and time decay t(theta)
- Bid/ask spread and flow are important
- *Goal is profit*

FX Salespeople

- Covers clients
- Usually specializes in a certain customer type, like corporate, real money, or hedge funds
- Provides market color and monitors FX and broad market information
- Pitches trade or hedging ideas
- Gets prices from traders
- Makes prices for customers
- *Goal: flow & mark-up*

Corporate Treasury

- Trades FX on behalf of a parent or subsidiary that is receiving or making payment
- Also trades FX to hedge income statement (cashflows) or balance sheet (assets)
- Depending on size, the Treasurer, Assistant Treasurer, Director of International Treasury, or an Analyst may do the actual trading
- Identifies exposures and determines what they want to hedge and how much
- May rely on FX forecasts, research, and economic data
- May use a Treasury Management System to manage exposures and to book trades
- Usually deals FX with banks in their credit facility

- *Goal: best pricing, and efficient workflow*

Suggested Readings:

Bloomberg FX Electronic Trading user guides:

1) FX Streaming User Guide: {IDOC #2045802 <Go>}
2) FX Dealing User Guide: {IDOC #2046611 <GO>}
3) FX and TOMS User Guide: {IDOC # 2030485<GO>}
4) FX Allocations: {IDOC #2036056<GO>}
5) Bloomberg FX Straight-Through Processing: {IDOC #2034930<GO>}
6) FX IB Dealing User Guide: {IDOC #2041043 <GO>}
7) FXPV User Guide:{IDOC #2044655<GO>} Client Version:{IDOC #2044654<GO>}
8) POMS FX Integration: {IDOC #2044996<GO>}

Bloomberg FX Options functionality:

9) FX Options Pricing User Guide: {IDOC #2040748 <GO>}
10) FX Options Trading User Guide: {IDOC #2034148<GO>}
11) OVRA User Guide: {IDOC #2041085 <GO>}
12) OVML <HELP>

Additional references:

13) http://www.newyorkfed.org/markets/foreignex.html
14) “An FX Primer” by Shani Shamah
15) “Mastering Foreign Exchange & Currency Options” by Francesca Taylor
16) “FX Market Insights”; {FXMI <go>} by Mike Rosenberg
