MACRO MATTERS: THE REAL ECONOMY

Companies operate in a larger economy and the assumptions that we make about macroeconomic variables will have an effect on the valuations of all companies. In this chapter, we begin by looking at how changes in the real economy, inflation and exchange rates affect valuation and at the historical behavior of each of these variables. We then consider how analysts deal with macroeconomic variables in valuation and argue that they often make implicit assumptions about growth and inflation that may not be realistic or explicit assumptions that are internally inconsistent. We evaluate whether we should be building in views on the macroeconomic variables, and if so, how best to do it.

Growth in the Real Economy

Every business is affected by the state of the economy, though the magnitude of the effect may vary across businesses. In this section, we look at how the growth in the real economy affects inputs into the valuation of individual companies and some history on real economic growth.

Why does real economic growth matter?

When valuing companies, we have to estimate growth in revenues, income and cash flows over time. While we tend to look at the company's specific prospects while making these estimates, the operating numbers for a company will be influenced by the state of the economy in which the company operates. Put more simply, the revenues and earnings numbers will look much better if the economy is doing well than if it is slowing down or shrinking. Since we are forecasting these numbers for the future, our estimates for individual companies will be affected by how well or badly we think the economy wll do over the next few years.

While all companies may be affected by the growth rate of the economy, not all of them will be affected to the same extent. We would expect companies in cyclical businesses, such as housing and automobiles, to be affected more by overall economic growth. Conversely, companies that produce staples should be affected to a lesser extent by whether the economy is in boom or recession mode. Consequently, optimism about

future economic growth will result in higher values for the former, relative to the latter. The effect of changes in economic growth on company valuations can also vary, depending upon whether they derive their value primarily from existing assets or growth assets. Not surprisingly, companies with significant growth assets will see their values change much more dramatically in response to shifts in the overall economy than mature companies.

Finally, economic growth affects other key market-related inputs into valuation. In chapter 6, we noted that riskfree rates tend to change over time and that change is often related to real economic growth. When economies are growing briskly, riskfree rates tend to rise, whereas economic slowdowns are associated with lower interest rates. In chapter 7, we traced the shifts in equity risk premiums and default spreads over time, and noted their tendency to rise with uncertainty about the economy and investor risk aversion.
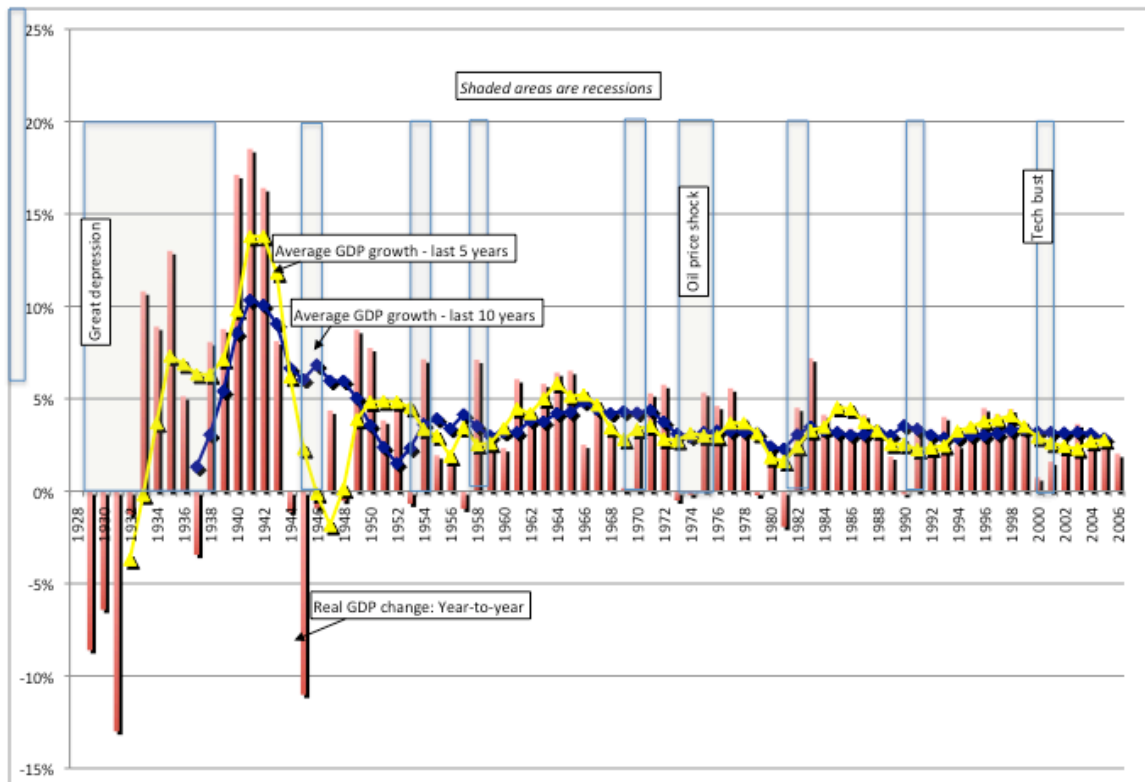
Looking at history

How much does real economic growth change from year to year? The answer clearly will depend upon which economy we look at. In the first part of this section, we will focus on real economic growth in the United States over time and how both real and nominal growth have varied across time. We will also look at how real economic growth has affected the aggregate earnings and dividends of publicly traded firms. In the second part of the section, we will expand the discussion to include other countries, including the fast growing emerging markets of Asia and Latin America.

US Real Economic Growth over time

During the 20th century, the US grew to become the dominant global economic power, but the growth was not uninterrupted. There we extended periods of economic decline and stagnation, with the great depression being the most significant example. In figure 8.1, we summarize annual changes in real Gross Domestic Product (GDP) for the United States from 1929 to 2007.

Figure 8.1: US Real Economic Growth over time: 1929- 2007

The shaded areas in the graph represent recessions, at least as defined by the National Bureau of Economic Research (NBER); two consecutive quarters of negative economic growth in real GDP has become the rule of thumb for classifying recessions. Table 8.1 summarizes the business cycles since 1850 in the United States, with the length of each cycle in months.

Table 8.1: Business Cycles in the United States: 1854- 2007 (in months)

		Contraction	*Expansion*	*Cycle*	
Peak	Trough	Peak to Trough	Previous trough to this peak	Trough from last trough	Previous peak tot his peak
June 1857	December 1858	18	30	48	--
October 1860	June 1861	8	22	30	40
April 1865	December 1867	32	46	78	54
June 1869	December 1870	18	18	36	50
October 1873	March 1879	65	34	99	52
March 1882	May 1885	38	36	74	101
March 1887	April 1888	13	22	35	60
July 1890	May 1891	10	27	37	40
January 1893	June 1894	17	20	37	30
December 1895	June 1897	18	18	36	35
June 1899	December 1900	18	24	42	42

September 1902	August 1904	23	21	44	39
May 1907	June 1908	13	33	46	56
January 1910	January 1912	24	19	43	32
January 1913	December 1914	23	12	35	36
August 1918	March 1919	7	44	51	67
January 1920	July 1921	18	10	28	17
May 1923	July 1924	14	22	36	40
October 1926	November 1927	13	27	40	41
August 1929	March 1933	43	21	64	34
May 1937	June 1938	13	50	63	93
February 1945	October 1945	8	80	88	93
November 1948	October 1949	11	37	48	45
July 1953	May 1954	10	45	55	56
August 1957	April 1958	8	39	47	49
April 1960	February 1961	10	24	34	32
December 1969	November 1970	11	106	117	116
November 1973	March 1975	16	36	52	47
January 1980	July 1980	6	58	64	74
July 1981	November 1982	16	12	28	18
July 1990	March 1991	8	92	100	108
March 2001	November 2001	8	120	128	128
Average: 1850-Today		*17*	*38*	*55*	*56*
Average: 1945--2001		*10*	*57*	*67*	*67*

Source: NBER

Looking at this long time period of history, there are some interesting facts that emerge that may have implications for how we deal with real growth in valuation:
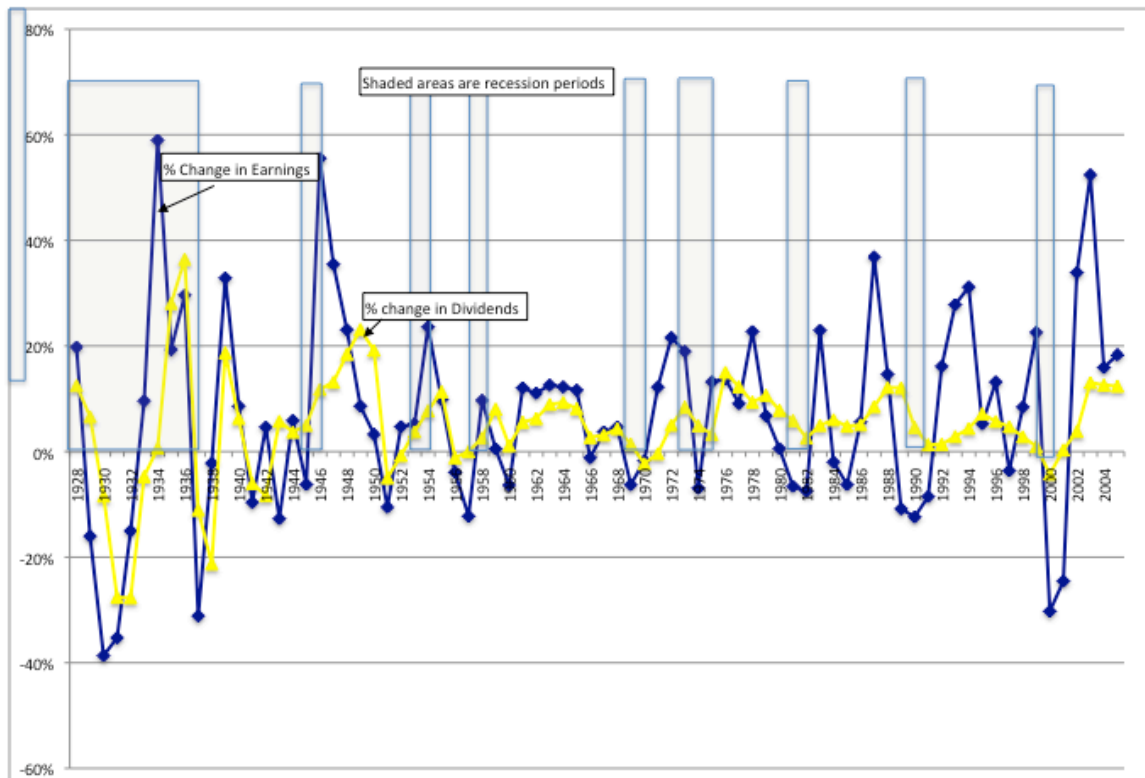
1. Cycle length is unpredictable: There is no systematic length to the cycles, making it difficult to forecast when the length and duration of the next cycle. The cycles of 1982=1990 and 1991-2001 have been the longest (100 months or longer) but the cycle prior to that lasted only 28 months. The average cycle lasted 55 months, but the cycles have become longer in the post World War II time period.

2. Recession length has varied: Since the great depression, recessions have lasted anywhere from 8 months to 16 months in length and have ranged from mild (2001-2002) to strong (1981-1982).

3. Hindsight is 20/20: One fact that does not come through when we look at this table is that the dates for the economic cycles are determined with the benefit of hindsight. In other words, investors and businesses were unaware in July 1990

that they were entering into a recession. It was only in early 1992 that the NBER

finally got around to categorizing the July 1990-March 1991 time period as a

recession

If we accept the proposition that predicting economic cycles is impossible to do and that we should focus on estimating real growth over the next 5 or 10 years rather than the growth in the next quarter, our task becomes easier (at least in hindsight). In figure 8.1, we have included the smoothed out estimate of real growth over the next five and the next ten years to provide a contrast to the year-to-year real growth numbers; the ten-year growth rate reported in 1954, for instance, is the average growth rate from 1954-1963. Note that there is far more stability in these long term forecasts, especially since the second world war; both the 5-year and 10-year average growth rates have been between 2-3%. This stability suggests that using a reasonable real growth rate number for the long term is more important (and viable) than forecasting growth on a year-to-year basis.

Since real growth affects valuation through the earnings and cash flows reported by businesses, we also looked at how aggregate earnings and dividends on the S&P 500 have behaved over time, as real economic growth has varied in figure 8.2:
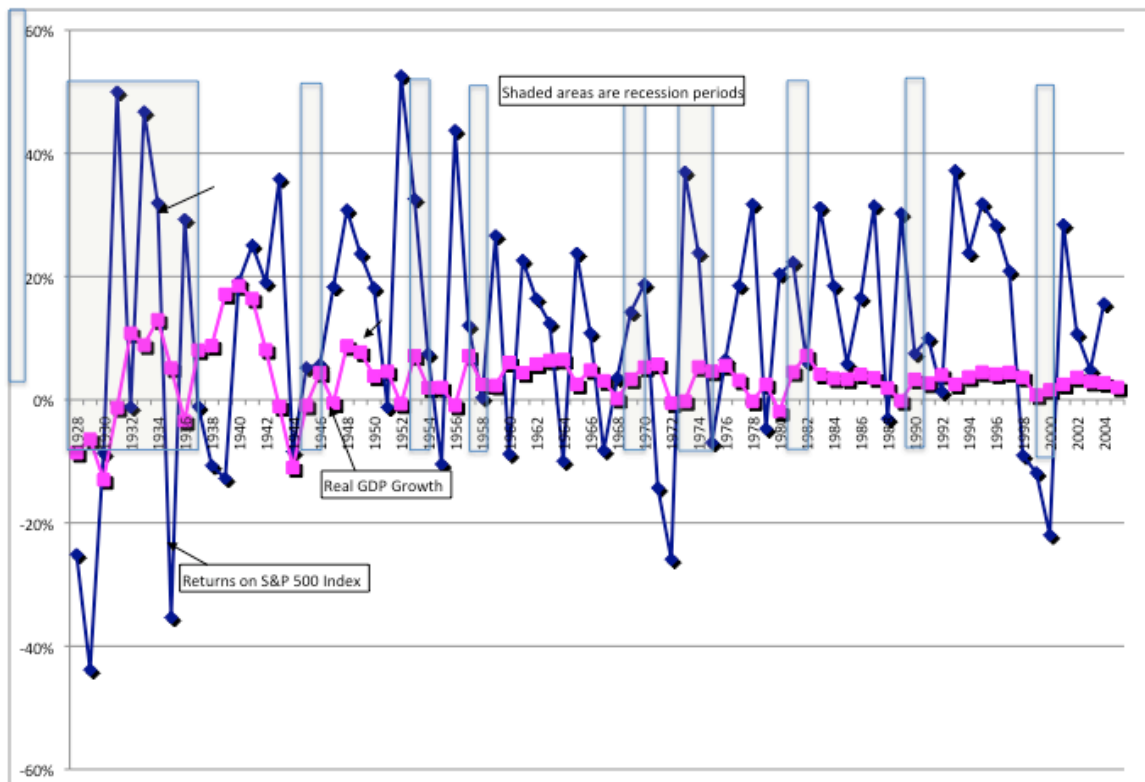
Figure 8.2: Earnings and Dividends on S&P 500 Companies

Looking back at the last 80 years of earnings and dividends on the S&P 500 companies, two trends emerge. The first is that both earnings and dividends are sensitive to economic conditions, with both declining during recessions. The second is that earnings are much more volatile than dividends over time.

As a final test, we looked at how the S&P 500 index has changed over time as a function of real economic growth in figure 8.3:

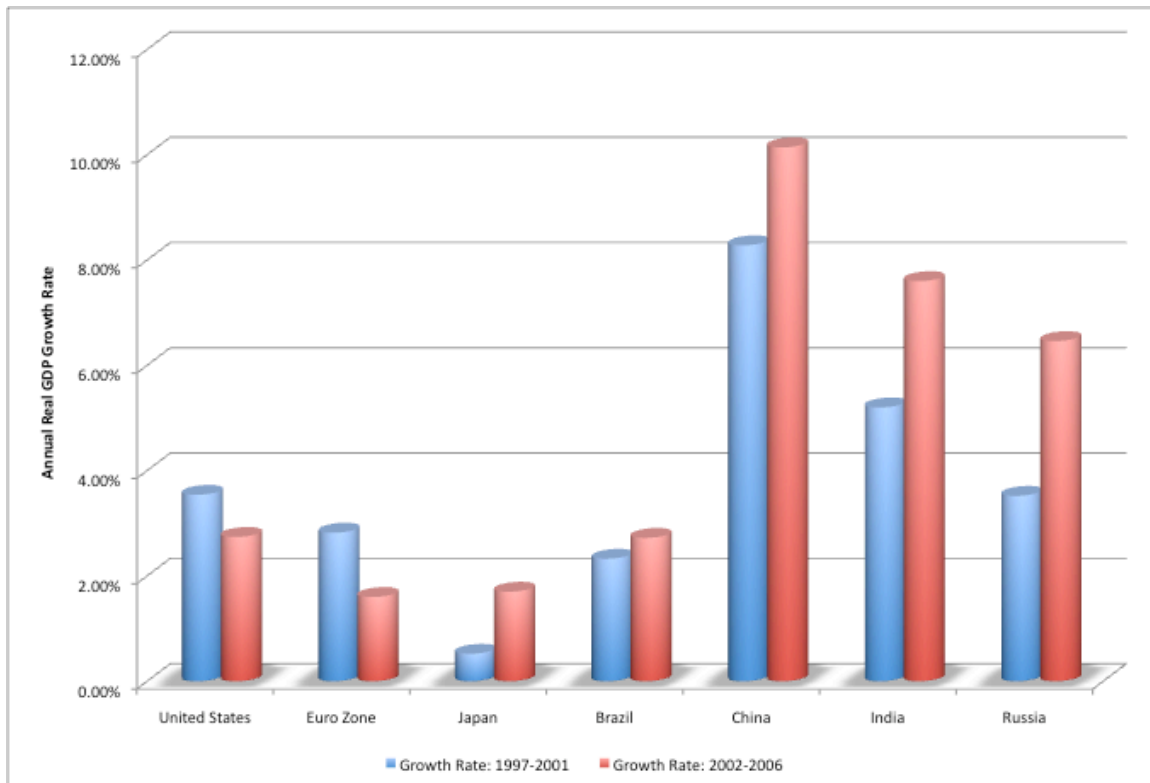*Figure 8.3: Real Economic Growth and the S&P 500*

Looking at the changes in real GDP growth and changes in the S&P 500, it seems clear that the index is far more volatile than the economy. Another interesting and more subtle relationship is also visible for most of the graph. Stock prices seem to drop prior to the slowing down in the real economy and seem to start their rise prior to the actual recovery taking hold.

Differences in Real Growth across Countries

Estimating both short term and long-term real growth in a mature market like the United States is far simpler than forecasting growth in young economies, especially ones that derive much of their growth from a commodity or a specific sector. The fact that

these economies are small, relative to the global economy, can allow them to grow at double digit rates in the good years and suffer catastrophic drops in bad years. In figure 8.4, we summarize real growth rates from 1997-2001 and 2002-2006 in Brazil, India, China and Russia, and contrast them with real growth rates in the EU countries, Japan and the United States.

Figure 8.4: Real Growth Rates in GDP: Across Countries

Not only are real growth rates have been higher in the smaller, emerging markets than in the mature economies, but they also tend to be volatile.

Expected Inflation

The valuation of every company rests on the assumptions we make about expected inflation in the future. In this section, we begin by looking at why inflation has such an impact on value, how inflation rates have behaved in the past and how much and why inflation rates vary across currencies.

Why does expected inflation matter?

As we noted in chapter 6, valuations can either be nominal or real. If nominal, the expected inflation rate is built into both the cash flows and the discount rate. In nominal valuations, expected inflation affects key inputs that we use in our analysis.

- The riskfree rate is the interest rate on a default-free bond and thus has an expected inflation rate built into it. Consequently, the cost of equity and debt that we obtain based on this riskfree rate also have expected inflation components.

- The growth rates that we use to forecast future cash flows incorporate both the growth in real output sales and expected inflation. To the extent that higher inflation allows the firm to charge higher prices, the growth rates will increase with inflation.

In other words, changing the expected inflation rate will affect all aspects of a nominal valuation. That is the reason why the currency in which we do a nominal valuation matters; expected inflation rates can vary widely across different currencies.

In a real valuation, neither the cash flows nor the discount rate has an expected inflation component and real growth has to come from growth in real output. One reason analysts choose to do real valuations is to try to immunize them from changes in inflation. However, expectations about inflation and changes in those expectations can affect even real valuations for the following reasons:

- Taxes are usually computed based on nominal income, not real income. To the extent that not all items in an income statement are adjusted the same way for inflation, the tax rate on real income can diverge from the tax rate on nominal income as inflation rises. In most economies, depreciation, for instance, is based on the original price paid for an asset and the tax benefits from depreciation are therefore fixed at the time of purchase. If inflation accelerates, even a company that can pass the inflation through to its customers in the form of price increases may see its after-tax cash flows decline, because the tax benefits from depreciation stay fixed (and are not marked up to reflect inflation).[1]

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[1] Assume that a firm has $100 million in EBITDA, $ 40 million in depreciation, no interest expenses and faces a marginal tax rate of 40% on its income. The firm will report $ 36 million in net income and $ 76 million in cash flows prior to reinvestment (net income + depreciation). Now introduce an inflation rate of 10% into the analysis and assume that the firm can raise the prices of its products at the inflation rate: EBITDA will rise to $ 110 million but depreciation will stay frozen at $ 40 million. The firm will now

- In many cases, analysts estimate real discount rates and real cash flows by first estimating the nominal values and then netting out expected inflation from these values. Using higher expected inflation rates will result in lower real discount rates and real cash flows.

- The inflation rate is not the same for all products and services. To the extent that inflation rates vary across products and services, relative prices changes, and some companies may therefore see cash flows rise at a rate much higher than the general inflation rate and other may see growth rates in their cash flows that lag inflation.

In summary, the value that we arrive at for a company, if we believe that expected inflation will be 3% may be very different from the value of that same company with an expected inflation rate of 5%. Inflation is not a neutral item in valuation.

Expected inflation also has an impact on the other macro variables that go into a valuation, include real economic growth and inflation, the two other variables that we cover in this chapter as well as riskfree rate and equity risk premiums, two inputs that we covered in the last two chapters. When expected inflation increases, the riskfree rate will go up to reflect that expectation and equity risk premiums may be ramped up as well. Uncertainty about inflation in the future can also make companies more reluctant to invest in long term projects and thus alter both the level of real economic growth and what sectors it occurs in. Finally, if the expected inflation rate in one currency increases, relative to other currencies, we should expect exchange rates to follow, with the higher inflation currency depreciating over time.

History

If expected inflation rates were constant, incorporating their effect into value will be relatively simple. It is because inflation rates change over time and vary across currencies that they can wreak havoc on valuation. In this section, we begin by looking at variation in the inflation rate in the US dollar over time and then examine differences in inflation rates across currencies.

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report net income of $42 million and cash flows of $ 82 million. If we convert the latter into real numbers, the real EBITDA is $ 100 million, the real net income is $37.8 million and the real cash flow is $73.8 million, $2.2 million less than it used to be.
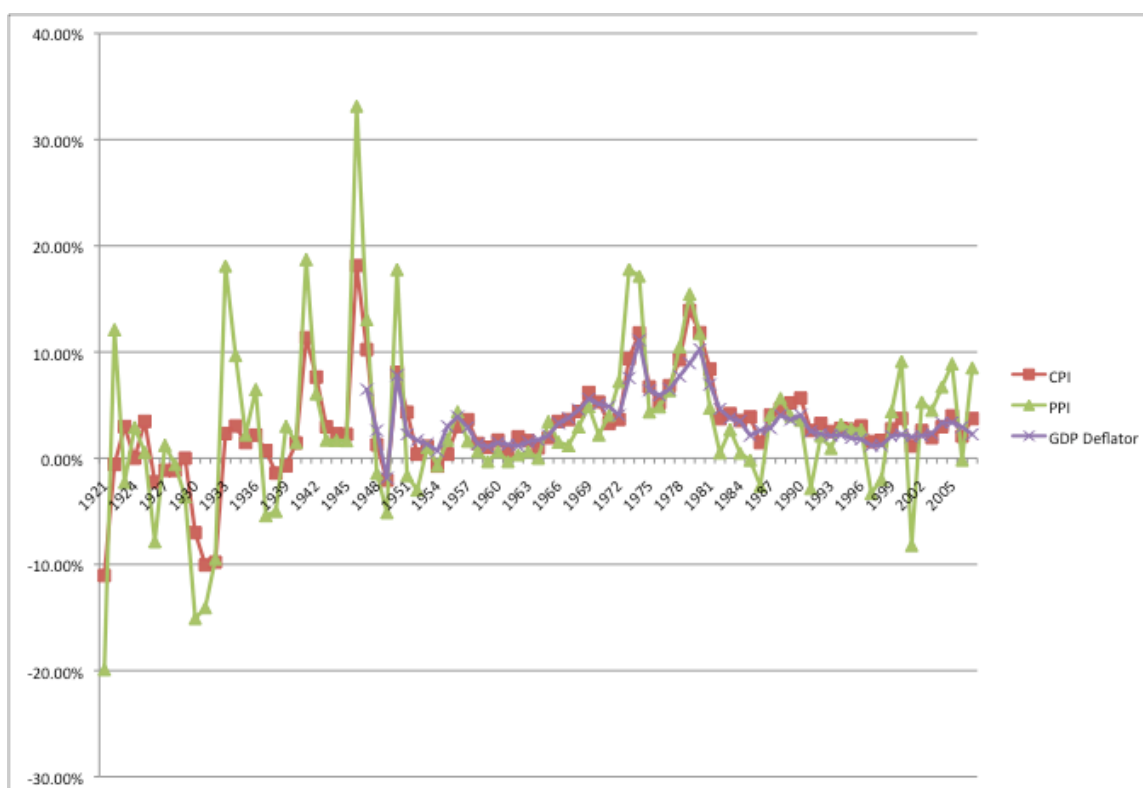
US Inflation Rate across Time

Before we look at variation in the inflation rate across time, we first have to determine how inflation is to be measured. The task is a complicated one, especially when we look at an economy as large and complex as the United States. At least in theory, the inflation rate should measure changes in how much it costs us to buy a representative basket of goods and services from period to period. Not surprisingly, inflation rates will vary depending upon what we put into the basket. In the US, there are three widely used measures of inflation, with a long history attached to each.

- The consumer price index (CPI) measures changes in the
- The producer price index (PPI) measures
- The Gross National Product price deflator (GNP deflator) measures

All three measures share some common problems. The first is that the basket of goods and services that is used to compute inflation is kept stable, even as relative prices changes. In other words, it is assumed that the proportion of the basket that is oil remains the same, even if oil prices increase significantly relative to other items in the basket. In reality, though, consumers will use less gasoline and adjust their consumption to reflect relative prices. The second problem shared by the basket is that implicit costs are not considered; for instance, the cost of housing is measured by looking at the cost of renting a house rather than the implicit cost of owning a house. To the extent that housing prices are increasing much faster than rental costs are, as was the case between 2002 and 2006, inflation will be understated. Figure 8.5 graphs out the behavior of all three measures of inflation from 1929 to 2007.

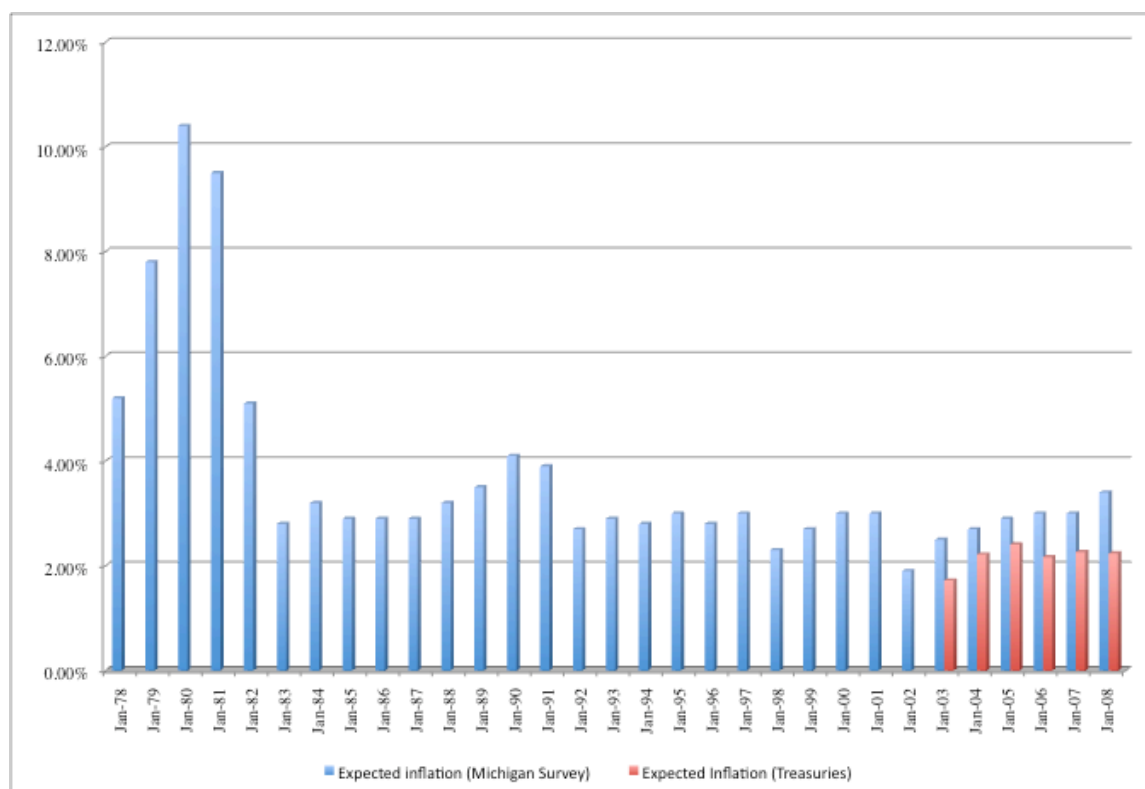*Figure 8.5: Inflation Rates in the United States*

Note that notwithstanding the differences, the three measures move together over time. Quirks in the way they are computed have sometimes caused one measure to lag the other. During much of this period, inflation in the United States was benign and ranged from 1-4%. There have been bouts of high inflation in the 1930s and during the Second World War, but the volatility in inflation accelerated in the 1970s, with inflation rates hitting double digits by the last few years of the decade. The only sustained period of deflation was during the great depression, when prices dropped more than 10% a year in 1932 and 1933. In the last two decades, inflation has subsided again, but assuming that this stability is permanent can be dangerous.

All three measures of inflation shown in figure 8.5 represent actual inflation. In much of valuation, our focus is on expected inflation and there are two measures that try to capture expectations. One comes from surveys done by the University of Michigan on inflation expectations among consumers and the other can be backed out of the ten-year nominal and inflation indexed treasury bond rates.

$$\text{Expected inflation rate} = \frac{(1+ \text{ Nominal Treasury rate})}{(1+ \text{ Inflation indexed Treasury rate})} - 1$$

Figure 8.6 graphs both measures for the periods of time that they have been available – since 1978 for the survey and since 2003 for the treasury rates.

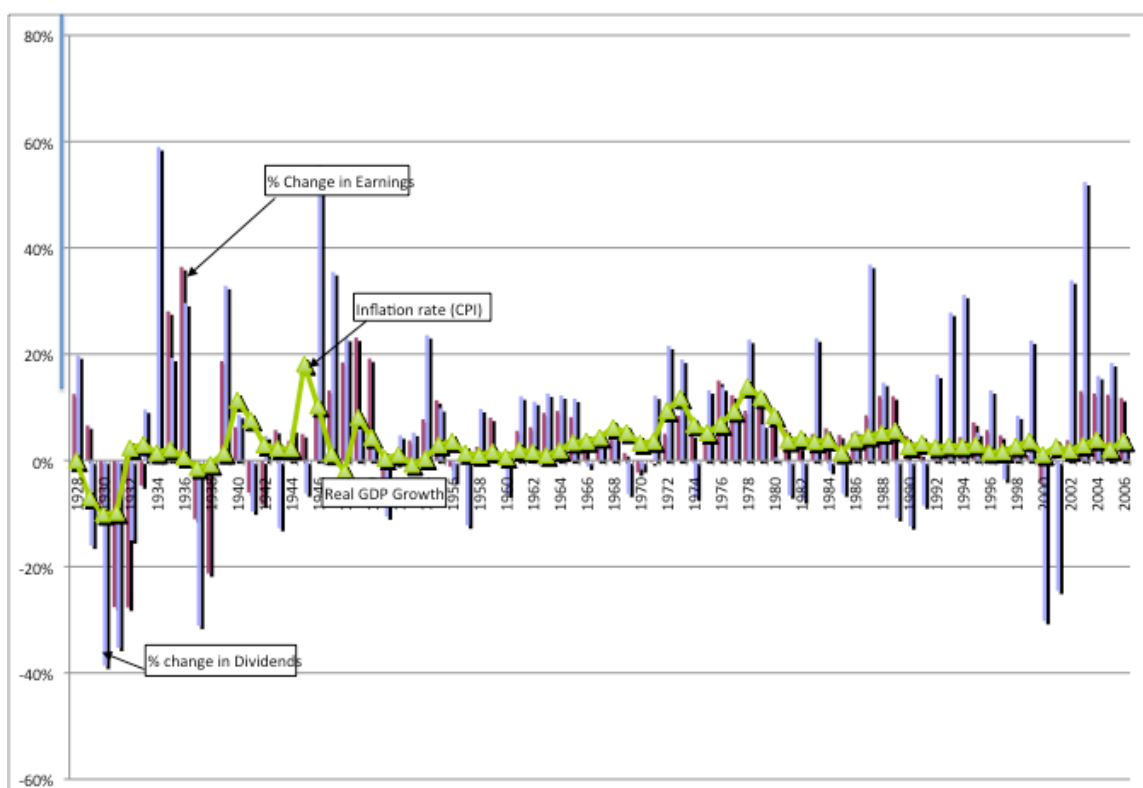*Figure 8.6: Expected Inflation – Consumer Surveys and Treasury Rates*

The survey numbers closely track the historical inflation numbers, with expected inflation increasing in the late 1970s in response to higher observed inflation. The expected inflation rates backed out of the treasury rates for the last 6 years have been consistently lower than survey expectations but have been better predictors of actual inflation during the periods.

Inflation, Earnings and Stock Prices

As we noted at the beginning of this section, expected inflation is relevant in valuation because earnings and dividends can be affected by changes in inflation rates. To examine this relationship, we look at changes in the aggregate earnings on the S&P 500 against the inflation rate (measured using the CPI) over time in figure 8.7.
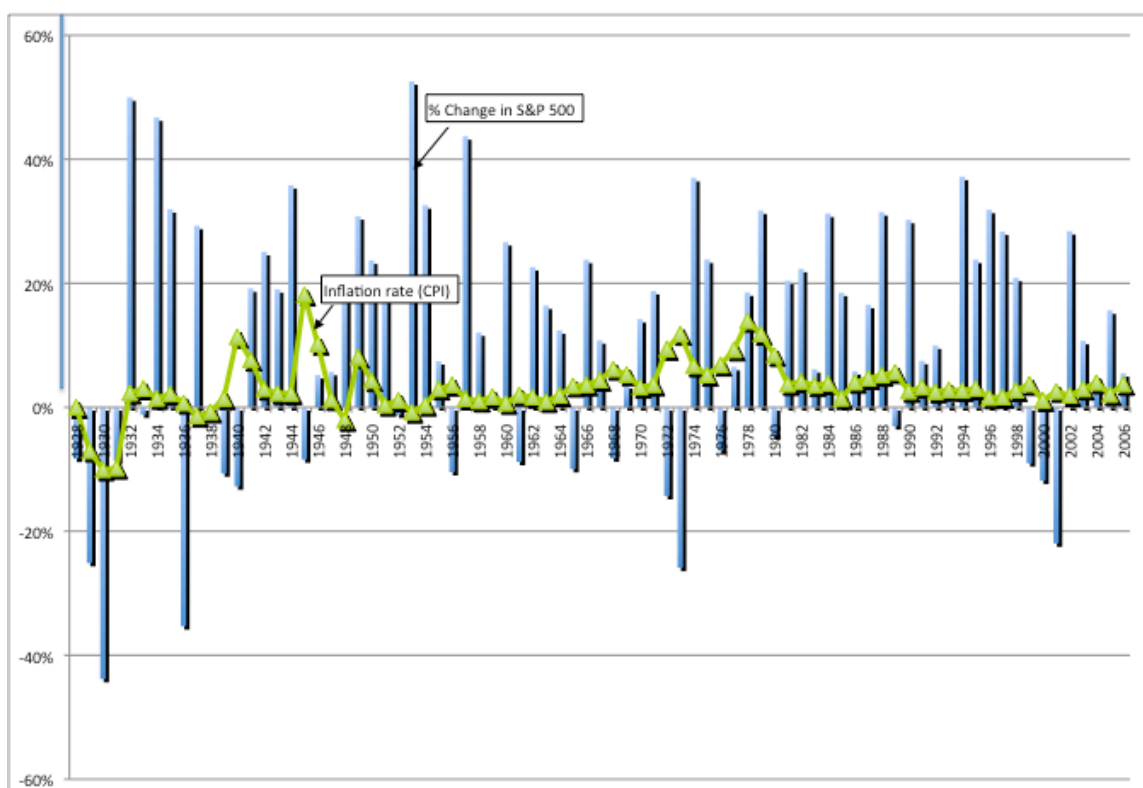
Figure 8.7: Earnings and Inflation – United States

Note that nominal earnings have increased at higher rates during periods of high inflation. Between 1971 and 1980, for instance, the average inflation rate was 8.19% but earnings increased at a compounded annual rate of 10.57% during the period, yielding a real growth rate in earning of just under 2,5%. Between 1981 and 1990, the inflation rate dropped to 4.47% and the nominal earnings growth rate was also lower at 4.74%, yielding a barely positive real growth rate in earnings.

The higher earnings growth posted by companies during periods of high inflation may seem to indicate that high inflation is good for stock prices and values. To examine whether this is in fact the case, we looked at the relationship between inflation and changes in the level of the S&P 500 index from 1929 to 2007 in figure 8.8:

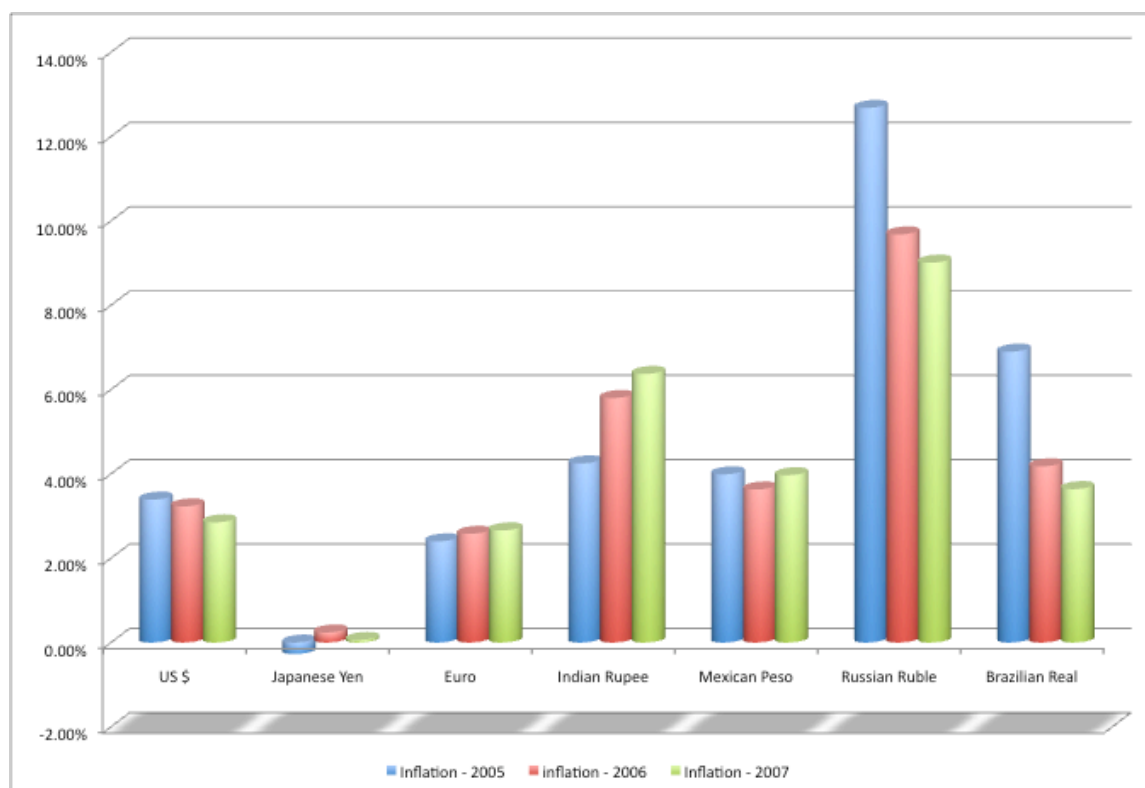*Figure 8.8: Stock Prices and Inflation – United States*

It is difficult to see any pattern here, when it comes to stock prices. The S&P 500 increased only about 10% a year during the 1970s, when earnings growth was healthy, whereas the annual return was closer to 16% between 1981 and 1990, when inflation was lower. The complicated relationship between inflation and value should come as no surprise, since inflation is a double-edged sword. Higher inflation may allow companies to increase earnings much more quickly, but interest rates and discount rates also go up nullifying and in some cases overwhelming the effects of higher earnings.

Inflation Rates across Currencies

The only reason that the currency you do a valuation in matters is because inflation rates vary across currencies. In trying to compare actual inflation rates in different currencies, we run into two issues. The first is that the way inflation is measured varies widely across countries, making it difficult to compare them head to head. The second is that there are government imposed price ceilings for some products and services in many countries, and these fixed prices can skew inflation measures.

In spite of these estimation issues, it is still useful to compare inflation rates in different currencies. In figure 8.9, we show actual inflation rates in seven currencies between 2005 and 2007:

Figure 8.9: Inflation Rates in Different Currencies

Inflation rates were lowest in Japan and highest in Russia, during this period. It stands to reason that interest rates are also lowest in Japan and highest in Russia and that exchange rates reflect the differences in inflation.

Exchange Rates

As with real economic growth and inflation rates, our views on exchange rates can affect the value we attach to individual companies. In this section, we will first consider why exchange rates matter and then examine past history.

Why do they matter?

Changes in exchange rates in the past and expectations in the future can make a difference in valuation. For companies with foreign operations, the reported earnings are affected by exchange rate changes; favorable movements in exchange rates will result in

higher earnings, whereas unfavorable movements can result in large losses. Note, though, that what type of movement is favorable/unfavorable will depend upon the nature of the foreign exposure. If the firm's costs are all domestic and its revenues are overseas, a weakening of the domestic currency will cause earnings to improve. If, on the other hand, the firm's costs are overseas but its revenues are primarily domestic, as is the case for some software companies, a weakening in the domestic currency will cause earning to deteriorate. Expectations of future changes in exchange rates will also manifest themselves in differences in expected growth. Thus, the company with foreign revenues will get a boost in growth if we expect the domestic currency to continue to depreciate over time, whereas the growth rate for the company with foreign costs may have to be scaled back for the same expectation. Views on exchange rates can affect even companies with just domestic operations because their competitive advantages against foreign adversaries will be affected by expectations of exchange rates. If we expect the domestic currency to weaken, a foreign company will be at a disadvantage relative to a purely domestic company. This, in turn, will affect expectations of future growth, margins and returns for the domestic company.

In emerging markets, views on exchange rates can sometimes play an outsized role because analysts choose to value emerging market companies in a foreign currency, to make some of their estimation easier. Thus, many Latin American companies are valued in US dollars, because estimating risk free rates and risk premiums is easier to do than in the local currency. However, this will also require that the future cash flows for these companies be estimated in US dollars, even though the actual cash flows may be in pesos or reais. The conversion of the local currency cash flows to US dollar cash flows will require expected exchange rates (local currency to US $) in the future.

There is one final way in which exchange rates views and expectations can affect valuations. In the face of volatile exchange rates, some companies choose to hedge their currency exposures, leading to hedging costs that lower operating income and value. Other companies, however, make bets on exchange rate movements, which if they turn out to be right, add substantially to profits, but if they are wrong, can cause huge losses. To value a company, we therefore need information on both its hedging and speculative
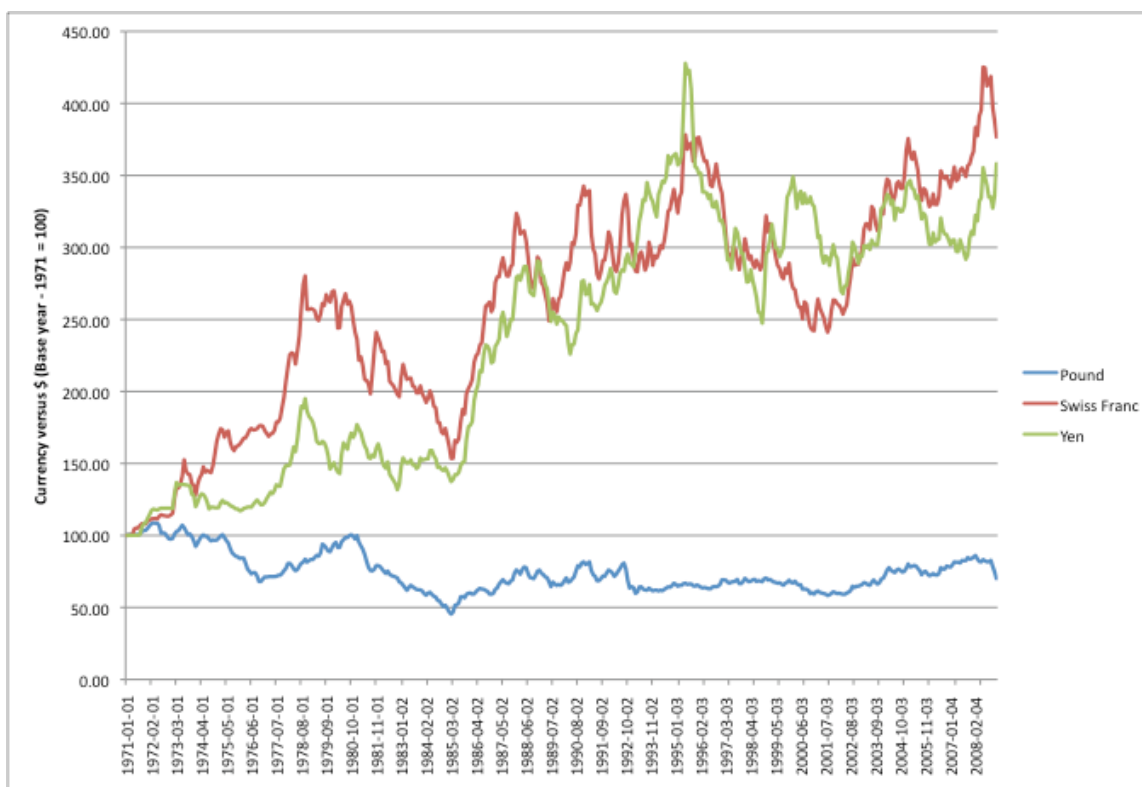
bets on the future direction of exchange rates and that information is not always forthcoming.

History

Until 1971, we operated in a regime of fixed exchange rates, and changes occurred only when governments chose to devalue or revalue a currency. Since these fixed exchange rates were often incompatible with the underlying fundamentals (inflation, interest rates and real growth in the economies), there were black markets for the most over valued and under valued currencies, where the exchange rates were very different from the official rates. After the Bretton Woods Conference in 1971, the major currencies were allowed to float (and find a market price) but most emerging markets continued (and many still continue) to maintain a fixed rate structure.

The currencies that have the longest market history are the US dollar, the British pound, the Swiss Franc and the Japanese Yen, and figures graphs out the movements in those currencies (with the dollar as the base) in figure 8.10:
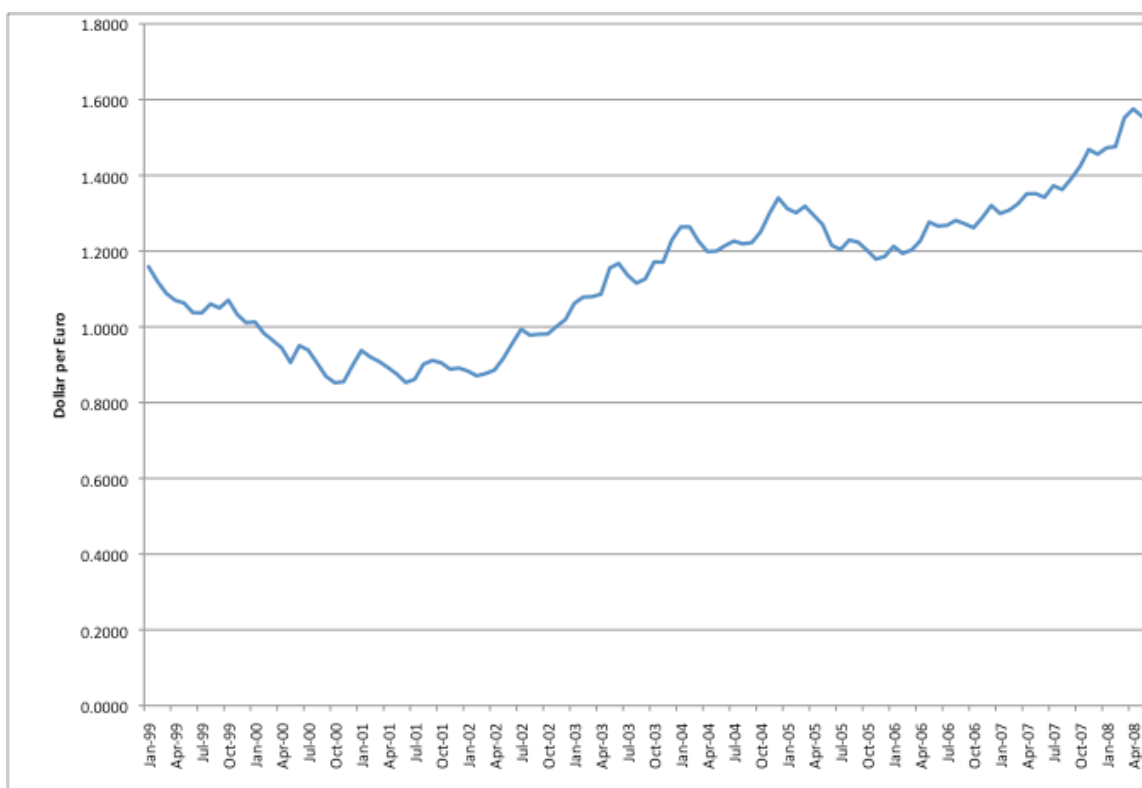
Figure 8.10: Major Trading Currencies versus US Dollar

There are two things to note. The first is that different currencies often move in different directions; during this period, the dollar strengthened against the pound but weakened substantially against both the Swiss Franc and the Yen. Within each currency, there are long cycles; with the Swiss Franc, for instance, the dollar weakened through 1980, strengthened for the first half of the 1980s and reverted back to weakness in the second half of the decade. Some of this movement can be traced to the underlying economic fundamentals – the strengthening of the Yen reflects Japan's rise as an economic power during the 1970s and 1980s - but some of it reflects deliberate government policy. The US actively encouraged dollar depreciation since 2001 to improve the competitive position of US companies in the export market.

Figure 8.11 presents the US dollar versus the Euro, which replaced the individual EU currencies in 1999 (French franc, Deutsche Mark…)

Figure 8.11: Euro versus US Dollar

After the Euro was introduced in January 1999, it initially suffered depreciation, reaching a value of $0.85/Euro in June, but has gone through an extended period of appreciation against the US dollar and the high was just over $1.575/Euro in April 2008.

There are some emerging market currencies that have opened up to free market pricing over the last two decades and they have been much more volatile than the developed market currencies that we have highlighted in figures 8.10 and 8.11. In figure 8.12, we graph the Mexican peso, the Indian Rupee and the Brazilian real from 1995 to 2008:
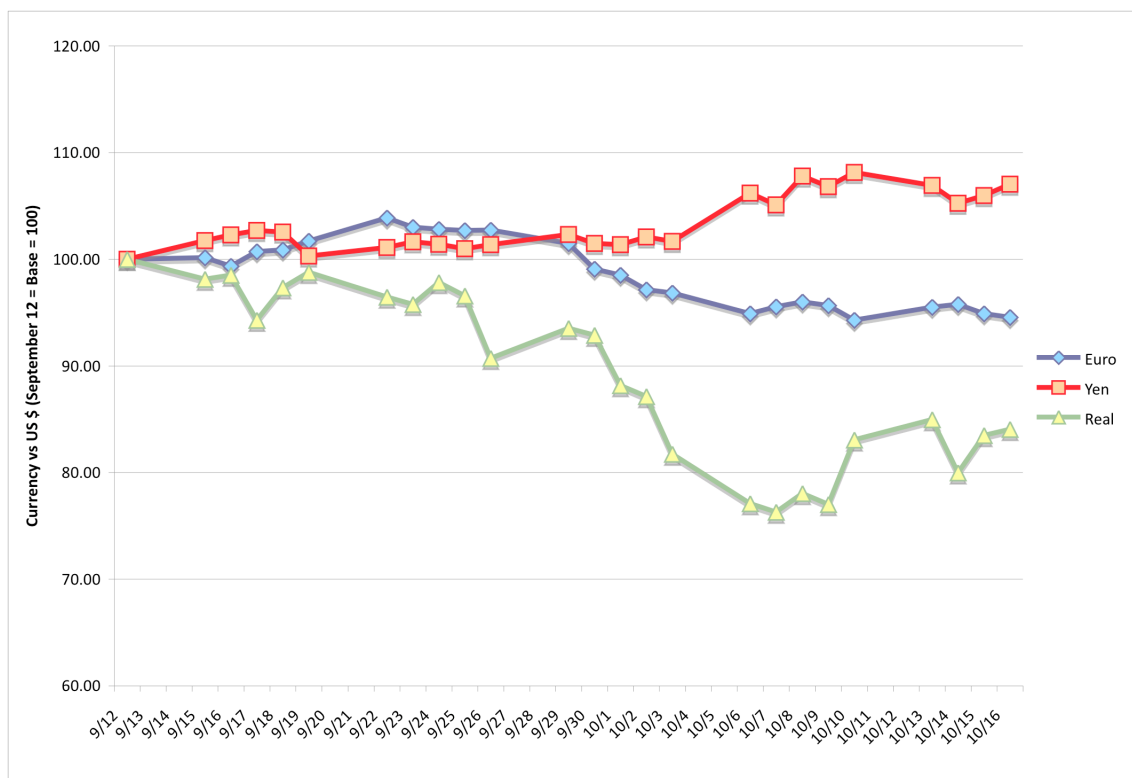
Figure 8.12: Emerging Market Currencies versus US Dollar

The Brazilian Real lost almost 80% of its value against the dollar between 1995 an 2002 but more than doubled its value between 2002 and early in 2008. The volatility in these rates should not come as a surprise and are caused both by political instability in these markets as well as economic variability over time.

While the conventional wisdom is that the currencies of mature economies like the US, Japan and Western Europe, with similar inflation, do not go through sharp contortions, the market crisis of 2008 that we highlighted in the chapter on equity risk premium may lead to a rethinking. Figure 8.13 presents the movements in the US dollar versus the Euro , the Yen and the Brazilian Real from September 12 to October 16.

Figure 8.13: Exchange Rates during a Market Crisis

While the volatility in the Brazilian Real may be predictable, the sharp devaluation of the Euro (which has lost almost 8% of its value against the dollar) and the rise in the Yen (up about 10%) is a sign that volatility in exchange rates is not restricted to emerging market currencies.

Current Practices

While changes in expectations about real economic growth, inflation and currency movements clearly change valuations the way in which these expectations are brought into valuation currently is surprisingly haphazard. In fact, analysts practice everything from benign neglect, where they essentially ignore the macro economic environment, to bringing in strong and idiosyncratic views about future macro economic developments into every valuation that they do.

1. Implicit assumptions: Analysts often make no explicit assumptions about economic growth or inflation, when doing valuations, and justify this neglect by arguing that their job is assessing the value of a company and not making macro economic forecasts. While there is some merit to this argument, these analysts are making

implicit assumptions when they forecast company-specific inputs. For instance, estimates of earnings growth for a company, if made in nominal terms, have assumptions about expected inflation built into them. Forecasts of cashflows for cyclical companies have real growth assumptions embedded in them. When estimating future earnings for multi-nationals, we are making use of expected exchange rates in the future, even if we do not estimate them explicitly.

2. Base it on last year: When asked to make forecasts of future real economic growth, inflation and exchange rates, some analysts draw on the most recent data on these variables. Thus, the inflation and real GDP growth rate for the most recent year are used as the forecasts for the foreseeable future.

3. Use forecasts of economists: There are forecasting services that employ the best economic models (and economists to run them) that provide estimates of expected growth, inflation and exchange rates (usually for a price). In many investment banks and portfolio management firms, there are economic strategists who provide these forecasts. In either case, analysts will then use the forecasts when valuing companies.

4. Idiosyncratic forecasts: Every analyst, at some level, thinks he or she has the capacity to forecast how the economy will do in the future or what the inflation rate will be. It follows, therefore, that some analysts try to build in their macro economic views into the valuation of individual companies. Consequently, an analyst who is valuing a cyclical firm will use his forecasts of real economic growth when called to estimate earnings growth at the cyclical firm.

The Dark Side

Every valuation is affected to some extent by the views that analysts have about how real growth and inflation will evolve over time. Making unrealistic or inconsistent assumptions about macro economic variables can result in serious errors in valuation. Idiosyncratic views about how these variables will evolve over time can also overwhelm other inputs into a valuation, making every valuation a joint result of company and macroeconomic views, with little to separate the two.

1. Unrealistic numbers: As we noted in the last section, many valuations are built either on implicit assumptions about future growth or are based on the assumption

that what happened last year is a good measure of what will happen in the future. With both approaches, though, the biggest danger we face is that we might be building in estimates for the future that are unsustainable for the long term. For instance, assuming that mature economies like the United States or Western Europe will be able to grow at 4% in real terms for the long term is unrealistic, even though that might have been the growth rate in the most recent year. Similarly, assuming that China and India will be able to maintain real growth rates of 10% for the long term is also unrealistic.

2. <u>Micro forecasting of macro economic variables</u>: Analysts who value cyclical and commodity firms use the argument that these firms are affected strongly be economic cycles to then try to forecast out the cycles in detail. An analyst valuing a cyclical firm will not only try to forecast when the next recession will begin or the current one will end but the next full cycle of economic growth, with the effects built into earnings and cash flow forecasts. As we noted in the section on real economic growth, economic cycles are unpredictable both in length and in strength and forecasts, even by the very best macro economists, tend to be wrong. The realism added by making these forecasts are therefore likely to be overwhelmed by the errors in these forecasts.

3. <u>Inconsistent with other macroeconomic assumptions</u>: Assumptions about macro economic growth are embedded in many of the inputs that go into valuing a company. The expected inflation rate, in addition to affecting expected earnings growth in a company, also will affect the riskfree rate. Consequently, changes in the expected inflation rate for computing earnings have to be matched by changes in the riskfree rate used in computing the discount rate. Selectively changing one set of inputs to reflect expectations about macroeconomic variables, without changes another set, can result in valuations that are internally inconsistent.

4. <u>Valuation driven more by macro views than by company views</u>: If you have strong views (positive or negative) about real growth and inflation in the future and choose to incorporate these views into your valuation, the results will not only be predictable (more positive views about macro economic developments will lead to higher assessments of value) but will also be much more difficult to

evaluate. An analyst who assumes that inflation rates will decrease and real growth will increase in the future is more likely to find a company under valued, but that undervaluation will be more the result of the macroeconomic views of the analyst than her views on the company.

Remedies

It is difficult for analysts to keep their views on the macro economy out of their individual company valuations. To prevent these views from hijacking valuations, we would suggest that a few simple rules should be followed:

1. Make implicit assumptions explicit: As we noted in the last section, many valuations make implicit assumptions about growth, inflation and exchange rates. While these implicit assumptions may be perfectly reasonable, the only way to tell is to make them explicit. For instance, braking the nominal growth in revenues down into growth in the units sold (real growth) and expected inflation will allow us to judge whether the inflation assumptions are reasonable, given both general inflation rats and the pricing power that a firm possesses. Similarly, recognizing how much how much of the growth in a multinational comes from its overseas operations and being cognizant of the assumptions made about exchange rates will enable us to assess whether these exchange rates are consistent with our other assumptions.

2. Don't extrapolate last year's numbers: Extrapolating numbers from the most recent financial year is always a dangerous practice, but doing so with companies that are exposed to macroeconomic risk is doubly dangerous. When valuing cyclical companies, using a base year that is the peak (or nadir) of a cycle will lead up to over (under) estimate the value of the company. Forecasting the earnings for a multinational based upon a base year number that is inflated because of favorable exchange rate movements will overstate earnings in future years.

3. Check for internal consistency: As we noted in the last section, assumptions about macro economic variables are interrelated. Thus, if we expect inflation rates to increase in the future, we should also adjust exchange rates and interest rates to match the expectation – the domestic currency can be expected to weaken and interest rates to rise with higher inflation. In addition, we should remain consistent with our views

of the same macroeconomic variables across different inputs in a valuation. If we build in higher revenue growth rates, because we anticipate higher inflation in the future, we should also factor this higher inflation into our cost variables and when making assumptions about capital expenditures.

4. Separate macro views from views on a company: As we noted in the last section, valuations that incorporate strong views about future real growth, inflation and exchange rate movements will be difficult to decipher, since they mix views of the company with views on macroeconomic variables. A more effective way to present views on macro variables is to separate them from your views on an individual company. This can be accomplished by breaking down the valuation into two steps. In the first step, value the company based on the assumption that the market is right about the macro variables; in effect, you will value the company with inputs consistent with market views today. For inflation rates, this will mean using a market expectation obtained either by looking at a survey number or at the difference between the nominal treasury bond rate and the inflation indexed treasury rate. For exchange rates, we will use forward rates and futures rates from traded currency futures as our expected exchange rates for the future; if derivatives do not exist, we will use purchasing power parity to derive future exchange rates.

$$\text{Expected Exchange Rate}_{FC,\$} \text{ in year n= Spot rate}_{FC,\$} * \frac{(1+\text{Expected Inflation rate}_{FC})^n}{(1+\text{Expected Inflation rate}_{\$})^n}$$

Once the company has been valued using these market-determined inputs, you can then consider the effects of imposing your views on these macro economic variables. The users of these valuations can make their judgments on whether to put more weight on your company assessments or on your macro economic views.

5. Use scenario analysis: In chapter 3, we looked at scenario analysis as one way to examine how the value of a company changes as our assumptions about the company change. Scenario analysis is a useful tool in assessing the effects of changes in macro economic variables. For instance, we can value a cyclical company under three real growth scenarios – economic boom, stagnation and a recession – and arrive at three different estimates of value. Applying a probability to each scenario should provide use with an estimate of value today.

Conclusion

The value of every company is affected by what we expect to happen to the overall economy, expected inflation and exchange rates in the future. Given this centrality, it is surprising how haphazard analysts are when it comes to making reasonable assumptions about these variables. Some make implicit assumptions through the company-specific numbers that they use and are are unable or unwilling to make these assumptions explicit. Others build all their forecasts of last year's numbers, thus building in whatever happened last year to the real economy, inflation and exchange rates into their future estimates and value. Still others make strong assumptions about the future path of macro economic variables, and through these assumptions have large effects on value.

While there is no panacea we can offer to these problems, we have five suggestions. The first is to make the implicit assumptions about real growth, inflation and exchange rates explicit and check these assumptions for reasonability and consistency; what we assume about inflation should be consistent with what we anticipate with exchange rates. The second is to separate macro economic views on inflation, real growth and exchange rates from views on individual companies, when doing valuation. The third is to use scenario analysis, assign probabilities to each scenario and to estimate the value under each scenario.