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**Economic Research**

# Business Cycle: the U.S. equities

*The Dukascopy Bank research department presents the first part of the research on assets performance within a business cycle. The research gives investors an opportunity to estimate the behaviour of several asset classes under changing economic conditions.*

The main question of the research is: how do assets perform across a business cycle?

This study is dedicated to the equity asset class in the U.S., and in particular its sensitivity to different economic regimes.

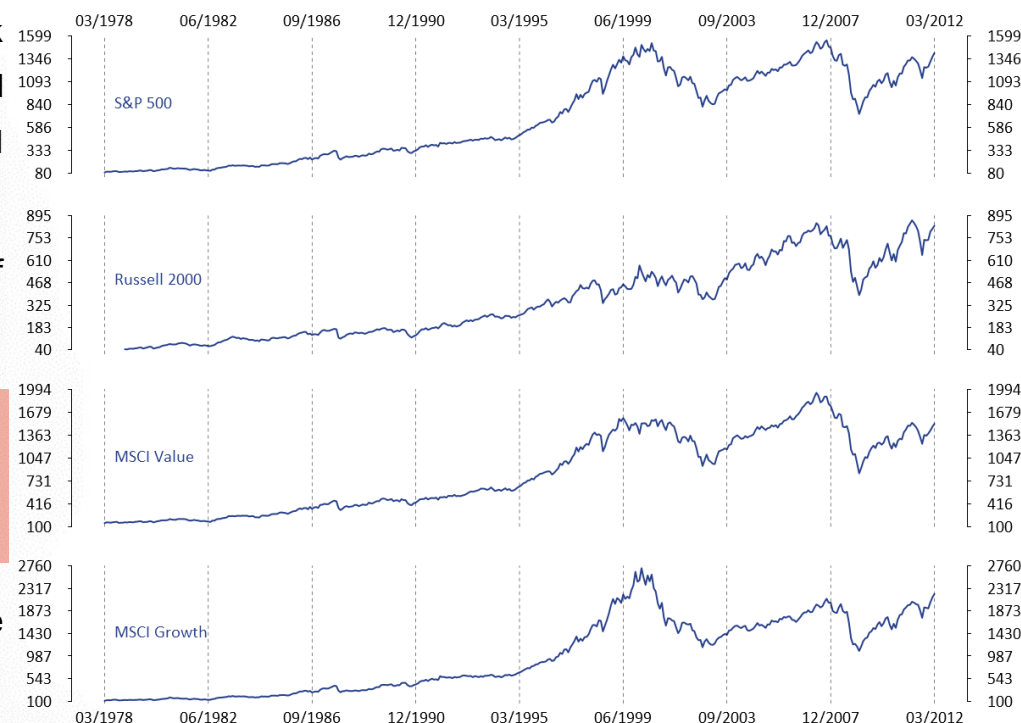
## Methodology

The U.S. equity asset class is represented by four American stock market indices: S&P500 – large cap stocks, RUSSELL 2000 – small cap stocks, MSCI USA Standard (large cap + mid cap) Value and Growth indices – value and growth stocks, respectively.

We concentrate on stock index returns and volatility as measures of stock performance.

Volatility is a measure of how erratic the price of a financial instrument is through time. The more fluctuation the financial instrument experiences, the higher the volatility is.

We also pay attention to changes in correlations between diverse stock types within the business cycle.



**Figure 1. Historical index data**



Correlation is a measure of how similar the performances of two financial instruments are. It varies from -1 to 1, with -1 being a perfectly opposite movement and 1 – a perfectly unidirectional one.

Classification of economic regimes is based on performance of the U.S. economy, which is evaluated by the composite index. The index is calculated as an average of the following standardised macroeconomic indicators: GDP (gross domestic product), unemployment rate, manufacturing PMI (purchasing managers' index), and the difference between 30 year Treasury bonds and 3 month Treasury bills interest rates. The last one is a leading indicator, so to include it in our coincident economic index we have set 12 months of lag time for it.

All results obtained are based on monthly data within a time frame from 1978 to 2012.

## Results

- Economic periods marked in accordance with the composite index correspond to the economic cycles estimated by the National Bureau of Economic Research.**



**Figure 2. The composite index**

The index is composed in such a way that it is easily interpreted. Zero level is considered to be an economic equilibrium. Hence, the index above this level indicates an expansion in a country's economy, the lowest values (values below -1) – recession periods, is associated with

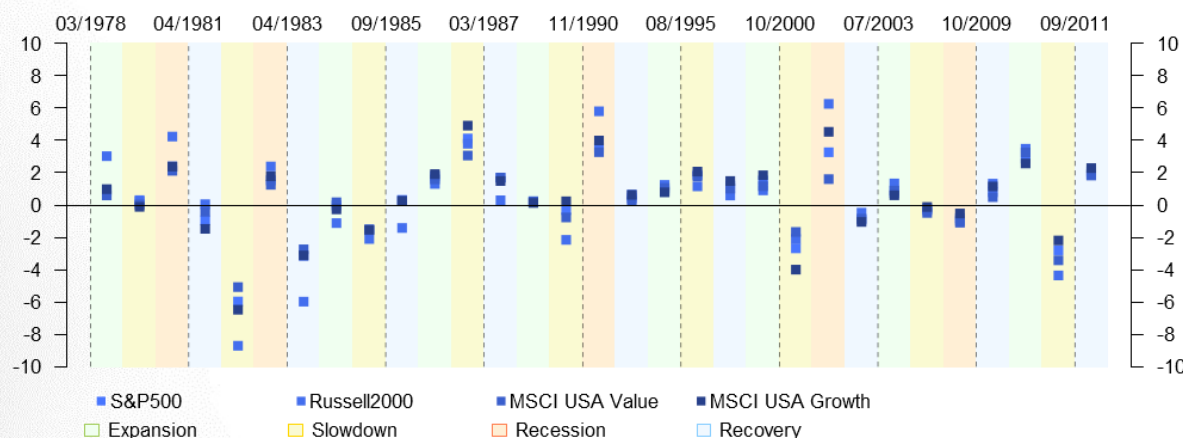
an economic slowdown and the recovery is reflected in the increasing index.

Expansion	1978 III - 1979 V		1983 VII - 1984 XII	1985 XI - 1986 IX	1987 V - 1989 V	1992 XI - 1995 VII	1996 VIII - 2000 X	2003 V - 2006 VI	2010 IV - 2011 IV
Slowdown	1979 VI - 1980 III	1981 VIII - 1981 IX	1985 I - 1985 VIII	1986 X - 1987 II	1989 VI - 1990 X	1995 VIII - 1996 II	2000 XI - 2001 IX	2006 VII - 2008 IX	2011 V - 2011 VIII
Recession	1980 IV - 1981 III	1981 X - 1983 III			1990 XI - 1991 V		2001 X - 2001 XII	2008 X - 2009 IX	
Recovery	1981 IV - 1981 VII	1983 IV - 1983 VI	1985 IX - 1985 X	1987 III - 1987 IV	1991 VI - 1992 X	1996 III - 1996 VII	2002 I - 2003 IV	2009 X - 2010 III	2011 IX - 2012 III

**Table 1. Business cycle periods since 1978**

## 2. All stock indices clump during slowdown periods and show strong performance in recessions.

This similarity is evident in Figure 3: average index returns are comparable across all economic periods since 1978. The results in Table 2 indicate that the economic situation influence indices significantly: for different stock indices monthly returns vary by 1.52 % - 3.34 % during the business cycle. The spread of changes can be explained by volatility that is higher for some indices and lower for others. In spite of this difference, for all indices, economic slowdown is a period of the lowest and, on the average, negative returns. But in recessions, when the macroeconomic indicators



**Figure 3. Average index returns during economic periods since 1978**

are at their lows, the indices show relatively stable positive returns (see Figure 3). This leads to the greatest average results for the economic regime (see Table 2). The reason for such behaviour of stock indices could be the fact that stock prices directly depend on traders' expectations, so the indices like S&P 500 often are considered to be leading indicators.

Stock Market Indices	Average Monthly Return			
S&P 500 (Big cap stocks)	1.09 %	-0.22 %	1.56 %	0.51 %
Russell 2000 (Small cap stocks)	1.12 %	-0.62 %	2.72 %	0.72 %
MSCI USA Value (Value stocks)	1.05 %	-0.32 %	1.2 %	0.4 %
MSCI USA Growth (Growth stocks)	1.1 %	-0.21 %	1.84 %	0.59 %

Expansion Slowdown Recession Recovery

**Table 2. Average monthly returns during different economic regimes**



### 3. Recession is a period of maximum volatility, whilst expansion is the calmest part of the cycle.

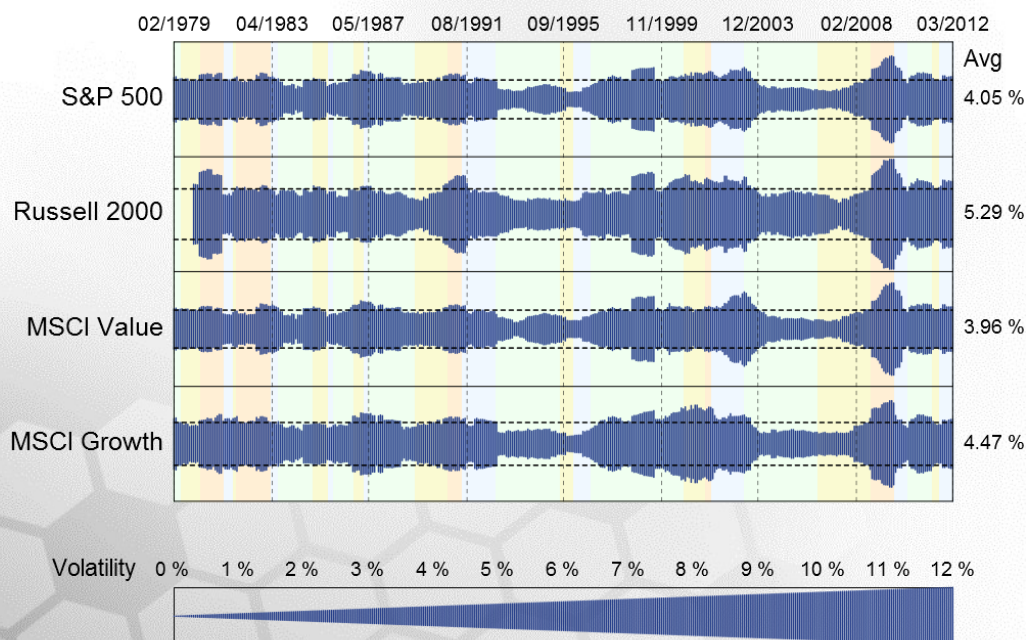
We calculated the volatilities in two different ways: rolling volatilities, i.e., volatilities based on observations for the previous year, and simple volatilities during different economic regimes.

The results in Table 3 point to the dependence between index volatilities and economic periods: the volatilities are higher in recessions and, on average, 1.8 % lower in expansions. During slowdown and recovery periods, volatilities are approximately equal. Similarly to situation with returns, volatility levels depend on the properties of the stocks included in the index. Table 3 shows that the volatility of big cap stocks is significantly lower than the volatility of small cap stocks.

Stock Market Indices	Volatility			
S&P 500 (Big cap stocks)	3.76 %	4.49 %	5.52 %	4.47 %
Russell 2000 (Small cap stocks)	4.91 %	5.93 %	6.97 %	5.7 %
MSCI USA Value (Value stocks)	3.7 %	4.1 %	5.62 %	4.6 %
MSCI USA Growth (Growth stocks)	4.34 %	5.11 %	5.66 %	4.75 %

Expansion Slowdown Recession Recovery

**Table 3. Volatilities during different economic regimes**



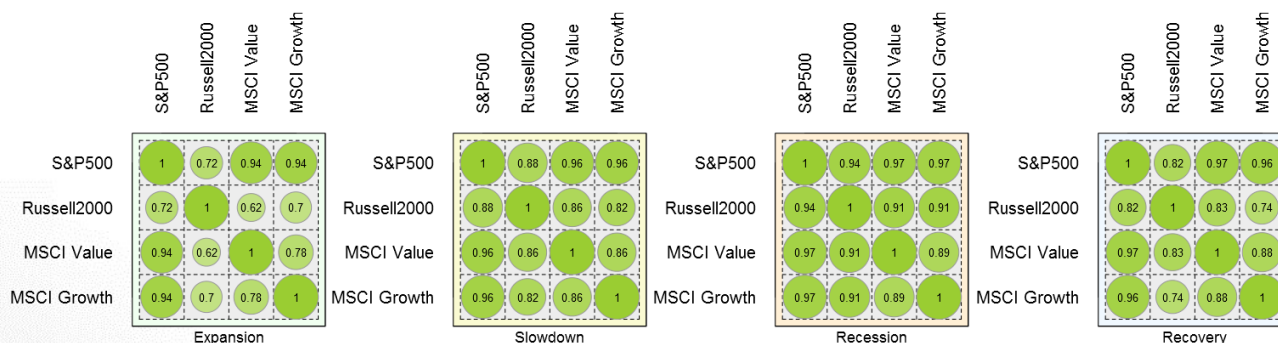
**Figure 4. Rolling volatilities since 1979**

The rolling volatilities, shown in Figure 4, correspond to the results in Table 3: they tend to be higher during recessions, lower during expansions and between their lows and highs in slowdowns and recoveries. This tendency was easily traceable during 2003 - 2009. In the 2008 - 2009 recession the volatilities were above 9 % - more than two times higher than average. The 2003 - 2007 expansion, in turn, featured volatilities lower or at their average levels. However, there was a noteworthy exception from the rule in 1998-1999, when the volatilities during expansion unexpectedly grew above the average levels. The explanation to that was the Asian crisis and the default of Russia, that did not dramatically affect the U.S. economy, but caused disturbance in global financial markets.

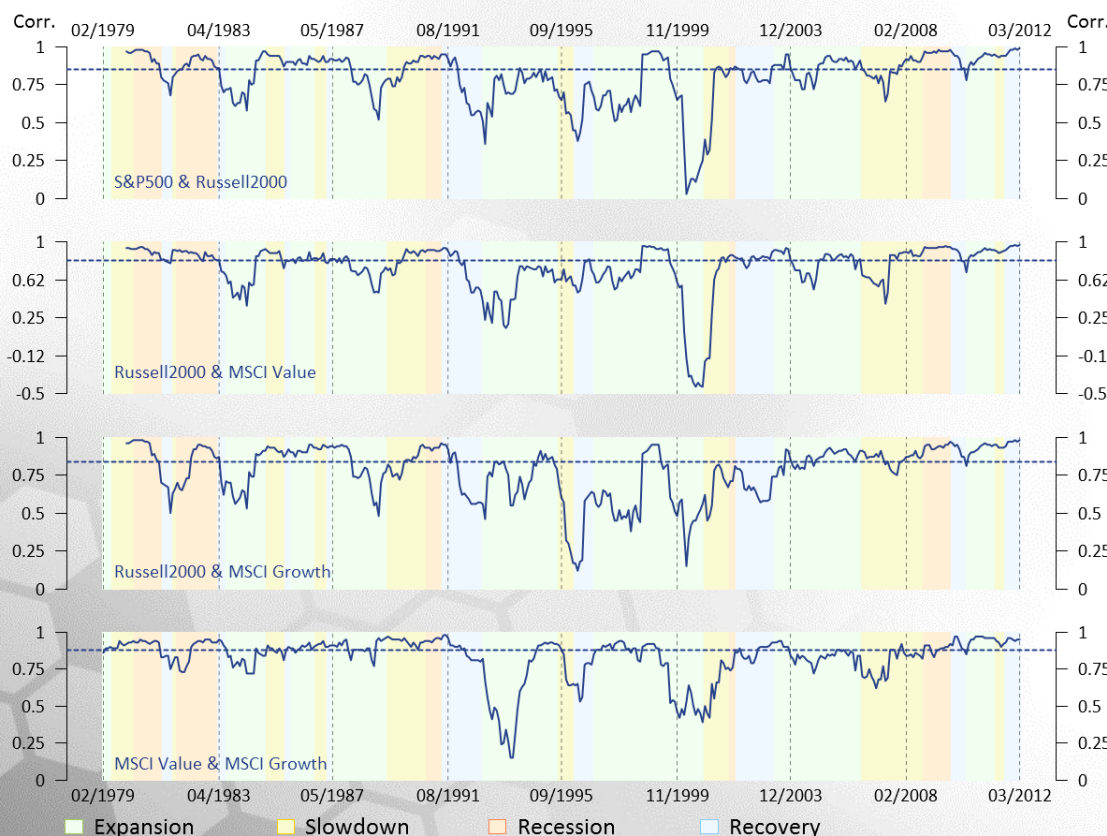
#### 4. The correlations between stocks increase on the back of a worsening economy and slightly decrease as economic conditions improve.

Answering the question whether a general trend exists on the stock market, we examined correlations between the indices. The obtained results are presented below.

The correlation matrices show that throughout all periods the correlations between different stock indices are high. The lowest correlations are typical for periods of economic growth.



**Table 4. Correlations during different economic regimes**



**Figure 5. Rolling correlations since 1979**

However, even the minimal values of 0.6 – 0.7 for combinations of Russell 2000 with other indices are rather significant. The correlations increase during jittery economic periods. For example, correlations with Russell 2000 mentioned above show a rise of 0.2 – 0.3 during recessions.

The rolling correlations in Figure 5 point to the same tendency. This demonstrates a pattern to move closely in bad times. Therefore it is particularly complicated to manage the risk of stock portfolios during recessions.



## Conclusion

Summarising the results above, economic regimes have an influence on stock performance. During expansion, a period of fast economic development, stocks tend to have moderate returns, low volatility and weak correlations. This makes the regime a good time to invest in stocks. As far as recession is concerned, high returns, elevated volatility, and strong correlations are expected. Therefore this period potentially is more profitable for short-term speculation, but risk management becomes the top priority.

### U.S. stock market indices:

- S&P 500 (Standard & Poor's 500 Index) - U.S. stock market index consisting of the 500 large-cap shares widely traded on the New York Stock Exchange and the NASDAQ
- Russell 2000 - the U.S. small-cap stock market index that includes approximately 2000 of the smallest securities and is traded at the Chicago Board Options Exchange
- MSCI USA Standard Value Index – MSCI Inc. large- and mid-cap U.S. stock market index designed for value investment style
- MSCI USA Standard Growth Index – MSCI Inc. large- and mid-cap U.S. stock market index designed for growth investment style



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