The business cycles and the influence of economic confidence indicators in the European region

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The economic confidence level is expressed by managers that are active in significant economic sectors. The financial markets consider these economic confidence indicators as leading instruments that can point the direction of the real economy. The level of trust in the economy is important because, similar with the stock investors behavior, the private sector managers or the consumers can act and carry a restrictive or a euphoric business policy, actions that could in fact affect the environment in a negative way and could unbalance the economic equilibrium.The role of this study is to propose a methodology of analyzing the influence of the economic confidence indicators over the stock market, an industry that can be overlooked as a transmission environment for the investment sentiment. We plan to study and comment the relation between these indicators, the stock market and future macroeconomic results like the GDP, the industrial production or the unemployment rate.

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1.Introduction

We consider the macroeconomic indicators as variables that show the economic trends. Gathering signals from the majority of the economic sectors and values for core variables like the GDP, the interest rate, the inflation or the unemployment rate, we can configure an image of the economic situation. The stock market can be accounted as a global indicator that absorbs all these variables and includes these in the price of the assets but lately we can also include the indicators that measure the sentiment from the real economy as important vectors. Many times people start by assuming that the stock market, which represents a transposal of the economic sentiment, forecasts the macroeconomic indicators variations.

It is known that the media has an important role in the propagation of economic booms or contractions and lately the markets tend to overreact to events or economic data. The speed in which the news are updated increases the volatility and unbalances the markets.

The scientific literature has developed enough on the influence that the macro variables have on stock markets return and if the directions of these macro results can generate long term trends on the stock market or if we can talk of a reverse circuit with the stock markets anticipating rebounds or contractions in the economy.

Andreas Humpe and Peter Macmillan (2010) say that volatility

anticipation of the markets that can follow after a convergent row of macro data is critical for stress tests and VAR type of analysis. In their study they mention that the macro and financial variables must contain information that isn't already included by the current or lagged volatility.

Aruoba, Diebold and Scotti (2007) have constructed an index that measures the real time business conditions by adding the quarterly GDP, the monthly industrial production, the weekly jobless claims and the real time price of assets. This index achieves notable results in comparison with the American stock market and its advantage is that it uses recent or real time data and the investors do not have to wait for private company results in order to take decisions. Brunnermeier and Pedersen (2009) have brought into discussion the mechanisms in which the stock market volatility is increased by brokers that speculate the weak side of the market participants.

Fornari and Mele (2009) take on a reverse approach and use the anti-cyclical behavior of stock markets and build up a model by using stock market volatility, with a market risk and monetary instruments proxy and targeted to forecast the economic activity within six months to one year.

Our study adds indicators that measure the sentiment or optimism of economic agents and consumers, the correlation with the stock markets and with the macro data and the conclusions that can be made.

The majority of the available studies have centered on the American market while our study will use data for the European market and indicators that have been introduced after the euro has been launched. We have in hand a list of indicators that measure the

confidence in the Euro zone: the IFO business cycle from Germany, the NBB business conditions from Belgium, the ZEW European expectations, the Sentix investor's confidence, the KOF economic barometer from Switzerland and also other indicators that measure the consumer confidence level.

2. The data

The data has been gathered from the Bloomberg's portal database. We used the Stoxx 600 index as a proxy for the European stock market and we log-adjusted its values in the purpose of comparing its data set to other indicators.

The ZEW European economic expectations and the German IFO have periodical high variations and negative numbers so we were forced to adjust the data. We translated the values by 100 points and used the natural logarithm.

The time period is January 2000 – August 2010, we used monthly data and for the data that isn't published monthly, like the GDP, we used the monthly GDP adjustments.

We have selected an index that measures the economic optimism in all the eurozone (ZEW), an index for the level of confidence in Germany (IFO), one that measures the consumer confidence level in the eurozone and macro variables like: the GDP, the industrial production, retail sales, the CPI and the unemployment change.

We could have used an aggregate real time business condition index as the ADS index published by the Federal Bank of Philadelphia but on the European market we didn't have data to cover the weekly change in unemployment claims for the whole region, a strong short term indicator. On the other hand the Aruoba, Diebold and Scotti study shows that the stock returns are a close proxy to the ADS. So we decided to test by successive pairing the data series.

Even though the results of a single framed regression wouldn't be representative enough or wouldn't score perfect tests, the simple improvement of the initial results by adjusting the series according to our presumptions should be a solid help in consolidating our conclusions.

3. Testing methodology and results

3.1. The economy, the stock market and the sentiment

First we start by searching which are the variables that influence the stock market returns. We have observed that indicators such as the retail sales do not describe long or medium term directions because the economic cycles tend to balance the activity from this sector. Frank Reilly and Keith Brown show in "Investment analysis and portfolio management" that there are market sectors that behave better or slower in a certain cycle period so we expect not to find important relations for all the indicators we have selected. If we consider the hypothesis in which you have to take into account that some variables might be lagged or have a different evolution rhythm then it would be obvious that we will not obtain major results from

this initial study. We estimate the coefficients for the following regression using the LS[1] method:

*STOXX = C(1)*CONSUMER + C(2)*CPI + C(3)*GDP + C(4)* IFO_GER + C(5)*PRODUCTIA + C(6)* RETAIL + C(7)*UNEM + C(8)*ZEW + C(9);*

Where *STOXX* = the European stock market index STOXX600, *CONSUMER* = the consumer confidence index, CPI consumer price index, *IFO_GER* = the economic optimism index from Germany published by IFO, *PRODUCTIA* = the industrial production, *RETAIL* = retail sales, *UNEM* = monthly unemployment change, *ZEW* = the economic optimism index for the Euro zone published by ZEW.

We obtain significant positive correlations for the two economic confidence indicators, a fact that strengthens our assumption that the stock market and these indicators have the same evolution rhythm, for the retail sales and a significant negative correlation with the CPI, which confirms to us that a higher than expected inflation influences negatively the stock markets as seen in table 1.

The almost inexistent correlation between *STOXX* , the GDP and the industrial production represents a motivation for testing the change in the level of correlation when we lag the series.

[1] LS - Least squares is a standard approach to the approximate solution of overdetermined systems, i.e., sets of equations in which there are more equations than unknowns. "Least squares" means that the overall solution minimizes the sum of the squares of the errors made in the results of every single equation.

3.2. The economic sentiment anticipates the macro results

Following Fornari and Mele's hypothesis we test if the stock market or the confidence indicators are more up to date and if they can forecast futures macro variables variation. A simple chart framing shows that the macro variables seem to be lagged (chart 1 and 2).

We tested the influence of the stock market and of the ZEW economic optimism versus the industrial production and the GDP. In order to test if the macro data is lagged we transposed the macro variables by one, two, three, four and five lags. We can also observe that the GDP data is lagged much more than the industrial production data so theoretically we should obtain better results on the GDP if we transpose this data with at least one more lag than the industrial production. This fact can be explained because the GDP data is published in its final form quarterly while the industrial production numbers appear monthly.

We test many lags and we find the best results for the industrial production lagged by two series and for the GDP lagged by five series as seen in table 2 and 3 estimating the following regression:

$$PRODUCTIA\_LAG2 = C(1)*STOXX + C(2)*ZEW + C(3);$$

$$GDP\_LAG5 = C(1)*STOXX + C(2)*ZEW + C(3);$$

We can note the good correlation between the industrial production lagged by two series and the ZEW economic confidence indicator. The results are not so conclusive for the GDP series because the monthly GDP forecast is not exact until the final one is published. We can conclude by stating that the adjusted series bring

much more solid results, a fact that confirms Fornari and Mele's hypothesis that on the short to medium term, the stock market acts as a leading indicator and our hypothesis that the role of the economic sentiment indicators is at least as important as the stock market's role.

3.3. The labor market and the economic optimism

The monthly unemployment claims are a short term proxy for the labor market conditions. In our first case we observed that the correlation between the variations in the labor market and the confidence indicators are not representative but we didn't take into account the lag issue.

The most representative indicator for the labor market is set by the change in the jobless claims. We have selected the indicator published monthly in Germany and we inverted its sign in order to observe much more easier the positive correlation with the IFO economic sentiment indicator published also in Germany (chart 3).

We estimate the coefficients for the following the regression:

$$UNEM\_LAG1 = C(1)*IFO + C(2)$$

We obtained a strong correlation coefficient of 2.12 with IFO for the UNEM values lagged by one series (table 4), so the unemployment change figures tend to be anticipated by a month by Germany's economic confidence indicator, the IFO.

3.4. CPI and the consumer confidence

Usually a gradual appreciation trend for the prices of goods corresponds with an economic expansion period, so the consumer confidence should have a similar evolution. But we are anticipating that the consumer confidence level should move before the prices move and we can observe this fact from chart 4. We test several lagged scenarios and we obtain the best results for a five series lagged CPI (table 5):

$$CPI\_LAG5 = C(1)* CONSUMER + C(2);$$

Accordingly to these results, the consumer confidence tends to deteriorate with at least one trimester before the prices to enroll on a descending trend and we observe that the correlation tends to amplify even more in the economic contraction periods.

3.5. The influence of economic confidence indicators rose between 2005 and 2009

A simple chart observation shows that periods of accelerated economic movement should bring a higher correlation level between the variables. We tested and compared the results obtained in case 2 for the 2000-2010 period, for the industrial production versus the stock market and the ZEW confidence level with the results obtained for the 2005-2009 period (table 6).

The results are quite impressive, we obtain a level of correlation at least two times higher for the 2005-2010 period.

3.6. The market cycles: contraction vs expansion

Statistics show that the recession cycle brings a much stronger influence on the sentiment and that the macro variables achieve extreme values. In order to check this hypothesis we have introduced two dummy variables that are allocated with the value 1 if we have a expansion period or a recession.

We test the correlation between the dummy variables and the industrial production and the ZEW European economic indicator in the 2005-2009 period (table 7 and 8):

PRODUCTIA = C(1) EXPANSIUNE + C(2)*CONTRACTIE + C(3);*
ZEW = C(1) EXPANSIUNE + C(2)*CONTRACTIE + C(3);*

We can affirm that the economic contraction period has a stronger negative influence on the variation of the industrial production and on the ZEW economic confidence indicator than the positive influence that the expansion period has on these variables.

4. Conclusions

We obtained significant results by adjusting the lagged series of the macroeconomic variables in comparison with the economic confidence indicators and with the stock market which confirms that these indicators and the stock market tend to anticipate the movements in the economy. The studies on the labor market and on the core goods market also bring solid results in the case of the lag adjustment for the macro variables versus the economic confidence indicators. The statistics show that the movements in the industrial

sector and in the short term labor market activity are less lagged than the GDP and the inflation ones.

In the first chart, the one that frames the industrial production, the ZEW indicator and the stock market, we can observe that the depreciation trend formed by the economic confidence indicator induces at the beginning the direction for the stock market and afterwards also the trend of the industrial production. The significant correlations obtained after adjusting the lag issue for the macroeconomic variables point the high degree of importance held by the economic confidence indicator.

The conclusions that have been taken in tests number 2 and 5 can certify the role of economic sentiment indicators in the European region and therefore we include these instruments in the palette of instruments that describe the economy's tendencies on the short and medium term.

We discovered that the importance of the economic confidence indicators increases in the accelerate expansion phases and in the contraction ones, which are usually also accelerated and that their role is more relevant to the macroeconomic variables than the stock market's role. If we take into account that the European stock market is part of a global circuit where the US still has the main power and that we also have forex related mechanisms, we can suppose that the stock market reflected a less accurate image of the European economic conditions. In the 2000-2007 period, the European stock market has strongly exceeded the returns brought by the American stock market, a situation that moved many resources towards the

European stock market, a process that has contaminated the accuracy in which the market has reflected the real economic conditions.

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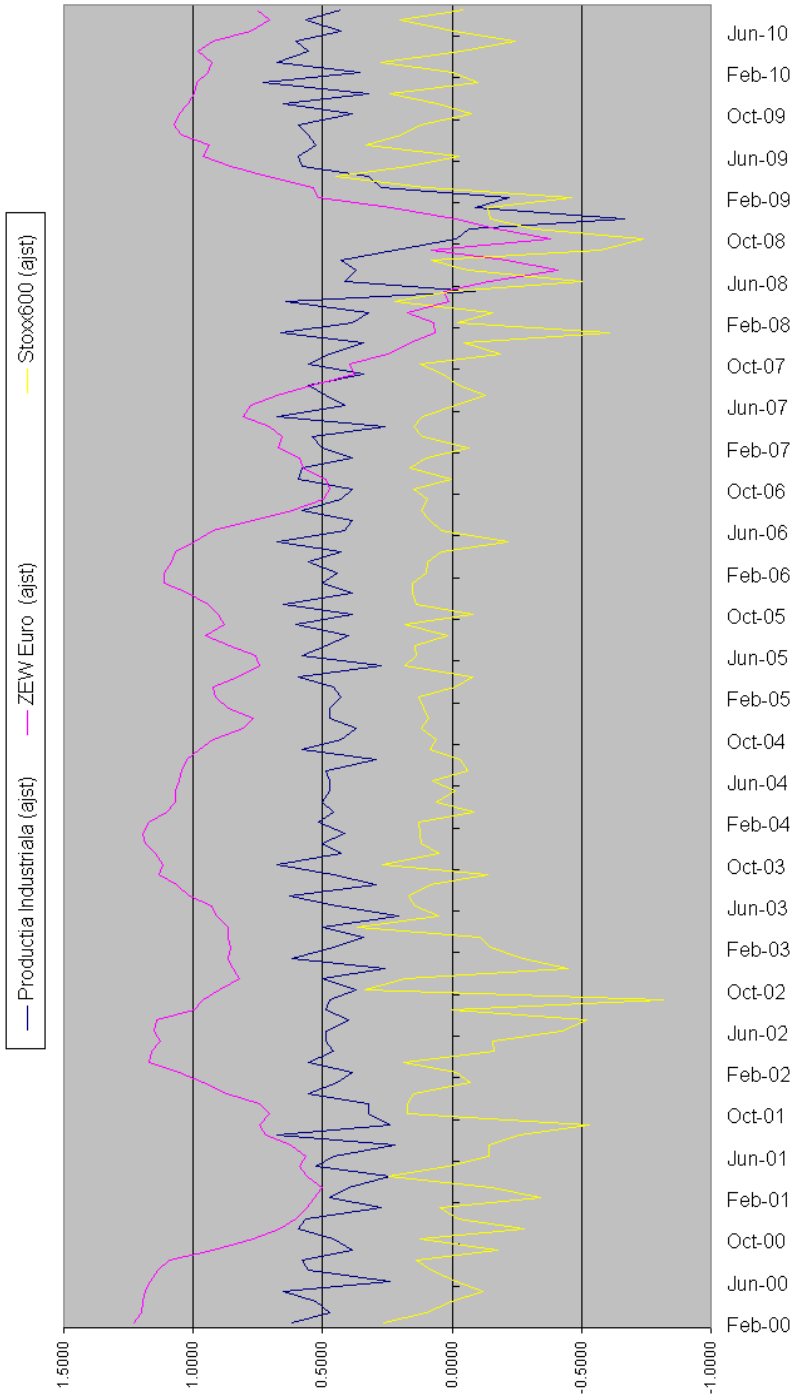
Annexes:

Chart 1

Industrial production, ZEW and Stoxx


Productia Industriala (ajst)
ZEW Euro (ajst)
Stoxx600 (ajst)
Jun-10
Feb-10
Oct-09
Jun-09
Feb-09
Oct-08
Jun-08
Feb-08
Oct-07
Jun-07
Feb-07
Oct-06
Jun-06
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Feb-03
Oct-02
Jun-02
Feb-02
Oct-01
Jun-01
Feb-01
Oct-00
Jun-00
Feb-00
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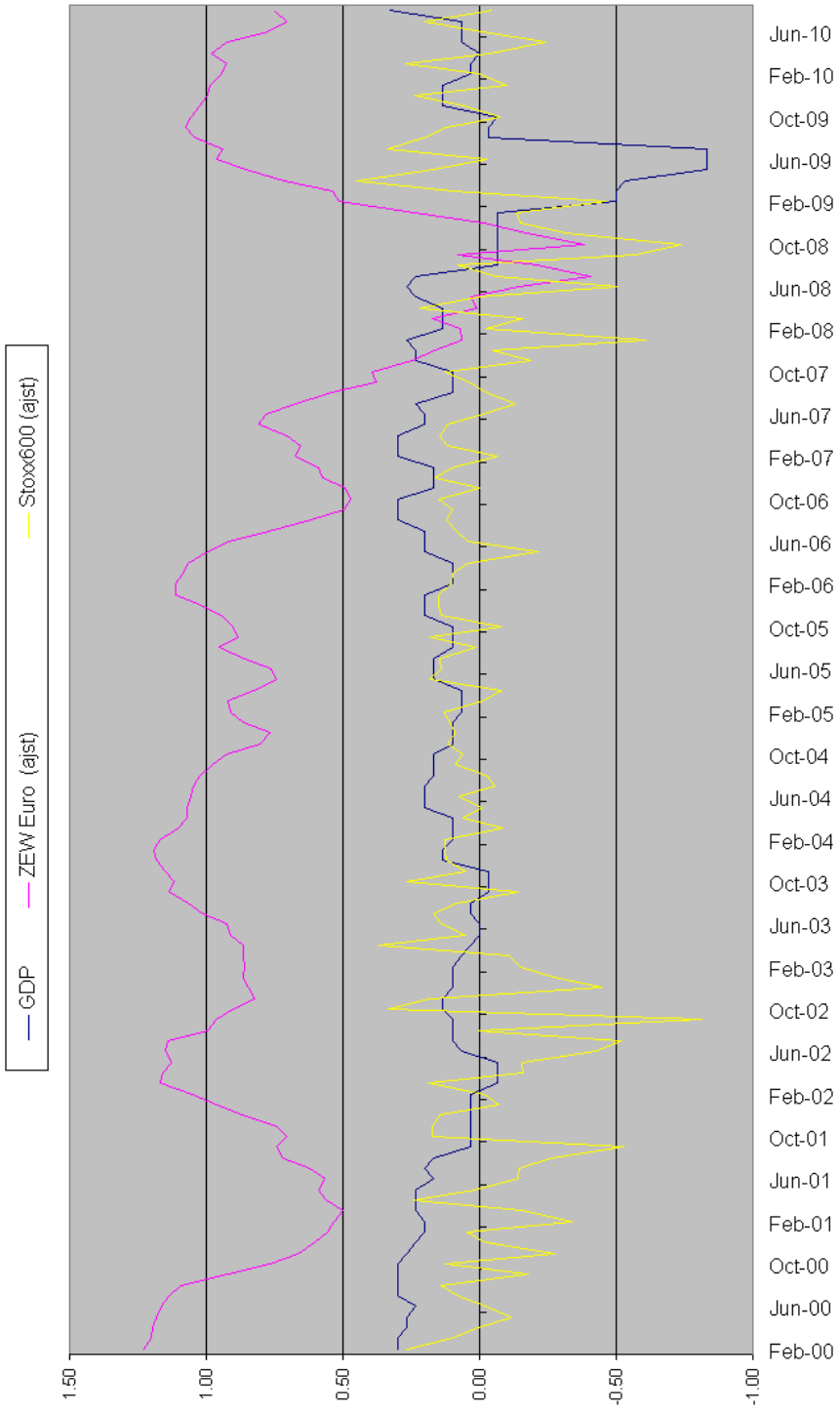
0.5000
0.0000
-0.5000
-1.0000

Chart 2

GDP, ZEW and Stoxx


GDP
ZEW Euro (ajst)
Stoxx600 (ajst)
Jun-10
Feb-10
Oct-09
Jun-09
Feb-09
Oct-08
Jun-08
Feb-08
Oct-07
Jun-07
Feb-07
Oct-06
Jun-06
Feb-06
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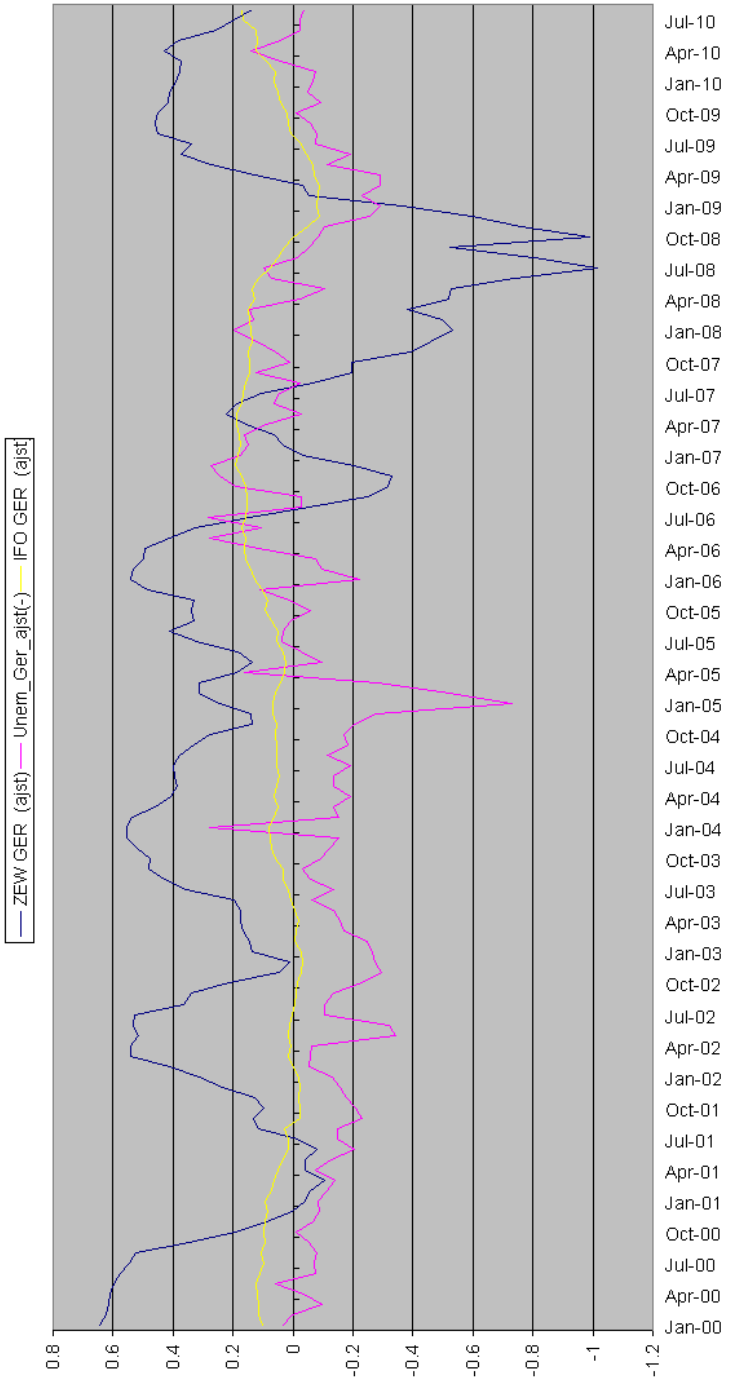
Feb-04
Oct-03
Jun-03
Feb-03
Oct-02
Jun-02
Feb-02
Oct-01
Jun-01
Feb-01
Oct-00
Jun-00
Feb-00
1.50
1.00
0.50
0.00
-0.50
-1.00

Chart 3

Unemployment claims, ZEW and IFO


ZEW GER (ajst)
Unem_Ger_ajst(-)
IFO GER (ajst
Jul-10
Apr-10
Jan-10
Oct-09
Jul-09
Apr-09
Jan-09
Oct-08
Jul-08
Apr-08
Jan-08
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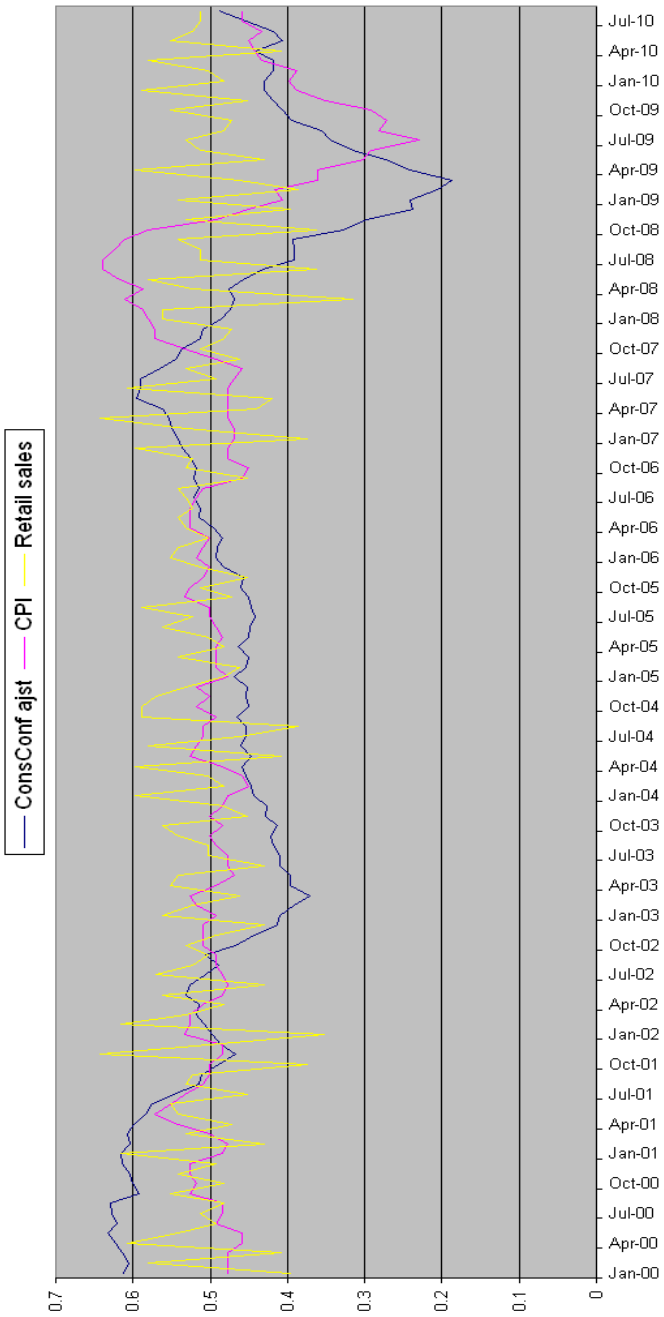
Oct-02
Jul-02
Apr-02
Jan-02
Oct-01
Jul-01
Apr-01
Jan-01
Oct-00
Jul-00
Apr-00
Jan-00
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1.2

Chart 4

Consumer confidence, CPI and retail sales


ConsConf ajst
CPI
Retail sales
Jul-10
Apr-10
Jan-10
Oct-09
Jul-09
Apr-09
Jan-09
Oct-08
Jul-08
Apr-08
Jan-08
Oct-07
Jul-07
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Oct-02
Jul-02
Apr-02
Jan-02
Oct-01
Jul-01
Apr-01
Jan-01
Oct-00
Jul-00
Apr-00
Jan-00
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0

Table 1

Dependent Variable: STOXX
Method: Least Squares
Date: 10/01/10 Time: 23:42
Sample: 2000:02 2010:08
Included observations: 127

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CONSUMER	-0.368641	0.325322	-1.133158	0.2594
CPI	-0.564554	0.375462	-1.503627	0.1353
GDP	-0.055488	0.154400	-0.359380	0.7200
IFO_GER	1.094089	0.441152	2.480076	0.0145
PRODUCTIA	0.013754	0.019782	0.695281	0.4882
RETAIL	0.552225	0.293910	1.878894	0.0627
UNEM	-0.142807	0.156133	-0.914654	0.3622
ZEW_EUR	0.132110	0.068293	1.934463	0.0555
C	-0.018658	0.273071	-0.068328	0.9456

R-squared	0.207445	Mean dependent var	-0.007998
Adjusted R-squared	0.153712	S.D. dependent var	0.221552
S.E. of regression	0.203814	Akaike info criterion	-0.274985
Sum squared resid	4.901752	Schwarz criterion	-0.073428
Log likelihood	26.46155	F-statistic	3.860689
Durbin-Watson stat	1.842663	Prob(F-statistic)	0.000453

Table 2 and 3

Dependent Variable: PROD_IND_LAG2
Method: Least Squares
Date: 10/02/10 Time: 00:27
Sample(adjusted): 2000:02 2010:06
Included observations: 125 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ZEW2	1.224735	0.249743	4.903987	0.0000
STOXX2	1.290365	0.410971	3.139798	0.0021
C	-0.903255	0.212851	-4.243612	0.0000

R-squared	0.281462	Mean dependent var	0.031200
Adjusted R-squared	0.269682	S.D. dependent var	1.120658
S.E. of regression	0.957699	Akaike info criterion	2.775140
Sum squared resid	111.8967	Schwarz criterion	2.843019
Log likelihood	-170.4462	F-statistic	23.89458
Durbin-Watson stat	2.413496	Prob(F-statistic)	0.000000

Dependent Variable: GDP_LAG6
Method: Least Squares
Date: 10/02/10 Time: 00:32
Sample(adjusted): 2000:02 2010:02
Included observations: 121 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ZEW6	0.878021	0.131782	6.662652	0.0000
STOXX6	0.372864	0.218723	1.704735	0.0909
C	-0.423389	0.112056	-3.778365	0.0002

R-squared	0.337465	Mean dependent var	0.248760
Adjusted R-squared	0.326235	S.D. dependent var	0.613068
S.E. of regression	0.503226	Akaike info criterion	1.488926
Sum squared resid	29.88188	Schwarz criterion	1.558243
Log likelihood	-87.07999	F-statistic	30.05185
Durbin-Watson stat	0.522862	Prob(F-statistic)	0.000000

Table 4 and 5

Dependent Variable: UNEM_LAG1
Method: Least Squares
Date: 10/01/10 Time: 14:26
Sample(adjusted): 2000:01 2010:07
Included observations: 127 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
IFO_1	2.121494	0.235489	9.008879	0.0000
C	-0.274246	0.022513	-12.18181	0.0000

R-squared	0.393675	Mean dependent var	-0.136496
Adjusted R-squared	0.388824	S.D. dependent var	0.238188
S.E. of regression	0.186210	Akaike info criterion	-0.508258
Sum squared resid	4.334284	Schwarz criterion	-0.463467
Log likelihood	34.27436	F-statistic	81.15990
Durbin-Watson stat	1.100386	Prob(F-statistic)	0.000000

Dependent Variable: CPI_LAG5
Method: Least Squares
Date: 10/02/10 Time: 13:39
Sample(adjusted): 2000:01 2010:03
Included observations: 123 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CONSUMER5	0.517864	0.049673	10.42540	0.0000
C	0.242164	0.024023	10.08040	0.0000

R-squared	0.473201	Mean dependent var	0.488039
Adjusted R-squared	0.468847	S.D. dependent var	0.069571
S.E. of regression	0.050703	Akaike info criterion	-3.109522
Sum squared resid	0.311071	Schwarz criterion	-3.063796
Log likelihood	193.2356	F-statistic	108.6890
Durbin-Watson stat	0.199883	Prob(F-statistic)	0.000000

Table 6

Dependent Variable: PROD_IND_LAG2
Method: Least Squares
Date: 10/02/10 Time: 14:11
Sample(adjusted): 2004:12 2009:05
Included observations: 54 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
STOXX2	2.447255	0.754803	3.242242	0.0021
ZEW_AJST2	1.222425	0.415982	2.938650	0.0049
C	-0.810287	0.272458	-2.973984	0.0045

R-squared	0.449653	Mean dependent var	-0.166667
Adjusted R-squared	0.428071	S.D. dependent var	1.371406
S.E. of regression	1.037140	Akaike info criterion	2.964763
Sum squared resid	54.85858	Schwarz criterion	3.075262
Log likelihood	-77.04859	F-statistic	20.83441
Durbin-Watson stat	2.092927	Prob(F-statistic)	0.000000

Table 7 and 8

Dependent Variable: PROD_IND
Method: Least Squares
Date: 10/02/10 Time: 15:09
Sample: 2004:12 2009:07
Included observations: 56

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EXPANSIUNE	0.873077	0.966337	0.903491	0.3704
CONTRACTIE	-1.079310	0.964484	-1.119055	0.2682
C	-7.11E-15	0.948273	-7.49E-15	1.0000

R-squared	0.523123	Mean dependent var	-0.153571
Adjusted R-squared	0.505128	S.D. dependent var	1.347990
S.E. of regression	0.948273	Akaike info criterion	2.783734
Sum squared resid	47.65874	Schwarz criterion	2.892235
Log likelihood	-74.94456	F-statistic	29.06989
Durbin-Watson stat	1.061958	Prob(F-statistic)	0.000000

Dependent Variable: ZEW
Method: Least Squares
Date: 10/02/10 Time: 15:25
Sample: 2004:12 2009:07
Included observations: 56

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EXPANSIUNE	-0.399723	0.384578	-1.039381	0.3033
CONTRACTIE	-0.701241	0.383841	-1.826907	0.0733
C	1.112000	0.377389	2.946561	0.0048

R-squared	0.170626	Mean dependent var	0.563271
Adjusted R-squared	0.139328	S.D. dependent var	0.406790
S.E. of regression	0.377389	Akaike info criterion	0.941003
Sum squared resid	7.548395	Schwarz criterion	1.049504
Log likelihood	-23.34809	F-statistic	5.451792
Durbin-Watson stat	0.527113	Prob(F-statistic)	0.007029