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**VOLATILITY AS AN INDICATOR OF UNCERTAINTY AND ITS
IMPACT ON THE REALIZATIONS OF INDUSTRIAL BUSINESS
EXPECTATIONS**

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ABSTRACT

This paper endeavors to identify radical uncertainty, by analyzing volatility characteristics as displayed by relative period-on-period changes in ongoing business tendency survey results. The concept is based on individual modular response appraisals during the current time period 't' compared to the preceding period 't-1' and embraces the analysis of expressing the relative relationships ($R_{t,t-1}$) as aggregate categorical percentages in a 3*3 matrix formation, with each row and column referring to the sum modality of answers.

The research objectives of this study are to compare the characteristics of a data set of qualitative South African industrial business tendency survey responses in terms of expectations volatility (uncertainty) as well expectations realizations.

The research findings are: Firstly, that there exist in statistical terms negative correlations between the respective analysis of expectations volatility (uncertainty) and the corresponding realization of expectations; Secondly, directional causality from expectations volatility (uncertainty) to the corresponding realization of expectations is noted in the case of business conditions, production and sales. Un-directional causality is noted in the case of fixed investment and prices. Strong feedback causality confirms in the case of new orders that the directional causality goes from realization of historic expectations to prevailing uncertainty.

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Introduction

The concept of uncertainty and its impact on economic behavior has intrigued economists and other learned scholars for more than a century. One way of identifying ‘Uncertainty’ would be to evaluate relative changes in business expectations. If this information is to be gathered on an ongoing basis, the tool available to the researcher would be that of evaluating business tendency surveys.

This paper endeavors to identify radical uncertainty by analyzing volatility characteristics, by comparing relative period-on-period changes in ongoing micro survey results, based on un-weighted individual modular response appraisals (i.e. differentiated Up/Same/Down), during the current time period ‘t’ compared to the preceding period ‘t-1’. The concept further embraces the analysis of expressing the relative relationships ($R_{t,t-1}$) as aggregate categorical percentages in a 3*3 matrix formation, with each row and column referring to the sum modality of answers.

The research objectives of this study are to compare the characteristics of a data set of qualitative South African micro industrial business tendency survey responses, covering general business conditions, production, sales, new orders, fixed investment and prices : Firstly, to provide additional information to the current elaboration on survey data; Secondly, to derive industrial expectations volatility (uncertainty) as well industrial expectations realizations; Thirdly, to test the hypothesis that uncertainty impacts negatively on the corresponding realization of expectations, and fourthly to profile derived composite ‘uncertainty’ and ‘realization’ indicators in terms of factor analysis and cyclical interpretations.

1. Volatility and Uncertainty as entities in economic expectations

In an early attempt by Knight (1921, pp20, 226) to describe uncertainty, a distinction was made between ‘Risk’ seen as calculated probability of an objective classification and ‘Uncertainty’, referring to a situation where no objective classification is possible. In contrast Hirshleifer (1992, pp10) totally disregards Knight’s distinction as a sterile one and suggests ‘subjective’ probability to describe the role of uncertainty in economics. However, Bowman (1958, pp1) conceded that objective probability could not account for uncertainty. Notwithstanding the advent of the computer age, the quantifying of the impact of uncertainty on economics still remains a qualified enigma.

Volatility as an economic phenomenon has to do with quantified historic movements and qualified future movements. For purpose of this paper ‘Volatility’ will be seen as the quantification of historic movements in business expectations and ‘uncertainty’ as a subjective situation linked to the relevant ‘volatility’, where no objective classification is possible.

2. Measuring Industrial Business Expectations

Expectations can be described as a subjective feeling or perception about an incident to happen in future. One way to find out about business expectations is to survey business people. If this information is to be gathered on an ongoing basis, the tool available to the researcher would be that of business tendency surveys.

The concept of Business Tendency Surveys, also known as BTS originated in the late 1930's. The subject is extensively covered by the OECD and the Centre for International Research on Economic Tendency (CIRET). Basically it is a qualitative (not quantitative figures) tool for measuring business conditions as interpreted by a panel of respondents. BTS survey questions are formulated in terms of categorical choices. The normal approach is that of three categories i.e. "Better", "Same", or "Worse" ("Up", "Same" or "Down"), of which the respondents have to choose only one, indicative of a comparative period economic situation.

3. Background, research objectives, hypothesis and methodology

Fusari (2006A) presented a paper on radical uncertainty indicators at the 2006 CIRET conference in Rome, whereby the possibility of deriving uncertainty from measuring volatility in expectations survey data was highlighted. This principle comprises of comparing relative period-on-period changes in ongoing micro survey results, based on individual modular (categorical) response appraisals i.e. differentiated Up/Same/Down, during the current time period 't' compared to the immediate preceding survey period 't-1'. The concept further embraces the analysis of expressing the relative periodical changes in response results ($R_{t:t-1}$) as aggregate categorical 3*3 matrix formation as displayed in Table 1, with each row and column referring to the sum modality of comparative answers.

Table 1. Matrix Cell Evaluations

$R_{11}(\text{Up} \rightarrow \text{Up})$	$R_{12}(\text{Same} \rightarrow \text{Up})$	$R_{13}(\text{Down} \rightarrow \text{Up})$
$R_{21}(\text{Up} \rightarrow \text{Same})$	$R_{22}(\text{Same} \rightarrow \text{Same})$	$R_{23}(\text{Down} \rightarrow \text{Same})$
$R_{31}(\text{Up} \rightarrow \text{Down})$	$R_{32}(\text{Same} \rightarrow \text{Down})$	$R_{33}(\text{Down} \rightarrow \text{Down})$

The crossing of two different modalities indicate the number of survey respondents changing their perceptions (opinion) between survey periods 't-1' and 't' and are displayed under columns R_{12} , R_{13} , R_{21} , R_{23} , R_{31} , R_{32} . The main diagonal of the matrix express, for each modality, the percentage of answers that does not vary from one period to the other i.e. R_{11} , R_{22} and R_{33} . An example of such an ($R_{t:t-1}$) 3*3 evaluation matrix over five comparative survey periods expressed in terms of relative percentage changes is displayed in Table 2.

Table 2. Relative Period-on-period Evaluation Matrix

Survey period Comparison	Relative Changes								
	R_{11}	R_{12}	R_{13}	R_{21}	R_{22}	R_{23}	R_{31}	R_{32}	R_{33}
2 : 1	2.5	4.1	1.6	3.3	45.9	11.5	1.6	14.8	14.8
3 : 2	1.5	4.6	3.1	4.6	48.9	9.9	0.8	9.9	16.8
4 : 3	8.5	1.9	0.9	7.5	45.3	7.5	1.9	9.4	17.0
5 : 4	5.2	1.0	0.0	5.2	44.8	14.6	2.1	11.5	15.6

The research objectives of this study are to compare the characteristics of a data set of qualitative South African industrial business tendency survey responses covering business conditions, production, sales, new orders, fixed investment and prices: Firstly to provide additional information to the current elaboration on survey data; secondly to derive industrial expectations volatility (uncertainty) as well industrial expectations realizations; thirdly to test the hypothesis that uncertainty impacts negatively on the corresponding realization of expectations, based on Correlation and Granger Causality evaluations and fourthly to profile

derived composite ‘uncertainty’ and ‘realization’ indicators in terms of factor analysis and cyclical interpretations.

4. Evaluating industrial business conditions in South Africa

The Bureau for Economic Research(BER) at Stellenbosch University, South Africa has been conducting IFO type business tendency surveys in various sectors of the economy since the early 1950’s. Both the diagnostic and prognostic business conditions are surveyed. The methodology regarding the various surveys of the BER is well documented – see Stuart (1987).

The BER evaluates the cyclical stance on business conditions within the South African manufacturing sector, by quarterly BT surveys, based on the ex-post (survey quarter) and ex-ante (forecast quarter) survey questions, formulated as :

a) Ex-post development

“Compared to the same period a year ago, do you *estimate* current quarter business conditions to be” ?

Survey Period		
Up	Same	Down

b) Ex-ante development

“Compared to the same period a year ago, do you *expect* next quarter business conditions to be” ?

Forecast Period		
Up	Same	Down

The modular responses to each survey run are captured as :

‘1’ for **UP**, ‘2’ for **SAME** and ‘3’ for **DOWN**

** Note - BER modular survey responses are normally quantified into weighted percentages portrayed as net balances and released as final totally unadjusted quarterly indexes ranging between -100 and +100. For purpose of this paper, BER survey results will refer to the raw modular responses notations in un-weighted terms.*

5. Measuring Volatility and Realization of Industrial business expectations

By postulating an evaluation matrix on survey questions covering expectations, the sum of cells representing relative changes can be interpreted as measuring volatility of expectations, which is a measure of the industry degree of uncertainty (Fusari, 2006A, pp4).

Historic BER discrete micro manufacturing survey data series, comprising survey results over the sample period 1992q3:2005q3 were collated for survey questions evaluations of general business conditions, volume of production, volume of sales, volume of new orders, fixed investment and purchasing prices, on ex-post(current) as well as ex-ante(expected) business conditions. For purpose of this paper, BER survey results will refer to the raw modular responses notations (i.e. differentiated Up(1)/Same(2)/Down(3)) as un-weighted discrete **micro** survey data.

Based on Fusari’s approach in analyzing relative changes in micro survey data, comparative BER manufacturing expectations(forecast period) micro survey data were evaluated in terms of quarter-on-quarter changes of individual survey respondents’ modular response appraisals(i.e. differentiated Up(1)/Same(2)/Down(3)). For purpose of this paper the measuring of volatility of survey expectations and the subsequent uncertainty are displayed in un-weighted terms i.e. counted and expressed as survey population percentages. ‘Uncertainty’

as such is seen as measuring the general business psychological feeling of respondents at a specific point in time.

‘Volatility’ in survey expectations is derived from the survey questions based relative ongoing quarterly changes in survey expectations (forecast quarter) period(t-1), compared to survey expectations (forecast quarter) in adjacent survey period(t), giving nine categories of relative changes for each ongoing quarterly comparison. ‘Realization’ of survey expectations is similarly derived for the survey questions from ongoing relative quarterly changes in survey expectations (forecast quarter) period(t-1), compared to survey estimations realizations (survey quarter) in adjacent survey period(t). The point in departure for both volatility and realization analyses is business expectations evaluations in survey period(t-1). The difference being the relative target survey variable in period(t). Volatility measuring ex-ante(expected) and realization measuring ex-post(current) business conditions.

The following methodological issues come to the fore in establishing expectations volatility and realization of expectations :

- i) Un-weighted sample representation – as the same BER survey sample is being used, self weighted representation does comply for regular respondents.
- ii) Exclusion of certain respondents not participating in adjacent surveys – the possible impact differences between regular and irregular respondents on BTS results can to a large degree be ignored (Pellissier(2006) & (2007)).
- iii) Impact behavior of discrete survey data - constant acceleration(i.e. up-up or down-down) and monotonic trend (i.e. up-same-up-same) have been ignored for purpose of this paper
- iv) Weighting of survey response results - although qualitative indicators like ‘Business Confidence’, as practiced by BTS institutions, are normally released in weighted terms, ‘Uncertainty’ for this paper is expressed in un-weighted terms to comply with individual response reactions

The derived results of relative quarter-on-quarter changes in expectations (volatility as well as realizations) for each survey run are categorized according to the ($R_{t,t-1}$) 3*3 matrix notation as set out in Table 1. Detailed changes in the BER’s quarterly manufacturing survey results on relative expectations measuring volatility and realizations in business conditions, fixed investment, new orders, production, prices and sales over the sample period 1992q3:2005q3 were calculated and displayed in 52*9 matrix notations. The rows indicating the relative quarterly survey comparisons over the sample period and the columns the relative aggregate modular changes as set out in Table 2.

The measure of Expectations Volatility(EV) is derived from the corresponding aggregated matrix cell evaluations indicating relative quarter-on-quarter **changes** in expectations (forecast quarter), displayed as $EV = R_{21} + R_{31} + R_{12} + R_{32} + R_{13} + R_{23}$
The matrix cells of R_{11} , R_{22} and R_{33} would be indicative of **no-changes** in survey expectations evaluations.

The measure of Expectations Realization(ER) is derived from the corresponding aggregated matrix cell evaluations indicating quarter-on-quarter **realization** estimations (survey quarter), displayed as $ER = R_{11} + R_{22} + R_{33}$
The matrix cells of R_{21} , R_{31} , R_{12} , R_{32} , R_{13} and R_{23} would in this case be indicative of **non-realization** in survey expectations evaluations.

Both expectations volatility (EV) and expectations realization (ER) were calculated for each variable on a quarterly basis and aggregated into annual averages over the sample period 1993:2004 and displayed in Table 3.

Table 3 – Expectations Volatility(EV) and Expectations Realization(ER)

Obs	Business Conditions		Fixed Investment		New Orders	
	Volatility	Realization	Volatility	Realization	Volatility	Realization
	BCEV	BCER	IVEV	IVER	OREV	ORER
1993	32.1	67.8	36.3	65.0	48.9	50.0
1994	30.6	68.0	37.0	62.9 [#]	45.3	61.1 [*]
1995	30.6 [#]	68.1 [*]	34.0	66.4	39.1 [#]	54.5
1996	40.1	61.4	38.5 [*]	63.8	43.2	55.3
1997	42.5	51.6 [#]	33.4	67.5	47.8	47.7 [#]
1998	33.0	59.4	33.1	69.6	49.6 [*]	57.8
1999	42.3	61.1	29.0	71.1	47.0	48.7
2000	47.3 [*]	51.9	30.8	68.0	48.0	51.8
2001	45.2	52.8	28.9	70.0	46.4	51.6
2002	45.2	57.0	26.8 [#]	73.7 [*]	45.6	53.4
2003	46.6	52.5	30.9	68.8	48.2	51.0
2004	45.4	52.7	29.7	70.2	46.8	50.6
Mean	40.1	58.7	32.4	68.1	46.3	52.8
Std.D	6.6	6.6	3.6	3.2	2.9	3.9

* - maximum ; [#] - minimum

Table3 - continued

Obs	Prices		Production		Sales	
	Volatility	Realization	Volatility	Realization	Volatility	Realization
	PPEV	PPER	POEV	POER	SLEV	SLER
1993	39.7	61.6	47.2	54.9	48.3	52.5
1994	37.6	62.4	44.1	56.0	45.8	55.3
1995	33.5	65.5	42.5 [#]	60.2 [*]	40.6 [#]	59.2 [*]
1996	33.9	65.0	43.5	57.2	45.3	57.0
1997	39.4	65.9	46.7	50.9 [#]	47.2	50.9
1998	37.0	63.0	48.7 [*]	52.0	48.6 [*]	51.6
1999	38.7	63.0	46.0	55.8	47.1	54.5
2000	33.5	67.3	47.4	52.3	48.3	50.1 [#]
2001	34.6	68.7	46.7	53.2	46.6	51.4
2002	29.7 [#]	73.4 [*]	44.9	54.1	44.7	54.3
2003	42.4	59.0	44.4	52.7	46.5	52.1
2004	42.5 [*]	58.4 [#]	46.3	54.8	46.7	51.5
Mean	36.9	64.4	45.7	54.5	46.3	53.4
Std.D	3.9	4.2	1.8	2.6	2.2	2.7

* - maximum ; [#] - minimum

It is clear from Table 3 that in most cases there seems to be on an annual average basis, at a specific point in time, an inverse relationship between expectations volatility and the corresponding expectations realization (high EV corresponding to a low ER). The ascending order indications of the mean EVs' and ERs' over the sample period 1993:2004 of the six surveyed variables are displayed in Table 4.

Table 4. Ascending order indications of Expectations Volatility

	Business Tendency Survey	Expectations Volatility(EV)	Expectations Realization(ER)
1.	IV (Investment)	32.4	68.1
2.	PP (Prices)	36.9	64.4
3.	BC (Buss Conditions)	40.1	58.7
4.	PO (Production)	45.7	54.5
5.	SL (Sales)	46.3	53.4
6.	OR (Orders)	46.3	52.8
	Mean	41.3	58.6

The inverted relationship between volatility (EV) and realization (ER) of the six surveyed variables in Table 4 is indicative and supports the acceptance of the hypothesis that uncertainty impacts negatively on the realization of expectations. The differentiated impact of uncertainty on business decision making comes to the fore with fixed investment displaying the lowest level of uncertainty and new orders the highest. The total annual average means EV(41,3) and ER(58,7) of the six surveyed variables portrays the average BER's survey respondents experience over the sample period of uncertainty in his/her expressed opinion on industrial business expectations and the corresponding realization of their respective forecasts.

6. Industrial Expectations Volatility(EV)

Based on annual average Expectations Volatility(EV) figures as set out in Table 3, 'Uncertainties' surrounding the six BER surveyed industrial business variables are analyzed in cyclical terms over the sample period 1993:2004, covering the last full South African business cycle(1993:1999). For evaluation purposes the year 1997 will be seen as the upper turning phase of the cycle, 1998 as the midterm downtrend and 1999 as the end turning phase of the downtrend.

6.1 Business Conditions

The BER survey question evaluating expectations on general business conditions expresses its highest uncertainty (EV=47,3) in the year 2000 at the beginning of an upturn in economic activity, indicating that uncertainty prevailed among industrial respondents by the way the economy was moving at that stage of the business cycle. The lowest uncertainty (EV=30,6) was experienced in 1994/5, during the euphoria of the new democracy. Although the business conditions variable slots in third in terms of the annual average level of EVs', the data series has the highest standard deviation of 6,6 points, indicating that the survey evaluation of a subjective business variable like expected changes in general business conditions' is in itself highly volatile.

6.2 Fixed Investment

The BER survey question evaluating expectations on fixed investment, experiences the lowest total annual average mean EV(32,4) and the corresponding highest ER(68,1) of the six variables compared. The highest uncertainty (EV=38,5) is noted in the year 1996, towards the end of the previous upturn business cycle, confirming that uncertainty prevailed at the time. The lowest uncertainty (EV=26,8) was experienced in 2002, during the present upturn business cycle. A somewhat downward trend in uncertainty is noted over the total sample period. The low uncertainty indications evaluations of fixed investment are indicative of the process of fixed investment decision making, whereby decisions would normally be based on in-depth research in an attempt to minimize uncertainty. Anticipation on industrial fixed investment, being mostly an endogenous factor observation of longer-term capital formation

has a more controllable frame of opinion forming and experiences less uncertainty and higher realization of expectations than other factors.

6.3 New Orders

In contrast to fixed investment evaluations, the BER's survey question evaluating expectations on new orders reached its highest uncertainty (EV=49,6) in the year 1998, midterm downtrend of the business cycle. The lowest uncertainty (EV=39,1) was experienced in 1995, at the euphoria of the new democracy. In comparison to the five other BTS variables investigated, new orders experienced the highest uncertainty (lowest realization of expectations) during the 1997/98 period. The highest realization of new orders expectations (ER=61,1) was reached way-back in 1994 and remained on a down-trend afterwards with the opening of new markets and globalization competition, declining to an ER of 50,6 in 2004. Expectations (forecasts) on new orders are hampered by mostly exogenous marketing factors, of which not all business managers have control, resulting in the South African case in high uncertainty coupled with low realization of expectations.

6.4 Prices

Volatility (Uncertainty) of price expectations and the corresponding realizations of price expectations are closely negatively correlated at the same time. In 2002 uncertainty in survey respondent's answers to production expectations declined to a low of 29,7 points, compared to a high in realization of 73,4 in the same period. This means that respondents were at the time very sure of the direction of changes in prices. An inverted situation occurred in 2004 when uncertainty increased to 42,5 points simultaneously running a downturn price realizations to 58,4.

6.5 Production

Production expectations volatility (Uncertainty) seems to be stable around a total annual mean of 45,7, based on a comparative low standard deviation of 1,8. The highest uncertainty figure (EV=48,7) was noted in 1998, midterm downtrend of the business cycle and the lowest (EV=42,5) in 1995. Both the highest and lowest expectations realization (ER's) was reached during the uptrend of the business cycle in 1995/97.

6.6 Sales

Similar to new orders, uncertainty following the BER's survey question evaluating expectations on sales reached its highest uncertainty (EV=48,6) in the year 1998, midterm downtrend of the business cycle and the lowest (EV=40,6) in 1995, at the euphoria of the new democracy. Expectations (forecasts) on sales are equal to new orders hampered by mostly exogenous marketing factors.

7. Comparison between expectations volatility(EV) and realization of expectations(ER)

To test the Hypothesis of an inverted relationship between uncertainty and the corresponding realization of expectations, Correlation and Granger Causality tests (Eviews) were implemented on quarterly expectations volatility(EV) and realization of expectations(ER) data.

Table 5 Cross Correlations

Evaluation	Relationship	R	t- value
Business Conditions	BCEV : BCER	-0.85	-11.56
Fixed Investment	IVEV : IVER	-0.88	-13.04
New Orders	OREV : ORER	-0.16	-1.11
Production	POEV : POER	-0.69	-6.78
Prices	PPEV : PPER	-0.77	-8.43
Sales	SLEV : SLER	-0.75	-8.04

As displayed in Table 5, all comparative relationships between expectations volatility(EV) and realization of expectations(ER) correlate negatively. Based on a significance t-value of -2,00, the hypothesis of an inverted relationship between uncertainty and the corresponding realization of expectations can thus be accepted in the case of business conditions, production, sales, fixed investment and prices. However, in the case of new orders the hypothesis of an inverted relationship (negative correlation) is rejected.

The latter situation gives rise to the question which comes first during the forecast survey assessment of an industrial economic variable, prevailing 'uncertainty' or expected 'realization' of outcome. To test the hypothesis, correlations as such do not imply causation in any meaningful sense of the word. The Granger approach to causality analysis (Granger:1969) was implemented (Table 6) to support the outcome of correlation in terms of the underlying causality relationships. Granger causality establishes precedence and information content, although it does not imply causality in the more common use of the term.

Table 6 **Pairwise Granger Causality Tests**

Sample 1992:4 2005:3
Lags : 3

Null Hypothesis:	Probability
Business Conditions	
BCER Granger Cause BCEV	0.536
BCEV Granger Cause BCER	0.930
Fixed Investments	
IVER Granger Cause IVEV	0.161
IVEV Granger Cause IVER	0.525
New Orders	
ORER Granger Cause OREV	1.000
OREV Granger Cause ORER	0.058
Production	
POER Granger Cause POEV	0.501
POEV Granger Cause POER	0.866
Prices	
PPER Granger Cause PPEV	0.106
PPEV Granger Cause PPER	0.642
Sales	
SLER Granger Cause SLEV	0.453
SLEV Granger Cause SLER	0.920

It can be derived from Table 6 that except for the new orders relationship, Granger causality is noted in directional probability terms from uncertainty(EV) to the realization of expectations(ER). Clear leading indicator relationships, based on a 75% Granger causality confidence level are noted in the case of business conditions, production and sales. Un-directional Granger causality (no clear-cut probability) is noted in the case of fixed investments and prices. Strong feedback causality confirms in the case of new orders that the directional causality goes from realization of expectations(ER) to uncertainty(EV) i.e. the impact of uncertainty on survey respondents business anticipations are derived from previous experience in the realization of their own forecasts.

The hypothesis that uncertainty does impact negatively on the realization of industrial business expectations can thus be accepted in five of the six cases considered. However, it can be concluded that uncertainty does prevail in business expectations, either in an ex-ante or ex-post situation. This gives rise to the question of aggregate 'uncertainty' factor loading on general business expectations in a composite way.

8. Composite Uncertainty Indicator

In a first attempt in compiling a composite uncertainty industrial indicator for South Africa, a Principal Component Factor Analysis was implemented on all six uncertainty (EV) measurements of business conditions, fixed investment, new orders, production, prices and sales.

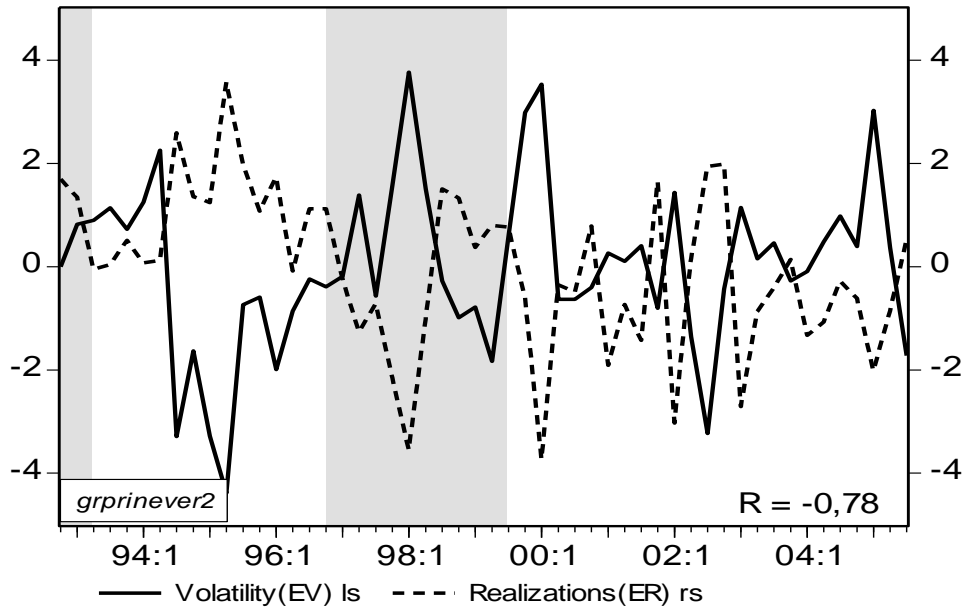
Table 7. Principal Component Factor Analysis

Sample: 1992:4 2005:3						
Correlation of BCEV IVEV OREV POEV PPEV SLEV						
	Comp 1	Comp 2	Comp 3	Comp 4	Comp 5	Comp 6
Eigenvalue	2.867	1.245	0.895	0.548	0.319	0.126
Variance Prop.	0.478	0.207	0.149	0.091	0.053	0.021
Cumulative Prop.	0.478	0.685	0.835	0.926	0.979	1.000
Eigenvectors:						
Variable	Vector 1	Vector 2	Vector 3	Vector 4	Vector 5	Vector 6
Business Conditions	0.317	-0.561	0.117	0.741	-0.141	0.042
Fixed Investments	0.023	0.795	0.233	0.534	-0.139	-0.093
New Orders	0.553	0.019	0.080	-0.127	0.345	-0.743
Production	0.502	0.055	0.132	-0.346	-0.774	0.090
Prices	0.233	0.157	-0.945	0.155	-0.066	0.018
Sales	0.535	0.159	0.125	-0.073	0.488	0.655

It is clear from Table 7 that the six EV variables under consideration can be reduced to two main components (Eigenvalues > '1'), accounting for 48% of variance. The vector loading of component 1 consists mainly of real business activity factors of business conditions, new orders, production and sales while price factors load somewhat less. Component 2 is indicative of the more heuristic survey variables of fixed investment factors coupled with inverted business conditions. However, component 3 also load relatively high on Eigenvalues indicating that the six EV variables correlate in comparison to each other quite differently and has to be further investigated in terms of weights.

Accepting component 1 in Table 7 as indicative of a composite 'Uncertainty Indicator', a similar Factor analysis was done in compiling a composite 'Expectations Realization Indicator'. Comparison between the BER's quarterly un-weighted composite uncertainty and realization of expectations indicators is graphically displayed over the sample period 1992q4:2005q3 in Figure 1.

Figure 1. Composite Expectations Volatility versus Composite Expectations Realizations



*** shaded areas indicating the down-phase of the South African business cycle*

Based on the correlation of -0,78 the inverted relationship between volatility and realization explains in an aggregate way that uncertainty as such does impact negatively on industrial business expectations.

9 . Conclusion

The purpose of this paper is to provide additional information to the current elaboration on business tendency survey data by evaluating the impact of ‘uncertainty’, as measured by expectation volatility on the realizations of industrial business expectations in South Africa. Findings are that uncertainty does impact negatively on the realizations of industrial business expectations. Directional causality from ‘uncertainty’, to the corresponding realization of expectations is noted in the case of industrial business conditions, production and sales. Un-directional causality is noted in the case of fixed investment and prices. However, strong feedback causality in the case of new orders confirms that the directional causality goes from realization of historic expectations to prevailing uncertainty. A derived un-weighted composite ‘Uncertainty’ indicator correlates negatively(-0,78) with the corresponding composite ‘Realizations of Expectations’ indicator, confirming the findings.

The business climate and business confidence indicators, as compiled by research institutions, do not consider uncertainty per se as a factor of influence. It is suggested that both these indicators be adjusted by a weighted uncertainty factor.

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