

A conditions monitor for household consumption

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Discussion paper (09006)



Explanation of symbols

.	= data not available
*	= provisional figure
x	= publication prohibited (confidential figure)
–	= nil or less than half of unit concerned
–	= (between two figures) inclusive
0 (0,0)	= less than half of unit concerned
blank	= not applicable
2005-2006	= 2005 to 2006 inclusive
2005/2006	= average of 2005 up to and including 2006
2005/'06	= crop year, financial year, school year etc. beginning in 2005 and ending in 2006
2003/'04–2005/'06	= crop year, financial year, etc. 2003/'04 to 2005/'06 inclusive

Due to rounding, some totals may not correspond with the sum of the separate figures.

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A conditions monitor for household consumption

Floris van Ruth

Summary: A system is proposed to monitor economic conditions relevant for household consumption. By tracking the development of a coherent set of related indicators, consumption realisations can be analysed and underlying trends made visible. It is shown that by using a careful selection process, an indicator set can be constructed which can communicate a lot of relevant information in a concise manner. The indicators are presented in a graphic form, for easy and quick interpretation by the users. A time function and other functionalities should be added to a web-based application to further enhance the utility of the product.

Keywords: Business cycle, short term economic indicators, consumption, indicator sets, data visualization

1. Introduction

The economy is characterized by many cross-relationships between economic indicators. This can both be bewildering and useful. The diversity of economic phenomena is reflected in the wide array of economic statistics published by various agencies. This paper proposes a method which will show important relations in the economy and at the same time introduce a measure of structure into the broad supply of statistical indicators. The basic idea is to take three core indicators of the economy and using economic relations, construct around each of them a system of related statistical indicators. This system then functions as an analytical tool, putting the reported statistics into context and allowing for more in-dept analysis of the realisations. The core indicators selected for monitoring are consumption, exports and fixed capital formation, which together largely describe the expenditure side of the economy. Together they drive medium term economic developments, if not the structural ones. This paper concerns the construction of a conditions monitor for the development of the index of household consumption. It is part of a set of three papers, one for each of the core economic indicators singled out here. A consequence of this separated approach is that there is considerable overlap in the general sections of the three papers.

The related indicators will assist in analyzing and interpreting realisations of the core indicators, showing the influences working at any given time. Given the observed conditions, smaller or larger realisations of the growth rate of consumption will be more likely. Thus, one can assess whether an observed development is normal or abnormal and likely to persist. A somewhat more advanced, and interesting, application is to use the conditions monitor to analyze how the developments in the different factors underpin the observed realisations of the target indicator. This allows a more structured and objective analysis of the developments in household consumption, and give insight in the underlying trends. The concept of publishing statistical indicators in coherent sets is not only useful because it helps structuring statistical dissemination via the explicit ordering of statistical information. Important is also that showing indicators in context of other statistics adds value to the individual indicators by demonstrating that developments are not random but part of a larger system. This makes it easier to interpret the developments of individual indicators and displays the underlying trends.

The actual form of the monitoring system is a separate issue from the fundamental concept of using a coherent group of indicators to track certain developments, and from the selection of these indicators. Having obtained a functioning indicator set, there are numerous methods for displaying them and communicating the information they contain. One could for example opt for computing a form of aggregate indicator, or for displaying the indicators separately either in graphs or symbols. Here, it is required that the conditions monitor should be easy and quick to interpret, show the maximum amount of information while still being comprehensible and it should be possible to ad interactive feature to increase its utility for the users. Therefore, it is proposed to use a graphic approach, constructing a diagram which jointly shows the development of the selected indicators.

2. Methodology

The aim is to construct a tool for analyzing and visualizing the conditions for consumption of goods and services by households. The development of an economic quantity such as consumption is usually influenced by a number of different factors. Generally, this is a complex process and which factors are most important at a certain time tends to be uncertain. However, together these factors will broadly account for the observed behaviour of the target variable, here consumption. The basic idea here is to jointly show the development of these factors, thus giving an indication of what conditions are like for consumption. This requires some clarification as to what is meant by conditions and how these are to be measured. Broadly speaking it means the aggregate development of those economic quantities which have a strong influence on the development of consumption. In general all economic variables are connected, directly and indirectly influencing each other. This means that the majority of the economic indicators tend to develop broadly in line most of the time. This is not very helpful, as monitoring all economic indicators or general economic conditions will only result in confusion or very unspecific, bland analysis. The key words are “broadly” and “most of the time”, for there are of course economic variables which are directly or causally connected, and much more which are connected only by the general development of the economy. Another way of looking at this is that the development of a specific indicator is the net result of the combined influence of a number of relevant other economic quantities. But the importance and timing the influence of each quantity will vary in time. On the other hand, macro-economic models used for forecasting tend to need a surprising small number of variables to predict the development of quantities such as consumption. This is not very helpful in constructing a conditions monitor for two reasons. The modelling environment is required to add additional information to the raw indicators, just publishing these indicators will give an imperfect reflection of the conditions for the target indicator. And the goal is a system which will show the developments in the whole relevant economic environment, not just the two or so most important indicators. This will allow for a richer analysis and lessen the chance of missing an important development.

It should now be emphasized that the aim is not to construct a prediction model, or even a behavioural one. The conditions monitor will not be able to give a quantitative explanation of certain realisation of the target indicator, nor is it designed to do that. The start of this approach is the identification of (general) factors which are important for the development of the target indicators. The key step is finding indicators which reflect these factors. These will form the backbone of the monitoring system. As we are not trying to model or forecast the target indicator, the related indicators need not be leading or be jointly significant. The main conditions are a clear link with one of the underlying factors, a significant individual relationship with the target indicator and being able to give relevant current information. This last condition means that even if a related indicator is lagging, it still can be included if the coincident realisation contains enough relevant information. Thus, the selection process can be summarised as follows:

- Use theory and existing knowledge to identify factors which are relevant for the target indicator, here household consumption.
 - Make a first selection of indicators which are connected to or representative of the identified underlying factors
 - Test the candidate related indicators for their connection with the target indicator.
- This is a multi-step process:

- Compute the maximum correlation of the candidate related indicator with the target indicator.
- Estimate whether the candidate indicator is significant in an ARMAX-model (an ARMA model with exogenous variables) of the target indicator. This is the crucial step in the selection process, as it tests whether the related indicator has a non-spurious link with the target indicator. The ARMA-component of the model will use the information available in the past development of the target indicator itself. Thus, if the related indicator is significant in the ARMAX-formulation, this means it contains new information and the identified relationship is unlikely to be caused by general co-movement. Another way of looking at this is that the related indicator is a source of impulses to the target indicator.
- Compute out-of-sample forecast errors to test the strength of the relationship
- Jointly evaluate the selected indicators to test how well the whole represents the target indicator and the identified factors. There are several ways to do this; e.g. principal component analysis, computing the average of standardized realisations, multivariate regressions or ARMAX.

When this process is completed, the result will be a *diverse* set of indicators with a proven and substantial link with the target indicator. The next step is how to construct a conditions monitor from this. There is no one superior method to do this. Together, the related indicators should reflect all important factors influencing the target indicator. How to extract and present this information is separate from the concept and selection of this group of related indicators. One could chose from different types of disaggregated graphical presentations, or compute an aggregated index, or give a “conditions score”. It depends on what one wishes to achieve. Our approach and the thoughts behind it will be presented in section 4, after the results of the selection process.

3. Indicator selection

3.1 Factor identification

The lion's share of consumption is paid for from labour income. In 2005, labour income (gross wages) constituted 50% of GDP in the Netherlands. This income is mostly converted into consumption goods. Thus, when looking for factors influencing consumption, it seems logical to look at developments in income and jobs. Whilst these are the essential, the situation is more complicated. There are two standard economic theories of consumption; the life-cycle hypothesis and the permanent income hypothesis. There are crucial differences between the two, but the basic premise of both theories is that consumption does not depend on current income alone, but also on expectations of future (development of) income. This means that consumers' expectations are a crucial factor for household consumption. These are of course related to the expected level of income, but also to the expectation of having a job at all, or getting a better one. Thus, labour market developments can be expected to be of importance too. More recent research (M. Mastrogiacomo, "testing consumers' asymmetric reaction to wealth changes" CPB discussion paper 53, 2006) has shown that developments in the value of assets held by households are becoming more and more important in understanding private consumption. This is due to the fact that more and more households own securities and property. Asset value development is therefore the final factor which needs to be considered.

3.2 Correlation analysis

The next step in the selection process is identifying indicators which are connected to the fundamental factors mentioned above. These are shown in table 3.1, consisting mainly of consumer confidence indicators, indicators related to the labour market and income and asset value indicators. The business survey indicators were included because they reflect general economic conditions and developments on the demand-side of the labour market. A more detailed description of the statistics used can be found in appendix I.

Table 3.1; potential indicators and their correlation with the growth rate of the volume index of household consumption.

<i>Indicator</i>	<i>Level/ growth rate</i>	<i>Maximum correlation</i>	<i>Lag (minus is leading, plus is lagging)</i>	<i>Expected sign</i>	<i>Correlation at lag 0 (coincident)</i>	
Consumer future situation	Survey; economic	level	0.6	-17	+	0.38
Consumer future situation	Survey; economic	rate	0.4	-23	+	-0.19
Consumer economic situation	Survey; past	level	0.73	-5	+	0.73
Consumer economic situation	Survey; past	rate	0.6	-19	+	0.05
Consumer future situation	Survey; financial	level	0.72	+13	+	0.60
Consumer future situation	Survey; financial	rate	0.5	-15	+	0.26
Consumer financial situation	Survey; past	level	0.73	+12	+	0.59
Consumer financial situation	Survey; past	rate	0.6	-7	+	0.51
Consumer unemployment risk	survey;	level	-0.7	+4	-	-0.68
Consumer unemployment risk	survey;	rate	-0.6	-15	-	-0.13
Consumer inflation sentiments	survey;	level	0.44	+15	-	0.27
Consumer inflation sentiments	survey;	rate	0.26	+5	-	0.21
Consumer confidence		level	0.72	+1	+	0.72
Consumer confidence		rate	0.58	-19	+	0.11

Lags and leads in months

Table 3.1(Continued); potential indicators and their correlation with the growth rate of the volume index of household consumption, .

<i>Indicator</i>	<i>Level/ growth rate</i>	<i>Maximum correlation</i>	<i>Lag (minus is leading, plus is lagging)</i>	<i>Expected sign</i>	<i>Correlation at lag 0 (coincident)</i>
Business survey; Order inflow	level	0.51	-20	+	0.42
Business survey; Order inflow	rate	0.32	-24	+	ns
Business survey; stock of orders	level	0.53	-10	+	0.52
Business survey; stock of orders	rate	0.48	-20	+	ns
Business survey; employment expectations	level	0.73	+6	+	0.7
Business survey; employment expectations	rate	0.47	-20	+	0.19
Producers' confidence	level	0.54	-11	+	0.51
Producers' confidence	rate	0.46	-20	+	ns
bankruptcies	rate	-0.46	-5	-	-0.41
Long-term interest rate	rate	0.22	+9	?	0.16
unemployment	rate	-0.71	0	-	-0.71
employment	rate	0.8	+3	+	0.72
Wages (collective)	rate	0.67	+24	+	ns
Wage income(quarterly)	rate	0.4	+8/24??	+	
House prices	rate	0.86	+11	+	0.66
Stock market	rate	0.67	-21	+	0.38
Inflation (CPI)	level	-0.47	-15	-	-0.19

Virtually all correlations have the expected sign, except for the inflation expectations. Unfortunately, some indicators such as the income and wage indicators lagged consumption too much to be of use. Others such as the interest rate possess

too little correlation with consumption. An interesting fact is that taking year-on-year growth rates of the sentiment indicators markedly increased their lead on consumption. Based on these results, a first selection was made, with the remaining indicators going through to the modelling stage. For the sentiment indicators, both the levels and growth rates were kept.

3.3 ARMA model testing

In this stage the indicators were tested for their significance in an ARMAX-model of consumption. This will show whether these indicators have a real influence on consumption, and at what lead or lag. Initially, the variables were entered at the lag or lead of maximum correlation found in the previous stage. From this starting point, the lag or lead with maximum significance was sought. This is henceforth considered to be the relevant lead or lag for this indicator. Finally, the predictive power of the indicator was tested in a rolling regression, out-of-sample forecasting simulation. The forecasting error gives another measure by which to compare the importance of the different indicators.

First, it is necessary to formulate an ARMA-model for the year-on-year growth rate of consumption. The optimal formulation proved to be:

$$\text{Consumption} = 0.02 + 0.63 \cdot \text{AR}(1) + 0.39 \cdot \text{AR}(3) + 0.18 \cdot \text{AR}(8) - 0.22 \cdot \text{AR}(12) - 0.93 \cdot \text{MA}(12)$$

$$(0.000) \quad (0.000) \quad (0.000) \quad (0.021) \quad (0.000) \quad (0.000)$$

$R^2=0.89$, $AIC=-7.32$, out-of-sample forecast error = 0.52%-point, Q-stat 0.121, Jarque-Bera probability = 0.79, LM-test probability = 0.05

The model statistics show that this formulation performs satisfactorily. In fact, it will become clear that although most indicators were significant when added to this model, they hardly improved the explanatory power of it.

In table 3.2, the results of the ARMAX-modelling are presented; some goodness-of-fit statistics, the out-of-sample forecast error, the lag or lead at which the indicator was most significant, and the estimated coefficient and its significance. Again, it is stressed that this exercise is not undertaken to forecast consumption, but to test the strength of the link between the candidate indicators and consumption. Therefore, all test statistics are important and not just the forecast error.

Table 3.2; Significance of potential indicators in ARMAX model for consumption.

<i>Indicator</i>		R^2	<i>AIC</i>	<i>RMSE</i> <i>forecast</i>	<i>Lag</i> <i>in</i> <i>model</i>	<i>Coefficient</i> <i>(significance)</i>
Consumer future situation	Survey; economic	0.9	-7.4	0.55	-15	-0.00005 (0.014)
Consumer future situation	Survey; economic	0.9	-7.4	0.53	-21	0.00013 (0.0024)
Consumer economic situation	Survey; past	0.9	-7.37	0.56	-6	0.00004 (0.05)
Consumer economic situation	Survey; past	0.9	-7.39	0.54	-13	-0.0001 (0.06)
Consumer future situation	Survey; financial	0.89	-7.32	na	+13	0.00016 (0.006)
Consumer future situation	Survey; financial	0.9	-7.39	0.54	-19	0.0003 (0.027)
Consumer financial situation	Survey; past	0.89	-7.33	na	+12	0.00016 (0.0031)
Consumer financial situation	Survey; past	Ns				()
Consumer unemployment risk	survey;	0.89	-7.34	na	+6	-0.00005 (0.0086)
Consumer unemployment risk	survey;	0.9	-7.4	0.52	-19	-0.0001 (0.0039)
Consumer inflation sentiments	survey;	Ns				()
Consumer inflation sentiments	survey;	0.89	-7.33	na	+4	0.022 (0.014)
Consumer confidence		0.89	-7.33	na	+1	0.0002 (0.03)
Consumer confidence		0.9	-7.39	0.53	-21	0.0003 (0.0067)

Table 3.2 (Continued); Significance of potential indicators in ARMAX model for consumption.

<i>Indicator</i>	<i>R²</i>	<i>AIC</i>	<i>RMSE forecast</i>	<i>Lag in model</i>	<i>Coefficient (significance)</i>
Business survey; Order inflow	0.9	-7.39	0.53	-20	0.0004 (0.012)
Business survey; Order inflow	0.91	-7.51	0.53	-25	0.0004 (0.019)
Business survey; stock of orders	0.9	-7.37	0.53	-19	0.00017 (0.02)
Business survey; stock of orders	0.91	-7.54	0.53	-23	0.0006 (0.001)
Business survey; employment expectations	ns				()
Business survey; employment expectations	0.92	-7.59	0.43	-20	0.00068 (0.015)
Producers' confidence	0.9	-7.37	0.52	-11	-0.0005 (0.0194)
Producers' confidence	0.9	-7.38	0.53	-20	(0.022)
unemployment	0.9	-7.37	0.57	0	-0.0027 (0.026)
employment	0.9	-7.94	na	+5	0.0073 (0.000)
House prices	0.91	-7.53	na	+6	0.0015 (0.04)
Stock market	0.9	-7.4	0.54	-24	0.0002 (0.003)
Inflation (CPI)	0.90	-7.39	0.54	-14	-0.307 (0.055)

The value of the coefficient cannot be translated into the strength of the link as the indicators were not standardized. Unfortunately, some indicators possess coefficients not of the expected sign. While serious, this is not a reason to discard these indicators out of hand. It could very well be that the coincident value of the related indicator does have a relevant and correct relation with consumption. A straightforward and therefore desirable option for the construction of a monitoring

system is to use the most recent realisations of the chosen indicators. Therefore, indicators which also possess a strong link with consumption at lag zero remain relevant. Where the sentiment indicators are concerned, sometimes the year-on-year growth rates exhibited a much stronger link with consumption than the level of the indicator. In that case, both forms were kept for testing in the next stage. All this explanation is necessary to explain why some indicators were included in the final selection whereas they should have been discarded had the modelling selection criteria been applied rigorously. This would have been suboptimal here, as the goal is not to model consumption, but to find a set of indicators with strong links to consumption which represent the basic factors set out above. Therefore, in the final selection stage, the indicators were evaluated as a whole. This meant that the overall stance of the indicator set should reflect consumption conditions, but it should also be possible to analyse underlying trends from the indicator set. This means that income and wealth indicators are required, but also consumer's expectations on this front. The same goes for labour market indicators, where producers and consumer expectations are as informative as actual realisations.

3.4 Analysis of aggregate performance

Based on this analysis and the results reported earlier, this final indicator set was selected:

Consumer Survey; expectations future financial conditions

Consumer Survey; unemployment risk

Consumer confidence

Producer survey; Employment expectations

Producer confidence

Jobs

Inflation

Housing prices

Stock market

A functioning monitoring system does not require all these indicators to be included; one or two could be dropped without serious consequences. But this set does represent all important factors for household consumption, and therefore yields much valuable information and insight into the forces shaping consumption development. All indicators are published on a monthly basis, which is quite

convenient as this is also the case for the index of household consumption. No information is given above on transformations or lags, as it is still a matter of choice how exactly the monitor is to be formulated. Below, a number of options is given how the indicators can be entered into the system. The consequences for the system as a whole are shown by analyzing in two different ways what the overall message of the conditions monitor would be at every point in time.

It is important to keep in mind that this stage does not yet concern the construction of the monitoring system itself. This is still the stage of indicator selection, which is a separate issue. What system or method is to be used to communicate the information contained in the selected indicators is a development issue in itself, which will be addressed in the final section of this paper.

The first method for assessing the overall message of the indicator set is by simply taking the average of all indicators. This average approximates the overall impression the monitor would give of the conditions at each point in time. Thus, this summarization can be compared to the actual consumption realisations, to assess how well the monitor functions. In order for this to be possible, the indicators do need to be standardized according to:

$$\text{Standardized value}_i = (\text{original value}_i - \text{average}) / (\text{standard deviation})$$

This ensures that all indicators have roughly the same minimum and maximum value, and average zero, and can thus be shown on equal terms.

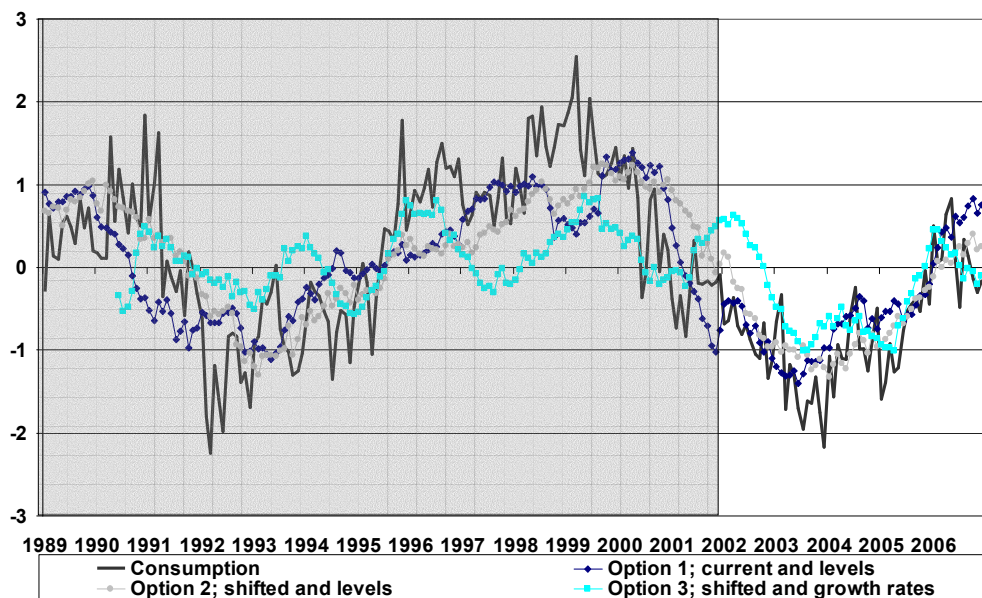
A different method for evaluating the joint development of the selected indicators is by using factor analysis. This technique is based on the extraction of common components or factors from groups of variables. It seeks to describe complex dataset by identifying relatively few underlying factors, which together can explain the observed behaviour. Usually, many factors can be extracted, but they differ in importance. The first factor, or principal component, extracted is the most important one, and will in a coherent indicator set explain a significant part of the behaviour of the individual series. How important a factor is, is measured by the percentage of the total variance of the series it explains. The hypothesis here is that the most important component will be related to consumption, as the first principal component is supposed to measure that what the individual series have most in common. As these indicators have been based on the strength of their relationship with consumption, it is likely that this represents their strongest common component. As said, the percentage of total variance explained indicates how strong the communality is. Another measure of this are the factor loadings. These indicate how each individual indicator is related to the common component. High factor loadings mean a strong link. Therefore, if all or most individual indicators have a high factor loading on the common component, this means both that the indicators have much in common and that the common component gives a good representation of the indicator set as a whole.

Now, three options for entering the indicators are considered and analysed using the methods described above:

- ① - All indicators in their normal form; levels for sentiment indicators; growth rates for the others.
 - Only current values are used, i.e. no leads or lags
- ② - All indicators in their normal form; levels for sentiment indicators; growth rates for the others.
 - Leading variables are entered at their lead of maximum influence, as determined in the ARAMAX-models.
- ③ - All indicators are entered as year-on-year growth rates.
 - Leading variables are entered at their lead of maximum influence, as determined in the ARAMAX-models.

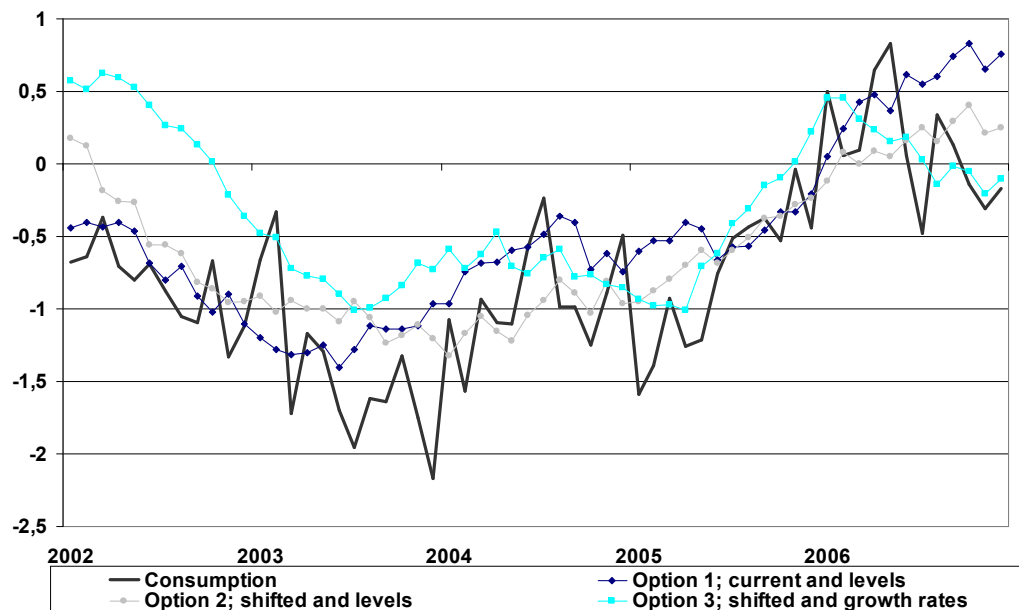
The first option has the strong advantage of being very straightforward and easy to communicate. The other two options are probably more accurate and contain more relevant information, but are less easy to grasp and explain. The overall picture of these three options is shown in graph 3.1, compared to the year-on-year growth rate in consumption.

Graph 3.1; Simple average of standardized indicator sets for three options compared with standardized growth rate of household consumption volume.



The area before 2002 is shaded, as the dataset is only complete after 2001. Therefore, the realisations before 2002 do not give an accurate reflection of the system as a whole, but are still informative. Graph 3.2 shows the developments from 2002 onwards in detail.

Graph 3.2; Simple average of standardized indicator sets for three options compared with standardized growth rate of household consumption volume. Complete set only 2002-2006.



Especially after 2002, the resemblance between the development of consumption and that of the indicator sets is remarkable. All options show the same phases of downturn and recovery. Even the more short-term developments are identified with reasonable accuracy. Overall, the monitoring sets are less volatile than the consumption realisations themselves. This is a good thing, as the aim is to place the consumption realisations into perspective, offering a way to distinguish between short-term and more fundamental developments. Option three, which has all indicators in growth rates and shifted to the lead of maximum relevance does seem to be the most accurate, especially from the end of 2005 onwards. However, the simplest construction, option one, also functions very well.

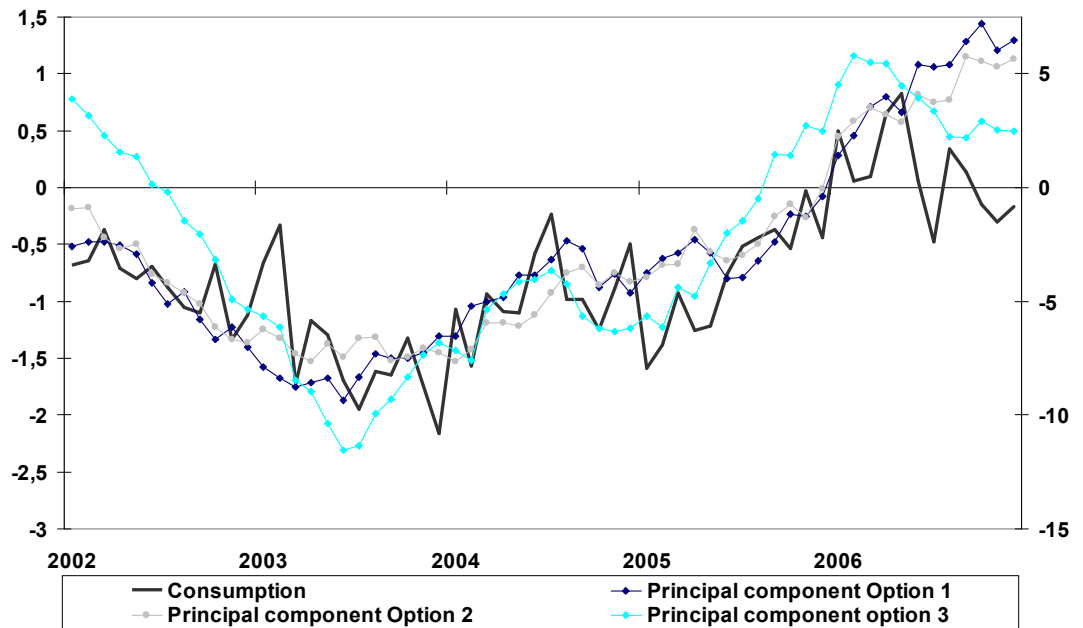
The next step is to use factor analysis to further analyse the behaviour of the different formulations and to test their coherence with consumption. In table 3.3 the extraction and factor loadings for each of the three options described above can be found. The components have been rotated using the VARIMAX method to obtain a more coherent extraction.

Table 3.3; Results of factor analysis for three different formulations of the indicator set.

<i>First principal component</i>	<i>Option 1</i>		<i>Option 2</i>		<i>Option 3</i>	
	<i>Total variance explained:57 %</i>	<i>Total variance explained:53 %</i>	<i>Total variance explained:53 %</i>	<i>Total variance explained:52 %</i>	<i>Total variance explained:52 %</i>	<i>Total variance explained:52 %</i>
<i>Indicator</i>	<i>Factor loading</i>		<i>Factor loading</i>		<i>Factor loading</i>	
Consumer Survey; expectations future financial conditions	0.454		-0.396		0.176	
Consumer Survey; unemployment risk	0.968		0.937		-0.922	
Consumer confidence	0.969		0.925		0.841	
Producer survey; Employment expectations	0.900		0.824		0.891	
Producer confidence	0.899		0.691		0.862	
Jobs	0.870		0.944		0.230	
Inflation	0.291		0.422		0.446	
Housing prices	-0.035		0.115		0.218	
Stock market	0.561		0.556		0.602	

The first important aspect is that the first principal components extracted are in all three cases able to explain by themselves more than half the total variance present. This means that the common component is strong. This is reflected in the factor loadings which are quite high for the majority of the indicators. There a few oddities such as the case of expected future financial situation, and the housing prices seem to be somewhat separate. But overall the pattern is clear. Option one, with all the indicators in their standard form and without shifts has the best score here, with 57% of variance explained. In graph 3.3 the computed first principal components are shown.

Graph 3.3; First principal component extracted from standardized indicator sets for three options compared with standardized growth rate of household consumption volume. Complete set only 2002-2006.



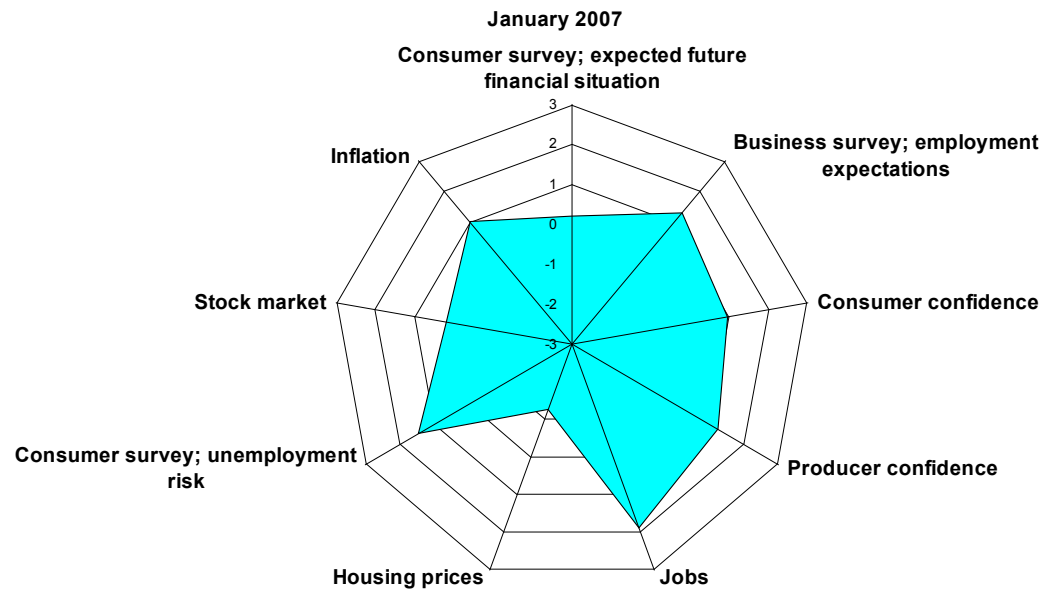
As before, the computed common development of the indicator sets reflect consumption development quite well. This indicates that the monitoring set will be able to reflect current conditions for consumption, yielding credible information. Option 1 and 3 seem to be the most accurate, with option 3 being especially more relevant in the last year of the sample. All these results are only relevant for the indicator selection.

The common indicators computed in this section are not meant for publication, and are not in any way the final goal. On the contrary, it is best to show the development of the related indicators individually, as then they yield the most information. How this is to be done is the next step, the design of the actual monitoring system itself. This is the subject of the next section.

4. A graphic conditions monitor

The most important aspect of the monitoring system is that it should be able to transfer in simple and easily comprehensible manner information on developments relevant for consumption. Its very structure should make available implicit knowledge on underlying factors which influence consumption. This might sound somewhat abstract, but it leads to a surprisingly simple practical form. The indicators selected above should be shown individually, thus indicating by their presence what kind of factors are relevant for consumption. Furthermore, the monitoring system should be graphic, as this means that it will be quick and easy to read and interpret. It should be constructed in such a manner that the overall picture represents the “strength” of the consumption conditions. For these reasons I propose the spider-diagram, see graph 4.1.

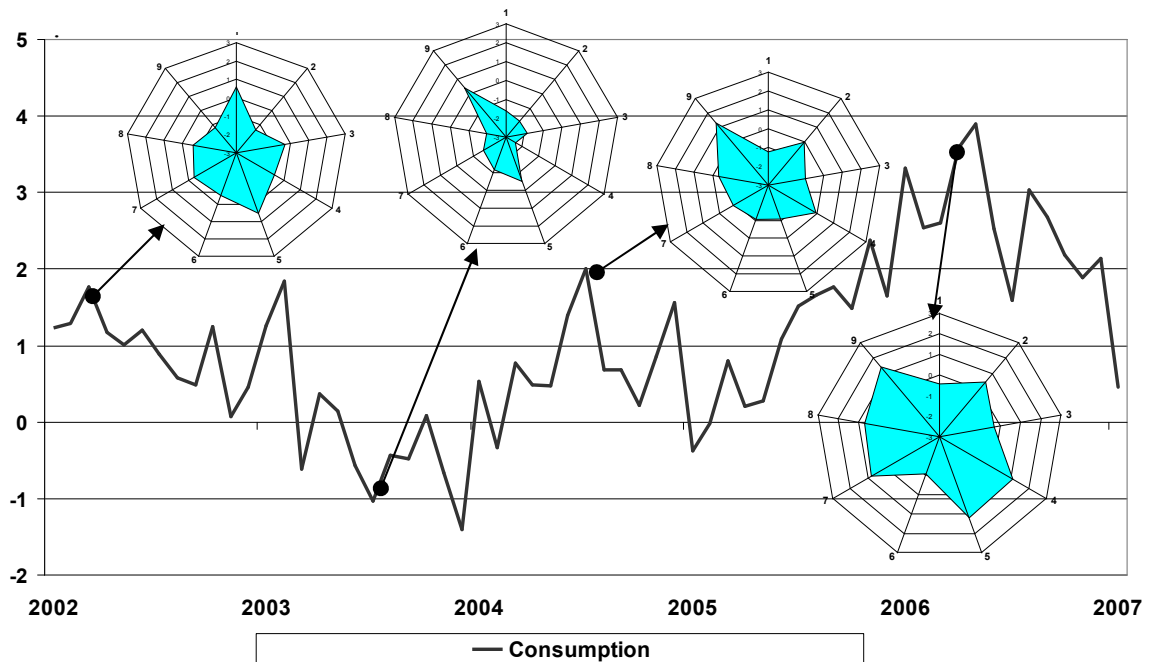
Graph 4.1; Proposed graphic conditions monitor for consumption.



This functions well for two main reasons; the surface covered is a direct and easily interpreted measure of the current level of conditions. And it is quite clear that the whole is constructed from individual indicators, which can be immediately identified and analysed separately. The values of the indicators are entered in a standardized fashion, as described in section 3 (Inflation and unemployment risk have been inverted). This allows them to be shown in one figure at the same scale. Other methods for weighing the data are possible, but this one is the most

straightforward. As mentioned before, this indicator set is only a proposal. Using less indicators or making all or some of these optional is a distinct possibility. In diagram 4.1 the situation in January 2007 is shown, when the realisation of the monthly index of household consumption was +0.5% year-on-year. Indicator behaviour is consistent. The diagram seems to suggest that, although not exuberant, the conditions for consumption were good. Therefore, +0.5% seems a bit low. In graph 4.2, the monitor diagram can be compared to the realisations at several other moments in time.

Graph 4.2; Evolution in time of Proposed graphic conditions monitor, compared with corresponding realisations of consumption growth rate.



What graph 4.2 shows is that the monitor contracts and expands as consumption development is weaker or stronger, as it was designed to do. At any one time one or two indicators can exhibit deviant behaviour, but this is not a problem as one indicator can not disturb the overall picture.

Graph 4.2 also points to interesting animation possibilities. If a time function is added to the diagram, the development of these factors can be followed. For full effect it should be combined with a corresponding concurrent diagram of the development of consumption.

Appendix I; Data description

<i>Indicator</i>			<i>Level/ growth rate</i>	
Consumption			rate	Growth rate of the monthly index of the volume of household consumption
Consumer future situation	Survey; economic		level	Whether the economic situation is expected to improve in the next 12 months (balance)
Consumer future situation	Survey; economic		rate	Realisation _t -realisation _{t-12}
Consumer economic situation	Survey; past		level	Whether the economic situation has improved in the past 12 months
Consumer economic situation	Survey; past		rate	Realisation _t -realisation _{t-12}
Consumer future financial situation	Survey; financial		level	Whether the household financial situation is expected to improve in the next 12 months
Consumer future financial situation	Survey; financial		rate	Realisation _t -realisation _{t-12}
Consumer financial situation	Survey; past		level	Whether the household financial situation has improved in the past 12 months
Consumer financial situation	Survey; past		rate	Realisation _t -realisation _{t-12}
Consumer unemployment risk	survey;		level	Expected development of unemployment in the next twelve months
Consumer unemployment risk	survey;		rate	Realisation _t -realisation _{t-12}
Consumer inflation sentiments	survey;		level	Expected price developments in the next twelve months
Consumer inflation sentiments	survey;		rate	Realisation _t -realisation _{t-12}
Consumer confidence			level	Aggregate indicator of consumer confidence
Consumer confidence			rate	Realisation _t -realisation _{t-12}

Business survey; Order inflow	level	Assessment of the inflow of new orders
Business survey; Order inflow	rate	Realisation _t -realisation _{t-12}
Business survey; stock of orders	level	Assessment of the total order book
Business survey; stock of orders	rate	Realisation _t -realisation _{t-12}
Business survey; employment expectations	level	Expected development of employment at the company in the next three months
Business survey; employment expectations	rate	Realisation _t -realisation _{t-12}
Producers' confidence	level	Composite indicator of producer confidence
Producers' confidence	rate	Realisation _t -realisation _{t-12}
bankruptcies	rate	Bankruptcies of private companies
Long-term interest rate	rate	Yield on ten year government bonds (DNB)
unemployment	rate	Number of working age population, available for work but unemployed
employment	rate	Persons of working age working at least 12 hours per week
Wages (collective)	rate	Development of monthly wages according to index of average collective bargaining contract wages
Wage income(quarterly)	rate	Wage income from national accounts
House prices	rate	Kadaster (land registry) survey of housing prices
Stock market	rate	Composite index of Dutch stock market (OECD)
Inflation (CPI)	level	Growth rate of the Dutch index of consumer prices

Appendix II; Graph of indicators and consumption

All indicators standardized, sentiment indicators in levels, others in growth rates

