STATISTICAL ANALYSIS OF FINANCIAL ACCOUNTS IN CASE OF NON-FINANCIAL CORPORATIONS

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Abstract

In the present economic conditionsit is more and more important for the macroeconomic analysts to usenew processesbased on theoretical and practical approaches which differ the present technics foranalysis andto make forecasts. In this paper we dealwith a new approach can be used toanalyse the financial instruments of non-financial companies. Ourresearchdoes not observe the income and consumption of the system of national accounts, but we focused on the financial accounts which are based on more reliable information. The purpose of our research was to analyse the financial accounts of non-financial corporations' sector data. In this paper we analysed the financial accountsof Huusing statistical tools. We aimed to determine the potential regularities and regressions in the time series.

Keywords:

Introduction

The 2008 financial crisis highlightedthat the traditional methods, the current approaches have risksin case of macro-economic analysis because they are not able to predict and forecast the turning pointsin each cases. Stiglitz and his co-authors went furtherin their study (2009). They pointed out that new methods, new approaches, new indicator systems should be developed and applied for measuring and comparing national economiesin the future. Our study followsthis approach, because we usenot only the system of national accountsbutalso their subsystem, the financial accounts to make a more detailed analysis of the internal processes and correlations.

In our research we were interested in which methods can be used to analyse the financial accounts that containlarge amount of informationandhow can we build the new results into the process of the economic analysis. In our work we studied the dynamics of the integrated financial accounts, especially the analysis of internal processes,in order to make forecaston the future changes of the various financial instruments. Now we present only a part of this research, we present only the analysis of some financial instruments which are the major part of the assets of non-financial corporations.

Statistical analysis of non-financial corporations' financial accounts

We use the following methods in the mathematical and statistical analysis of the financial accounts' time series in case ofthe non-financial corporation sector:

- Dynamic and trend analysis,
- Analysis of the relationship,
- Co-integration test,
- VAR model.

The first question in the analysis of the historical data is to decide whether the time series is stationary, does it containa trend or seasonality. In some cases it is easy to

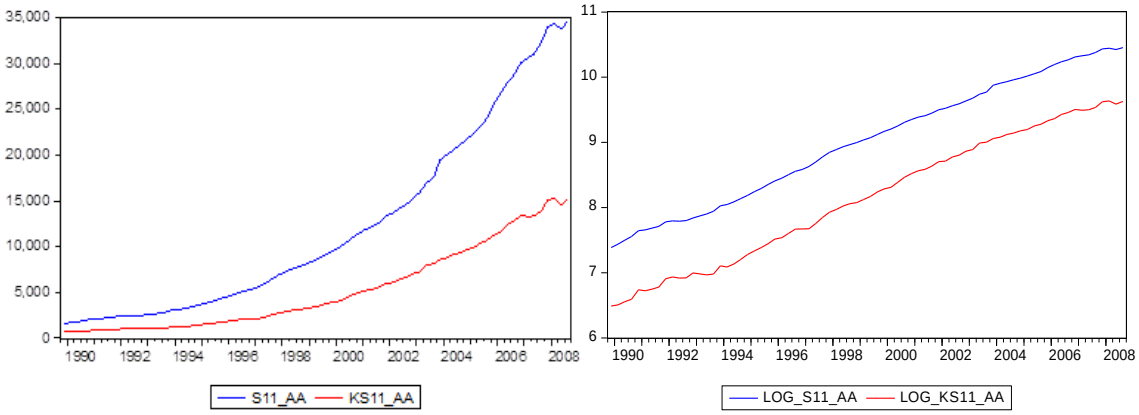
answerusing a diagram to represent our data. This analysis is particularly important when we fit the initial model. The aim is to find the theoretical model which describes the empirical time series with the best accuracy.

In case of the dynamic analysis we identified the common trends and their effects, and then we examined the systematic deviations from this trend because they may refer to some changes in the preference. In the next step we explored the relationships between the real and financial data as well as within the financial data. These relationships make possible toforecast the real variables on the basis of financial data, which was the primary purpose of our analysis. The relationships were tested by co-integration tests to eliminate thevirtual relationshipscaused by the common trend (Stark 2012).

To classify the non-financial corporations into a separate sector is justified by the special features of these corporations and their role in the economy. It is easy to prove that their activities, the structure of the financial asset and liability, and the financial solutions basically differ from the other sectors.

The rest of the sectors have financial assets for different purposes. The composition of the assets of non-financial companies is very heterogeneous, cash, deposits and loans havethe largest share.We can state that the structureofthe non-financial corporations' assets in Hungary is different from the other countries' structure. At the end of 2011, in the European Union the equity (45.5%)had the highest rate, followed by loans (17.4%) and cash and deposits (13.1%)

Figure 1:Total assets (AA) of non-financial corporations between 1990 and 2008



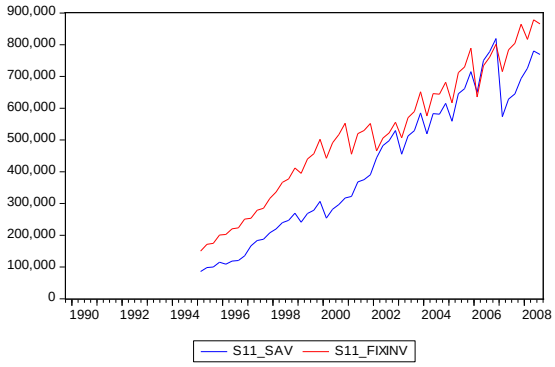
The asset of non-financial corporation sector is a steadily increasing time series. The stock datafollow an exponential trenddue to the effects of inflation which explainsextremely well the changes in capital stock. Significant difference cannot be detected between the consolidated and unconsolidated financial time series. In the logarithmic form there is only one constant difference (Figure 1), which means that the growth rates of thetwo time series do not differ, the outstanding difference is due to the initial conditions. The co-integration tests show a real relationship with high reliability.

Based on the above there is no major empirically relationship between the consolidated and non-consolidated assets. The relative proportion of the two time series is constant, which provides a single average growth rate. If we explain the total assets by the sector's gross domestic output or by value added, we can discover a strong relationshipatthe level of the stocks. Due to the strong relationship between the output and value added none of them hasa strong relationship with the assets.However, observingthe differences the relationshipisinsignificant, even though the co-integration tests show a real relationship. Introducingvarious delays or forecastsdoes not solvethis problem.

If we use the secondary accounts and the capital accounts we can explore real relationships. The gross savings show a strong relationship with the change of assets (Figure

2).This relationship does not exist in case of the original data, but it existsif we introduce a significant quarterly delay or quarterly expectations. The savings have some effectson the changes of assetstypically through semi-annual, annual delays, while the investmentseffect on the changes of assets through the expectations and plans. If we supposerational expectations we finda real relationship in the future data. Using these results together we findsigned errors due to the extremely high multicollinearity.

Figure 2: Real economy savings (SAV) and investment (FIXINV)in case of non-financial companies between 1994and 2008



In the aggregated data we canfind the company's purposesthat they save for a future investment while on the other hand it is easy to see that the real economic savings and borrowings do not appear immediately in the financial accounts. The financial accounts show a kind of smoothed value, the fluctuations of the real economy slowly appear in the changes. Thus, the information obtained using the financial accounts may be used to predict the future changes of investment.

*The stocks of cash and deposits*can be explained by the given percentage of total assets and it follows the same trendfrom statistical point of view. The time seriesfollowsa smooth, exponential trend.

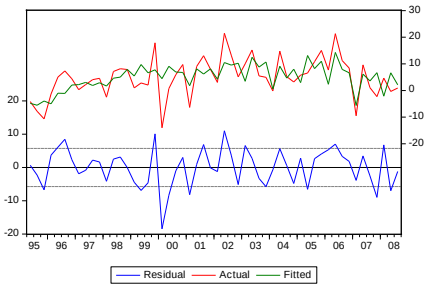
The time series areco-integrated by the total assets, i.e. there isa real relationship between them. However, the cash and deposits rate cannot be considered to be stable in the examination period. The significant trend indicates that their share within the total assets permanently decreases. Analysing thisproportion the inflation shows a significant, but not very strong correlation, its sign is typically negative, i.e.in case of increasing inflation companies reduce their liquid reserves. Due to the strong relationship with the total assets it can be well explained by the gross domestic production level.

Examining the differences we canconclude that the cash and deposits have a stronger relationship with the changes of the production than the total assetsin accordance with our theoretical expectations. The change of the output level directly affectsthe liquid assets, the relationshipmeans direct and delayed affects, too. Inflation isalso significant here (Figure 3). Omitting the inflation the relationshipremains, but the delayed variables become insignificant. Overnight interest rates paid on deposits arein all cases insignificant.

Figure 3: Relationship between cash (A21) and inflation(INFL) in case of non-financial corporations

Dependent Variable: D(S11_A21)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(S11_OUTPUT)	5.40E-06	1.46E-06	3.708577	0.0005
C	53.24159	21.61776	2.462864	0.0173
INFL	-0.899904	0.240059	-3.748671	0.0005
LOG(@TREND)	-10.33834	5.036931	-2.052508	0.0454
R-squared	0.429626	Mean dependent var		4.952315
Adjusted R-squared	0.395404	S.D. dependent var		7.364481
Prob(F-statistic)	0.000003			



The rate of cash within liquid assets isconstant, but a slight negative trend can be observed. The trend of cash represents a change of practice,the enterprises progressively reduce the amount cash reserveover the changes of real economic variables, independently of them. In case of cash there also a strong relationship between the levels of production and cash. In case of differences we find real relationship, which is not smoothed by the effects of inflation.

If case of the differences the inflation is significant with negative sign, i.e.due to the high inflation companies reducestheir cash much more than the external trend. However, observing the proportion of the cashwithin the liquid assets the inflation does not explained the changes of this rate.

In case of *the deposits* - as a complementary of liquid assets – we can drawsimilar conclusions. Its rate is constant,in case of decreasing cash it slightly increases. There is also a strong relationship with the real economy. Inflation does not have relationship with the deposit, but the interest rates ofpayable demand and fix deposits are also insignificant. It proves that for the companies the interest received is not asimportant as the liquid nature of the asset.

If we use the three sub-groups together in the same regression, we conclude that the cash and depositsare not substitute, but rather complementary instruments. That is, the cash anddeposits - although both are for turnovergoals–are not competitive instruments to each other in the operation of companies. As a result of rising inflation cash does not become a deposit, but other kinds of more profitable forms. Our observation showsthat the rate of corporate deposits is not relevant inthe corporate sectoraggregated on macro level.

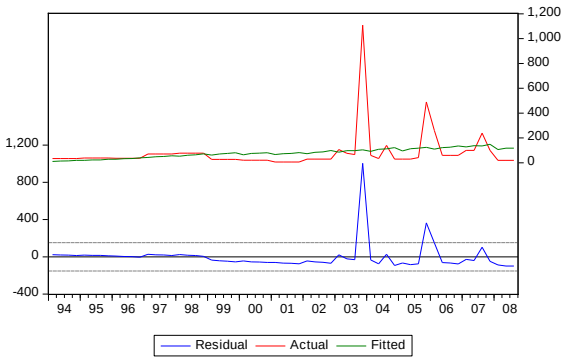
The major part of the consolidated *loans* which is given by non-financial corporationsisa credit for foreign partners. A significant part of loans to foreigners is not a real investment, but a form of disinvestment of the parent companies. This part cannot be explained by the variables of the national economy, so we could analyse only the remaining part. The internal loan can be approximated by an exponential trend and the proportion of total assets is assumed to be constant. The first-order differential does not have a relationship with the production variables, but the operating income and the savings are goodexplanatory variables. It can be assumed that internal loans of the sector are not operational, but their main purpose is savings. Changes of the loan show a strong relationship with the sector's planned investments.

On the asset side the *shares*of non-financial companies can play multiple functions. First, this instrument is an equity,sothe main part of this stock shows the relationship between the parent company and the subsidiary. The second function is a saving form. The first form is more important in the case of Hungarian data. The major part of the instrumentis unquoted shares and not shares, while the external portfolio is almost entirely foreign shares. The time series can be approximated by exponential trend. We can detect only a weak relationship with the production levels, and the savings and investment activity are not significant (Figure 4). In the case of sub-groups the main changes are the transactions of shares. The investment and stock market transactions differ from these trends, showing two fundamentally different changes. There is no significant relationshipwith yield variables, even in case of quoted shares. We can detect a significant relationship only with the planned investmentinthe real economic variables, but its strength is significantly lower compared to the case of loan instrument.

Figure 4: Relationship between shares (A512, A51) and investment (FIXINV)
in case of non-financial corporations

Dependent Variable: S11_TRA512+S11_TRA513-KS11_TRA512-KS11_TRA513

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-15.36624	54.39809	-0.282478	0.7786
S11_FIXINV(4)	0.000175	9.44E-05	1.855476	0.0687
R-squared	0.056960	Mean dependent var		78.66639
Adjusted R-squared	0.040415	S.D. dependent var		155.0202
Prob(F-statistic)	0.068701			



In order to examine the relationshipsin the*corporate assets* more preciselywe build up a vector-autoregressive (VAR) model using the main instrument groups. The main objective of this analysis is not the interpretationof coefficients and significance levels, but the detailed examination of the conjugate impulse response functionsdescribing the long-term relationships.

Application possibilities

The model can be expanded by the analysis ofthe liability of this sector, and the analysis ofthe further financial sector's total assets.In these casesit is needed to determine the relationships between the financial and real economic time series data, and to detectthe time-series dynamics and finally to develop the vector auto-regressive model. It means that the sector analysis of the assets and liabilities, thesimulationof the VAR model allows us to build a complex structured model which may be an appropriate tool to estimate the future changes of the macroeconomic processes. VAR models can be applied in such cases when there is a strong relationship between the variables so using these relationships we can improve the forecast accuracy.Using appropriate assumptions for cross-correlationsthe VAR models may be able to create *impulse response functions* and we may be able to quantify the direct impact of the macro economic scenarios.

It is important to emphasize that onechange in one financial asset causes multiple changesin the model due to the double-entry bookkeeping of economic transactions, since this change has an effect to the asset and liabilities within the sector, and a further effect between the sectors as well due to the relationships between the sectors.

Conclusion

In summary, analysing the financial accounts using statistical tools can be integrated to the process of economic analysis. The financial accounts statisticsis suitable to gaininformation on the economic players and processes. It would be useful to compare the results with using financial data of other European Union member countries or any other countries.It is the next step in our research work.

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