Correlation between Growth Rate and Non Performing Retail Loans in the Republic of Macedonia

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Abstract
The research paper investigates the correlation between Gross Domestic Product, total declared and paid wages by Macedonian real economy and the level of nonperforming retail loans in the Republic of Macedonia in the period of the last quartile of 2010 till first quartile of 2012. The examination of the feedback effect broadly confirms the strong correlation between real economy and nominal economy. From the analysis carried out, it was found that the level of NPLs in retail banking is directly attributed by ups and downs within the business cycle. Moreover, the research paper indicates that NPLs in retail loans responds to volatility in real economy, where increase or NPLs is perfectly negatively correlated to economic growth rate. Correlation analysis with SPSS 17.0 was used to administrate this research study.

Key words
Gross Domestic Product, Business Cycle, Paid wages, NPLs, Pay Roll Account

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1. Introduction
In this research paper we test the hypothesis how probability of default (PD) is affected by general economic conditions, measured by isolated macroeconomic variables. A payroll account is a bank account that is set aside for the purpose of managing all disbursement that is associated with the payroll of an employer. The role of pay roll account in retail banking is one of the main tools to determine current market condition as well as watchdog of credit risk appearance in amplitudes within the business cycle.

Macedonian’s real economic structure and its capacity to pay monthly wages is a critical factor to know and to understand the potentials and capacities of retail banking market. Moreover, the inclusion of selected macroeconomic variable gives a statistically explanatory model and statistically significant strength in predictive performance over not included macroeconomic variables.

The role of payroll account in retail banking is incredible, since the starting points of creating retrospective and prospective strategy relies on the potentials and capacities of Macedonian economic structure to disburse monthly net wages. Therefore, the dynamics of unsecured loans will depend on business cycle, which means that the credit risk level will be determined by general economic conditions.

National economies go through a regular model of ups and downs in the value of activity known as “Business Cycle”. Business cycle and amplitudes within the cycle is crucial for businesses as well as for financial institutions. The Macedonian business cycle is characterized increasingly by large volatility and dramatic current account reversals. Consequently shocks to trend growth are the primary source of fluctuations that cause serious damage to the performances of real economy. Thus, the small volume and openness of real economy underlies premises that the Macedonian economy structure in context of volatility continuously losing its competitiveness.

In simplest term, this underlines that Macedonian real economy does not have the structural power to buffer the shocks that are coming from external and internal channels. Moreover, the dramatic reversals in fiscal, monetary, trade and investment policies in last few years does not showed consistency and significant level of economic results.
After worldwide financial crisis of 2008, the Macedonian real economy is faced with difficult time to achieve projected economic growth. Ups and downs as the main phenomena in Macedonia business cycle as it expressed in the table 5.6 affected the general economic capacities and deteriorate the competitiveness of the real economy. Consequently shocks to an economic growth increased the uncertainty and seriously injured the real economic structure. Uncertainty in last few years has seriously injured liquidity in the real economy, this problem created a lot of repercussions in the company’s competitive edge that generates domino negative effects in macroeconomic indicators as well as in financial institutions.

In order to analyze dynamics and credit risk level of unsecured loans, the relationship among GDP, Companies paid wages, total wage disbursement and non-performing loans is a key analytical tool to detect what cause produces what effects. We use second hand data obtained from Public Revenue Office, National Bank of Macedonia and State Statistical Office to test the relationship of over mentioned variables.

Table 1. Growth Rate and selected Variables

<table>
<thead>
<tr>
<th>GDP - Business Cycle</th>
<th>Q1 2010</th>
<th>Quartile I</th>
<th>Quartile II</th>
<th>Quartile III</th>
<th>Quartile IV</th>
<th>Q1 2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Companies paid wages</td>
<td>1.90</td>
<td>-3.50</td>
<td>0.30</td>
<td>-1.50</td>
<td>-2.50</td>
<td>-4.50</td>
</tr>
<tr>
<td>Total declared wages</td>
<td>-5.00</td>
<td>-2.50</td>
<td>1.50</td>
<td>1.10</td>
<td>-4.50</td>
<td>-5.50</td>
</tr>
<tr>
<td>Total declared and paid wages</td>
<td>-1.82</td>
<td>-5.50</td>
<td>-1.50</td>
<td>1.50</td>
<td>-2.50</td>
<td>-5.60</td>
</tr>
</tbody>
</table>

Source: NBRM, PRO, SSO

Figure 1. GDP Growth Rate

The data shows that the company’s capacity to pay regularly wages to its employees is linked directly to dynamics of general economic condition. As we can see from the data obtained from Public revenue office figure 5.7 Macedonian companies faces difficulties in regularly distribution of monthly wages. The correlation analysis shows that fluctuation of companies to process the wages to their own workers is perfectly correlated with Gross domestic product growth (correlation 0.93), which implies that the relationship between variables have strong positive close connection.
Figure 2. Companies Processed Wages

The dynamics of total declared and paid wages as we can see in table 5.8 show downward sloping curve which is reflection of general economic condition. Thus, Total declared and paid monthly wages in the economy is a barometer not only for performance measure of real economy but also is a strong indicator for demand for unsecured loans as well as robust indicator of overflow risk in retail banking sector.

![Total Declared and Paid Wages](source)

Source: Public Revenue Office

Figure 3. Total Declared and Paid Wages

The most commonly available indicator of loan portfolio quality is the actual default rate measured by the ratio of nonperforming loans to total loans.\(^1\)

In October 2012, National bank of Macedonia confirmed that 390 million Euro loans have passed to non performing loans (280 million corporate loans, 110 million euro retail loans). The worrying growth dynamics of past due loans to performing loans increased from month to month and exceeded critical limit of 10 percent and until October 2012 to achieve the highest rate 11.2 of total issued loans. Growth rate of NPL and failure of corporate and retail clients to return more than three mostly installments is caused by the deterioration of the real economy, poor performances of firms and weak financial conditions of citizens.

According to my opinion this is the first alarm that the economic crisis in the real sector can spill over to the nominal sector (financial institutions), which has so far been immune.

![Non Performing Loans](source)

Source NBRM

Figure 4. Non Performing Loans

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\(^1\) J. Giancarlo Gasha and R. Armando Morales, Identifying Threshold Effects in Credit Risk Stress Testing, IMF working paper WP/04/150, p. 3
2. Data Analysis

The research paper highlights some important macroeconomic indicators that describe cause – effect relationship between clients’ user of unsecured loans and selected macroeconomic indicators that are important from risk assessment and validation in retail banking.

Use the Correlation transformer to determine the extent to which changes in the value of an attribute (such as non-performing loans) are associated with changes in another attribute (Business cycle and total paid wages in the real economy). The data for a correlation analysis consists of two input columns. Each column contains values for one of the attributes of interest.

The Correlation transformer can calculate various measures of association between the two input columns. You can select more than one statistic to calculate for a given pair of input columns.

The correlation coefficient $r$ is a measure of the linear relationship between two attributes or columns of data. The correlation coefficient is also known as the Pearson product-moment correlation coefficient. The value of $r$ can range from -1 to +1 and is independent of the units of measurement. A value of $r$ near 0 indicates little correlation between attributes; a value near +1 or -1 indicates a high level of correlation.

When two attributes have a positive correlation coefficient, an increase in the value of one attribute indicates a likely increase in the value of the second attribute. A correlation coefficient of less than 0 indicates a negative correlation. That is, when one attribute shows an increase in value, the other attribute tends to show a decrease.

Table 2. Correlations

<table>
<thead>
<tr>
<th></th>
<th>Companies Processed Wages</th>
<th>Total Declared and Paid Wages</th>
<th>NPL</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP</td>
<td>Pearson Correlation .801</td>
<td>.503</td>
<td>-.991**</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed) .004</td>
<td>.388</td>
<td>.001</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Companies Processed Wages</td>
<td>Pearson Correlation .885</td>
<td>.046</td>
<td>-.809</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.097</td>
<td></td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Total Declared and Paid Wages</td>
<td>Pearson Correlation .885</td>
<td>.046</td>
<td>.561</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.005</td>
<td></td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>NPL</td>
<td>Pearson Correlation -.991**</td>
<td>-.809</td>
<td>.561</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed) .601</td>
<td>.005</td>
<td></td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>

**. Correlation is significant at the 0.01 level (2-tailed).
. Correlation is significant at the 0.05 level (2-tailed).

The data obtained from correlation analysis indicates that selected macroeconomic variables in context of Pearson’s $r$ shows strong correlation. The correlation between Gross Domestic Product and Non Performing Loans measured by Pearson R shows perfect negatively correlated -.991 at significant level 0.01, this means that as one variable in our case GDP decreases in value the second variable increases in value (NPL) which implies that the variables are asymmetric in reaction. Increased percentage of the NPL is caused by decreased percentage of GDP. So we can conclude that when gross domestic product value is decreases the nonperforming loans of issued loans increases.

The Correlation between GDP and Companies processed Wages measured by Pearson’s R show positive strong correlation .881, this means that as GDP increases or decreases in value the companies that processed wages will increase or decrease, which implies that the variables are symmetric in reaction. But the problem is the significant level 0.104 which is higher than $\alpha = 0.01$. This phenomenon can be argued with following arguments. First, Macedonian GDP volume is small in nature so increasing or decreasing the output in
particular sector can cause increase or decrease in GDP, or increasing of output of some big companies might increase the GDP growth rate. Second, growth caused by particular sector or big companies does not imply that the entire economic sectors show positive or negative sign. Since significant level is not acceptable we can conclude that when GDP increases or decreases the company’s capacity to pay monthly wages will increase or decrease since the correlation is .881 but we need to take in the consideration the stated argument for significance of statement.

The correlation between Total declared and Paid wages and Nonperforming loans measured by Pearson’s R shows negative correlation -.561, this means that as total declared and paid wages dynamics is decreases the non-performing loans value is increases. This means that variables are asymmetric in reaction. So we can conclude with significant level 0.01 that decreases of total wages distribution to employees will increase the non-performing loans of total issued loans.

Hypothesis Related to Research Question
The hypothesis related to third research questions explores the dynamics of demand of unsecured retail loans in relation with business cycle and explores clients’ credit risk level in term of economic condition. How volatility in the real economy impacts on deterioration of credit risk levels regarding unsecured retail loans?

Table 3. Household Quartile Growth Rate

<table>
<thead>
<tr>
<th>Household Credit growth rate</th>
<th>Q4 2010</th>
<th>Q1 2011</th>
<th>Q2 2011</th>
<th>Q3 2011</th>
<th>Q4 2011</th>
<th>Q1 2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP</td>
<td>2.9</td>
<td>5.3</td>
<td>5</td>
<td>1.9</td>
<td>0.9</td>
<td>-1.3</td>
</tr>
</tbody>
</table>

Source: NBRM

Figure 5. Relationships between Selected Indicators

Figure 6. Household Credit Growth Rate to GDP
As we can see from the data from NBRM the household credit curve follows by ups and down which indicates that demand for household credit is determined by fluctuations in business cycle.

Even though the household to GDP is 18.36% which is still lower compared to neighboring countries we can conclude that Macedonian retail market is achieved in early saturation phase in term of retail loans. Since the credit growth curve intercepts the GDP curve in first quartile of 2012 where the credit growth rate is higher than GDP growth rate we can conclude that the demand for unsecured retail loans is linked to GDP.

Determination of credit risk levels in term of economic condition in main indicator to validate the credit quality. The data obtained from correlation analysis in table 5.10 indicates that Gross domestic product and Non Performing Loans measured by Pearson R shows perfect negatively correlated -.991 at significant level 0.01 which implies that the variables are asymmetric in reaction. Increased percentage of the NPL is caused by decreased percentage of GDP. So we can conclude that when general economic conditions is decreases the credit risk levels of issued retail loans will increase. Based upon the results of two tests we can conclude that dynamics of demand of unsecured credits will depend on business cycle, which means that the credit risk level will be determined by economic conditions.

3. Conclusions

1. Retail credit curve follows the business cycle, which indicates that demand and supply for household credit is determined by fluctuations in business cycle;
2. The household credit ratio to GDP currently is 18.36% which indicates that Macedonian citizens are less credited compare to neighboring countries;
3. The analysis shows that decreases in GDP increase the demand for household credits;
4. Total declared and paid wages to the employers in real economy is based on business cycle;
5. Increased percentage of nonperforming loans is caused by decreased percentage of Gross National Product.

Bibliography