

MACROECONOMIC CHALLENGES FOR THE TRANSITION TO THE ECONOMY 4.0 IN BULGARIA

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Introduction

The fourth technological revolution the world has been experiencing since the massive penetration of high technologies in mid-1990 has the potential to change the economic and social structure. The globalization of commercial and financial flows has paved the way for the new digital revolution that is to challenge the traditional production methods and use of production factors. In such a highly integrated global economy where the pace of technological change is faster than ever evidenced before the sound macroeconomic performance could accelerate the technological transition and make it happen more smoothly. On the other hand, the unfavorable economic environment could offset considerably positive effects of digitalization of economy and turns into a challenge for its successive transition.

Empirical studies on technological change economic effects

As Wolter et al., 2015 point out the terms Industry 4.0 and Economy 4.0 should be distinguished. When we refer to Industry 4.0 we should have in mind the interactive interconnectedness between analogue production and the digital technologies. Meanwhile, the concept Economy 4.0 has a much broader meaning and it includes the technological change in industrial production and the economic and social effects it causes. Some of these effects one can summarize as follows:

- higher productivity due to more digitalized production methods will result in reducing stocks, improving personnel planning, optimization of logistics, lower production costs and also an increase in product quality (Schroder, 2017);
- higher product quality will stimulate the export-oriented sectors such as machine building, automotive and chemicals industry and will address the demand for customized products in the globalized world where companies face competitive pressures and constantly defend their advantages (Wolter et. al, 2015);

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- additional product sales due to improved technological methods and increased labour productivity are expected while the additional added value will increase the economic profits, wages and aggregate demand (Wischmann et al., 2015);
- structural transformation of employment and potential loss of jobs could happen in an economic environment of increased demand for highly qualified persons at the expense of low qualified ones mainly in the manufacturing sectors.

These effects can be more visible in countries where the share of industry in the economy is relatively high and automation technologies are more spread in production (Deutsche Bank Research, 2014). The share of industry in Bulgaria is nearly 40% of the total gross value added which is in line with the EU-28 average levels but in the penetration of new production methods Bulgaria is still far from the average EU trends. In order, this lag in technological development to be achieved high investments, stable consumer demand for new products and highly innovative business environment are required. Hence, we based our discussion on the changes in the structure of economy, especially in terms of investments and household demand, labour market conditions, the potential of local economy to stimulate innovations and the financial system to transform savings into investments that allows us to identify the main local challenges for a transition to high-tech production that one should have in mind when assessing the technological potential of Bulgarian economy or conducting policies that promote „smart“ growth.

How the crisis has changed the structure of Bulgarian economy?

The economic crisis in Bulgaria slowed down the economic growth in 2008-2017 to 1.9%, while the average annual growth in 2001-2007 was 6.1%. Until 2008 domestic demand (final consumption and investments) was the main factor behind the GDP growth, while the external demand, dominated by fast growth in imports of goods and services, was negative until 2007. However, the crisis changed this trend.

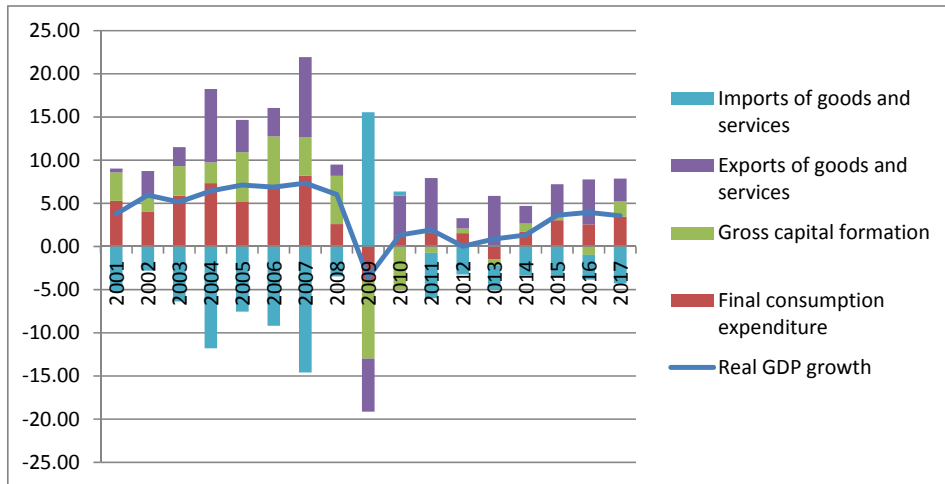


Fig. 1. Real GDP growth structure by components

Source: Bulgarian National Statistical Institute

The significant lag of domestic demand as a factor for economic growth is due to the serious decrease of investment activity in Bulgaria in parallel to the increase of the export of goods and services. The gross fixed capital formation registered 33% decrease in 2016 compared to 2008. The subdued investment activity is due to many causes. First, one may mention the insufficiently clear signals still for uprising economic development and high levels of intercompany debt (87.4 bn. euro in 2013, according to a survey of the Bulgarian Industrial Association). Second, the credit activity is nearly moribund (over 70% of loans to non-financial enterprises are worth up to €25,000) and there is a substantial decline in foreign direct investments (3% of GDP in 2017 at 28% in 2007) that has changed the pattern of economic growth in Bulgaria, which previously relied mainly on external financing. Moreover, the gross fixed capital formation is the only component of GDP which until 2011 and especially in 2013 and 2016 marked negative rates of real growth, underscoring the serious negative impact of the crisis on the investments in Bulgaria. Therefore, the current investment climate in the country does not contribute to rapid technological growth and returning to the pre-crisis levels of investment is vital to the transition to a digital economy.

However, approximately 60% of imports of goods and services both before and after the crisis include raw materials and investment goods which make them highly dependent on the local activity of enterprises and their investments in tangible assets. Accelerating investment would have a long-lasting positive effect on the technological structure of the Bulgarian economy, but it also would

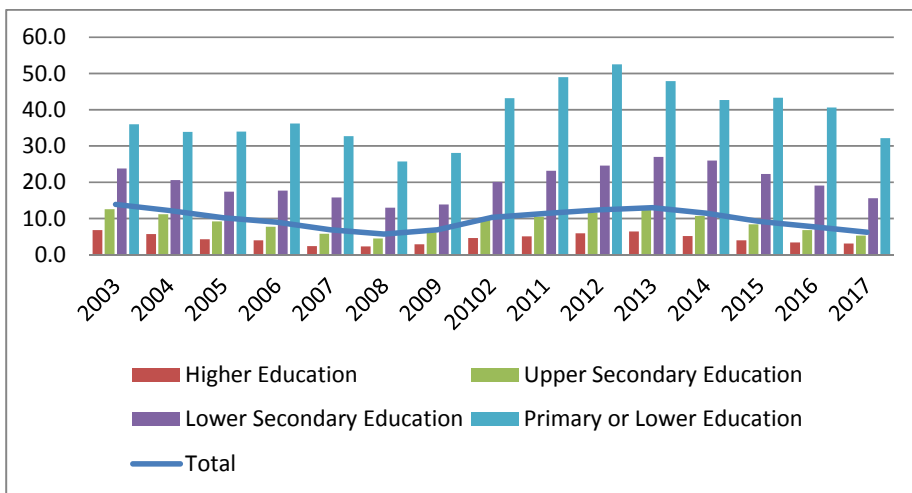
increase the import of goods and services, especially investment ones, and reduce GDP in short run. More investments in export-oriented industries would mitigate this effect. That is why stimulating the digital development of industries such as machine building, automotive and chemicals industry in Bulgaria would have a double positive effect. The increased investment for their technological improvements would lead to increased local exports, thus offsetting the negative effect of the use of imported components in these industries. The digitalization of Bulgarian production will additionally support the national exports whose competitive advantages in foreign markets are mainly due to a good ratio between quality and price of local goods and the fixed exchange rate of the lev to the euro.

The final consumption expenditure shows some stability after 2010 and it caused the higher contribution of domestic demand to economic growth in 2012 and 2014. This is also evident from the structure of imports in which the share of consumer goods is growing steadily and in 2017 now stands at 22% of the total imports of the country. Still, the model of private consumption in Bulgaria has not changed dramatically in the crisis period. The most noticeable decline in monetary expenditures of households in 2008-2016 was observed in food and soft drinks due to their lower prices, while household spending on education, health and public utilities increased. In the field of services one can see diverse dynamics – a significant increase in the prices of education, restaurants and hotel services and declining transport prices and prices of communications and entertainment services whose larger share in consumer spending has a dominant retaining effect on overall inflation in Bulgaria. The relative stability of household expenditures in different phases of the business cycle signals consumption of low elastic goods, mostly indispensables, where regardless of the level of consumer income consumption remains constant. This would make it more difficult for new products to be offered at the Bulgarian market and show that the digitization of production would be a successful if it is more oriented towards supplying mass merchandise and services.

Do more educated employees also mean higher income?

Labour market status is a key to the digitization of the economy as it determines both the available labour potential and the opportunities to exploit the benefits of higher technology production. Meanwhile, the labour market is expected to be one of the most affected sectors of the transition to the Economy 4.0 no matter which economy is being considered and a good knowledge of its specificities would help anticipate future effects from technological transformation. During the crisis the unemployment in Bulgaria has increased with a certain lag and structure of employment has changed while low levels of income relative to the EU average have been maintained. The unemployment rate started to

accelerate from the first quarter of 2009 at values of 6.4%, reaching 12.9% at the end of 2013 and in 2017 has now caught up with unemployment rates of 2008 – around 6%. The decline in employment affected mostly construction, mining and manufacturing, while in the IT-sector, freelancers, administrative and support service activities employed persons grew. This indicates that the crisis has been used for a structural change in employment, conducive to the digitization of the economy. Only among university graduates employment is rising with 15% in 2017 compared to 2008, which is valid for all economic activities, while with high school graduates unemployment is approximately 11% in 2011-2014 and 7% in 2015-2017, 16% is the unemployment for persons with lower secondary education and 32% for persons with primary or lower education in 2017. Changes in employment by occupations also indicate that employers have shown a somewhat far-sighted policy: by laying off workers with lower professional class and by seeking to retain experienced staff which can make the transition to digitalization of production much faster and smoother.



Source: Bulgarian National Statistical Institute

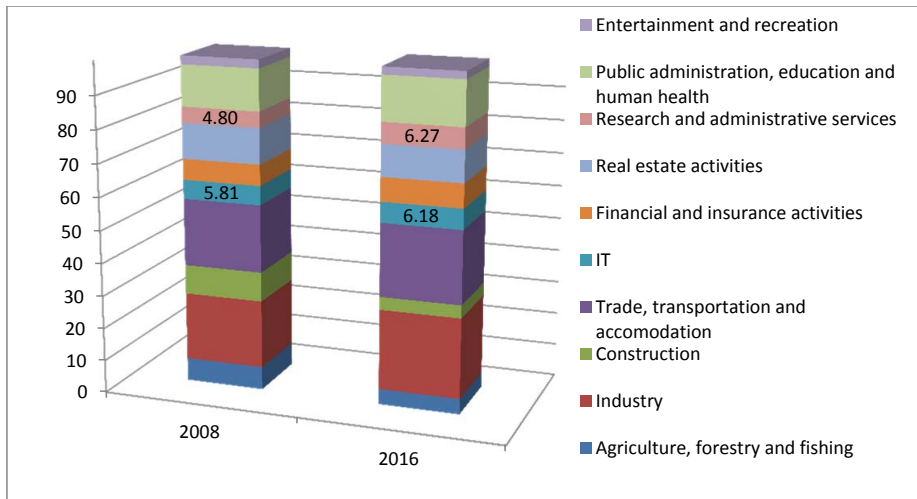
Fig. 2. Unemployment rates by level of education

The priority given to maintaining more qualified employees contributes to the increase of the average wage in Bulgaria in 2008-2016 by 74%, reaching €485 but it is lagging significantly behind the average European levels. Despite the income growth, which significantly outpaces the growth of labour productivity (25% in 2008-2016), increasing employment among university graduates is

mainly in economic sectors where the average wage is below the national average wage (catering, administrative and support service activities, utilities). This process reflects lower employment opportunities in the economy as a whole, yet on the other hand, leading to social income stratification in a high unemployment environment among household members in adolescence and with lower education. Despite the retention of highly qualified personnel in the sectors of the economy most directly affected by digitalization and the maintenance of high incomes there, the overall level of incomes remains relatively low, which prevents the creation of sufficient demand for more expensive and high-quality goods. This would make the transition to Economy 4.0 more difficult as it brings lower profits for manufacturers and smaller opportunities for investment in high technology and innovation. But, on the other hand, it reiterates the importance of exports for the realization of production from innovative productions where higher incomes for Bulgarian exporters may stimulate them investing in new production methods.

What is the innovation and high-tech potential of the Bulgarian economy?

One of the positive processes that may be observed during the crisis is the increase of general level of activity of high-technology and innovative enterprises. The increase of share of the economic activity of “Professional activities and scientific research, administrative and support service activities“ in the structure of gross value added (in absolute terms from 1.3 bn. euro in 2008 to 2.6 bn. euro in 2016) runs in parallel to the one-half increase of the number of enterprises in that sector, which rank third in the country. At the same time, these enterprises diminish their expenditure for tangible fixed assets acquisition by 21% between 2008 and 2014, and show a predominant structure of employment at fewer than 10 persons, indicative of the fact that irrespective of the potential they demonstrate for development and optimization, they still remain small in the volume of their activity.



Source: Bulgarian National Statistical Institute

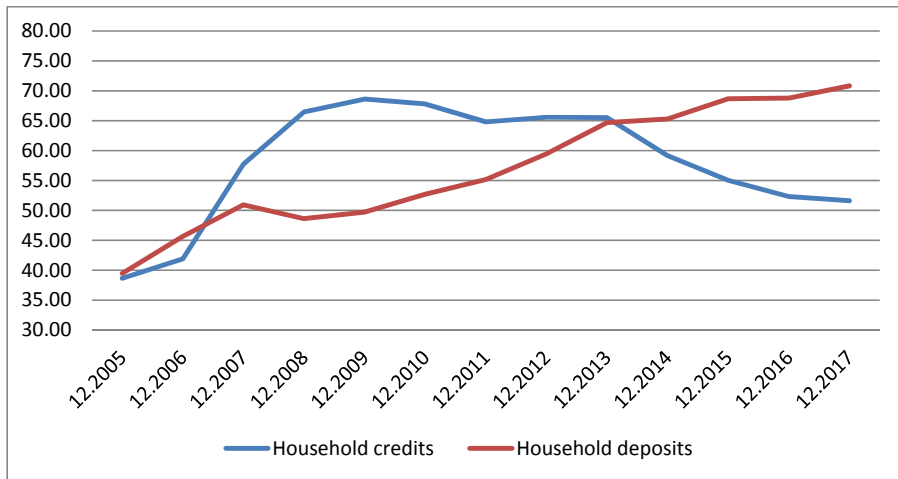
Fig. 3. Gross Value-Added Structure

The gross value added produced by enterprises in the IT and communication services increases by 41% and their share in the gross value-added structure is almost the same as the share of research and administrative activities. This highlights the outpacing rate of growth of IT and communication services in the period after the crisis and signals a structural change in national economy keeping in mind that in the IT sector both the increase in employment and the average wage are higher than the ones registered in research and administrative activities. Within the companies of this industry the dominant structure of employment is over 250 employees and the nature of their activities presupposes highly qualified staff. This is also revealed through the twofold increase of their expenses for labour remuneration with a stable highest average wage for the country – from 210% of the average for 2008 to 229% of the average in the country for 2015. The growing potential of companies in this sector is evident also through their increase in numbers and in share within overall production, which is close to the one occupied by companies related to communal services. At the same time, the relative level of expenses for the acquisition of fixed tangible assets of IT companies has been maintained. This, in turn, indicates that on the whole these enterprises show serious potential for becoming structurally defining in terms of the employment of highly qualified persons in Bulgaria. To an extent such processes may be taken as indicative of using the crisis so as to develop high

technologies and utilize competitive advantages which favour the transition to Economy 4.0.

Is the financial intermediation in Bulgaria sufficiently efficient for Economy 4.0?

During the crisis household savings have significantly increased in a very low credit activity environment. Signals of increased uncertainty for income and jobs in the economy have led to growing household savings, which at the end of 2017 already amounted to 48% of nominal GDP (24.5 bn. euro).



Source: Bulgarian National Bank

Fig. 4. Deposits and credits of households as a percentage of GDP

In their prevailing share, these are savings between 500 and 1250 euro realized on a consistent decline in interest rates on deposits, leading to the conclusion that high household deposits essentially comprise money saved with difficulty that can cover the most urgent needs if necessity arises and it cannot be expected that they would become a solvent demand. The growth of loans to households in 2009-2017 was 2.5% and it is determined by interest rates on loans by banks in the country, which far exceed those in the euro area. Last but not least, this fact also creates barriers to the growth of domestic demand.

Savings and loans of non-financial enterprises in the period 2008-2017 follow a similar trend to household dynamics, but with two exceptions: with no surprise corporate savings are significantly less than household savings and the

interest rates on loans to non-financial enterprises are almost half as low. At the end of 2017 loans to non-financial enterprises are almost identical to the ones registered until the fourth quarter of 2010, which actually shows a lack of funds for corporate activities in the economy. Such dynamics is a serious challenge for the transition to a high-tech economy but is fully in line with the decline in investment activity as allocated credit funds to corporate sector comprise about 65% of registered deposits of households (16 bn. euro) in 2017. From the point of view of the financial sector these processes are explained by the lack of good investment projects and the general uncertainty in the economy. However, they have a significant impact on the investment activity as dramatic increase in inter-company indebtedness shows. According to expert estimates from the Bulgarian Chamber of Commerce the inter-company indebtedness amounted to 25.6 bn. euro in 2008 but was already estimated to be 87.4 bn. euros in 2013 according to the study conducted by the Bulgarian Industrial Association. This makes the investments in Bulgaria extremely dependent on banks' investment plans and shows that despite the significant increase in household deposits, they are not used to stimulate the investment activity of enterprises.

Conclusion

The economic crisis in Bulgaria amplified by the global financial crisis in 2007-2008 led to a temporarily more balanced structure between internal and external factors of economic growth, which is cyclically driven. The global crisis has seriously affected Bulgarian non-financial enterprises and their recovery is still timid – investments are low, highly dependent on the investment plans of banks and intercompany indebtedness is growing. Meanwhile, the overall level of incomes remains relatively low; most personal savings are money saved with difficulty and mass merchandise still dominate the household consumption model which prevents the creation of sufficient demand for more expensive and high-quality goods and services.

On this background, the crisis has also caused a structural change in employment, conducive to the digitalization of the economy, combined with an increase in numbers and in share within overall production of the IT and research companies. Since 2008 there is a process of educational restructuring of employment and the number of employees with higher education increases. Export opportunities are a major driver of corporate activity on the back of unclear prospects for granting more corporate bank credits and the completion of the current planning period for allocation of the EU funds. The development of new technologies that would contribute to a greater expansion of the local export sector would help to adapt the economy not only to the new economic realities but also to the new digital era. Moreover, it is visible that the ascending economic development is

more grateful time for penetration of new technologies but especially when the economy is recovering new technologies can boost this process and make it more resistant to aggregate demand shocks.

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Abstract

The paper examines changes in the Bulgarian economy following the global financial and economic crisis of 2008 that affect the macroeconomic environment for making the transition to the Economy 4.0. The main identified obstacles to sustainable technological economic growth are subdued investments and still low credit activity, high intercompany indebtedness, and relatively low levels of personal income. Meanwhile, the ongoing structural change in employment, increase in numbers and in share within overall production of the IT and research companies, and growing export opportunities may have a positive effect on the digitalization of Bulgarian economy.

Key words: economic growth, investment activity, labour market conditions, digitalization, financial intermediation.

JEL: E22, E24, G21.