STATI

POSSIBLE IMPACT OF THE 2008-2009 ECONOMIC CRISIS ON CZECH POTENTIAL OUTPUT THROUGH THE LABOUR MARKET

Martin Janíčko, Marek Mičúch, Zdeněk Chytil*

Introduction

Economic science is incessantly witnessing controversy about how to define potential output, with some economists stating it is completely impossible, and others essentially claiming it is relatively simple and straightforward. Clearly, it is not the intention of this paper to discuss main problems of potential output definition. Hence, for the sake of simplicity, we tend to use the New Keynesian (i.e., more or less *mainstream*) definition of potential output and business cycle, generally arguing it is an output with a "stable" inflation. Equally, this approach is put forward in its certain form by institutions such as the International Monetary Fund, the World Bank, and the European Commission.[1] It is also this framework that is being frequently used in the contemporary economic literature and by number of generally renowned economists.[2]

Complementarily with the above, the *Dynamic Stochastic General Equilibrium* (DSGE) approach has become increasingly popular in recent years (Llaudes, 2005). In particular, the DSGE adherents promote the so-called *forward-looking* Phillips curve (e.g., Justiniano et al., 2010), which also offers certain immunity towards *Lucas' critique*, as it is developed in the context of optimizing behaviour of businesses and individuals. All of these approaches attempt to incorporate price flexibility and speci-

* University of Economics, Prague, Faculty of Economics (martin.janicko@vse.cz, micuchm@vse.cz, chytil@vse.cz).
This paper has been written with the help of IGA 506050 financing.

1 In terms of business cycle theory, we apparently do not work with the Real Business Cycle approach, essentially stating that business cycle fluctuations mean fluctuations in potential output itself (Kydland and Prescott, 1996). Even in this aspect, where deemed necessary, we stick to the New Keynesian theory of business cycle, which clearly distinguishes between short-term fluctuations and potential output (Mankiw, 1985).

2 Well presented and illustrated e.g. in Razin, 2004.

ficity of market structures into one model, thus making use of the microeconomic foundations principle.

Technically, however, the majority of economists tend to use the typical Cobb-Douglas production function. Moreover, this function has also served as a preferred tool of international institutions such as the OECD or the ECB for many years in row. It is perhaps the following form which is exhibited most often:

$$Y_t = TFP_t \cdot K_t^{\alpha} \cdot L_t^{1-\alpha}, \tag{1}$$

where Y_t stands for potential output; $L_t^{1-\alpha}$ is potential/full employment in power of its proportion in the respective economy, while $L_t^* = L_t \cdot \left(1 - u^*\right)$ is full employment given as workforce less natural rate of unemployment (or NAIRU). Finally, K_t^{α} stands for stock of capital over its proportion in the respective economy.[3]

However, it should perhaps be noted that the above outlined mainstream approach is completely opposite to what some other economic streams suggest. For instance, in some of their findings and interpretations, Post Keynesians state that potential output is always lower without nominal rigidities than with them.[4] Hence, a relatively high level of regulation is to be maintained for an economy to work at its *real* potential output. Moreover, they argue potential output with nominal rigidities is also much more stable, which essentially means a lower unemployment level (and a higher employment level respectively) is kept more steadily than the lower unemployment level constantly requiring higher levels of government interference. All this reasoning relates primarily to the *effective demand* problem. According to Post Keynesians, the output is a function of aggregate demand even in the long run.[5]

Similarly, unlike mainstream economists and/or Post Keynesians, a number of heterodox economic scientists question the very usefulness of potential output calculations. Among them we can find Austrian School adherents, who generally believe that output gaps are overestimated as per rule, since the whole business cycle amplitude is caused by central bank (activist) monetary policy. This happens when potential output is measured as an average of past economic performance on a trend-fitting basis. In other words, when determining the position of an economy within its business cycle, central banks take into account past conjunctures that were artificially caused by monetary *stimuli*. Subsequently, when this "artificial" boom is over and *malinvestment* capacities are being destroyed and/or abandoned, it is not (effective) demand but rather structural factors that bring the recession about. Hence, the economy *de facto* still works on its potential − even during the recession phase (Hayek, 1967).

3 A similar expression, where "N" denotes the pool of workers and equilibrium employment is given as $U^* = u^*.N$, can be found, for instance, in Vošvrda (1996) in the form of $Y^* = K^{\alpha} \cdot \left(N - U^*\right)^{1-\alpha}$.

4 Reasoning of this sort can be found in Lavoie (2004) or similarly in Crotty (2002). In other words, the Post Keynesians state that there are at least two possible potential outputs for the respective economy.

5 Although Post Keynesians are undoubtedly closely linked to Marxists in some areas, in this case Marxists believe that long-term output is determined almost purely by the supply side of the economy; e.g., Duménil and Lévy, 2007.

Using the theoretical framework for potential output described above, let us turn our attention to the recent economic situation. According to the latest data, in 2009 the Czech economy – as many others in the European Union – emerged from the recession that it was hit by in the course of 2008 and 2009.[6] In the Czech Republic, the (technical) recession started in the fourth quarter of 2008 and ended in the third quarter of 2009. Put differently, the country was technically experiencing recession for three quarters of one year. However, doubts still exist concerning two principal aspects of the past crisis: *first*, whether it could occur again in similar magnitude in the foreseeable future. Such doubt is notably attributed to the fact that governments in developed countries are currently being forced to limit their expenditures due to high public debts and, more generally, deteriorated public finances in terms of their structure and revenue-spending balance. *Secondly*, one could question whether or not potential output has been affected as a consequence, and if so, to what extent. The second question should be at least partially answered in this paper.

Whilst the crisis might have likely led to some material long-lasting shrinkage in potential output levels, there is also a risk that it could forestall potential output growth from returning to the pre-crisis rates in the medium to longer run. As a consequence, the principal aim of the paper is to examine whether the 2008-2009 financial and economic crisis has had any substantial incidence on potential product, and therefore showed signs of *acyclicity*. Since the crisis is still somewhat present in the economy – mainly in the form of *anaemic* output growth and higher rates of unemployment in a number of developed economies – we focus on the qualitative (i.e., explicatory reasons) and quantitative (in terms of potential GDP losses in the Czech Republic) aspects of possible potential product (growth) decline/slowdown.

Essentially, to answer such questions we need to estimate potential GDP itself. As it has been already mentioned, there are several techniques for calculating it, most of them broadly recognized by the contemporary mainstream economic science. Most of these techniques focus on calculating potential output upon the Cobb-Douglas production function (Hurník, 2005). However, as it is widely perceived, apart from many benefits this approach brings about, it also has several inconvenient facets. Among those should be highlighted the notorious "trend problem", typical for population growth and capital accumulation, and the not-that-accurate capital stock estimates, which are usually made retrospectively. Yet, as some economists are ether skeptical to such calculation because of the problems with total factor productivity (TFP) aggregation, they prefer to calculate potential product based on average GDP growth. Such an approach is presented in this article as well.

The rest of the paper is organized as follows: the first section draws up on several transmission mechanisms through which recessions can likely affect potential output. This is analyzed mostly by generalizing previously available results for developed economies. In the second part, we calculate the potential output of the Czech Republic using output gap and employment gap estimated by Hodrick-Prescott filtering; and

6 In conformity with the statistical and economic definition, (technical) recession occurs when quarter-on-quarter GDP (GNP, GNI) contracts in two consecutive quarters.

in the final part, we present results focusing on the Czech labour market, including helpful findings for the dynamized gap version of Okun's law.

1. Economic crisis and potential output

The intensity of the financial and economic crisis of 2008 and 2009 was to a large extent unexpectedly strong and unprecedented at least for several past decades. It is sometimes even admitted the crisis/recession was the strongest crisis since the infamous Great Depression of the 1930s. Moreover, a number of authors suggest financial crises are more likely to become crises affecting even potential output. According to diverse sources, the incidence on potential output of several financial crises before the 2008-2009 one is estimated to around 1.5% − 2.4% on average[7] (Lemoine and Pavot, 2009).

We might find a number of good reasons why potential output is suspected to have been hit by the recent economic and financial crisis. Firstly, the crisis might have diminished potential output due to the negative effect on investment, as the disturbed capital accumulation might have resulted in increasing obsolescence of the capital stock. In this sense, we shall argue that the number of companies going into liquidation has mainly impacted the short-term capital stock, and therefore short-term potential output behaviour (EC, 2009). Also, larger write-offs and faster depreciation rates, which are often caused by the need for stock reclassification, contribute to the matter[8] (Lebrun, 2009).

Secondly, labour force could have been affected since the human capital accumulation and restoration might have been suspended. Finally, the total loss of labour force might have been even higher with a higher number of people discouraged and therefore quitting the labour market as such. This could have been achieved by requesting premature retirement, or, for instance, moving to the shadow economy labour force, and thus generally lowering participation rates and overall employment.

Further, behaviour of the private sector seems to have been exaggerated or excessive in terms of firms' reactions and expectations; in recessions, company managements tend to be overly pessimistic of the future, and they lay off more labour force than would be "reasonable" in the context of existing consequences. We call such behaviour "unreasonable" as it is typically revised when the economy gets out of the recession. On the other hand, businesses usually keep the "core" labour force consisting of workers that they consider essential for their base functioning. Such workers are, however, usually the most costly ones, for they are not only the best paid workers in the company, but they are usually granted high bonuses and extra-salary compensations. However, their short-term marginal as well as average propensity to consume is lower compared

7 Among the developed countries experiencing this kind of problems we could single out Spain in 1978-1979, Norway in 1987-1988, Finland in 1989-1993, Sweden in 1991-1993, and Japan in 1992-1993.

8 Essentially, standard macroeconomic theory recognizes three ways how capital intensity can evolve: 1) capital deepening; 2) capital widening; and 3) capital shallowing. However, we are still not sure whether the crisis brings about capital shallowing or capital widening effects. This is due to lack of trustworthy empirical evidence.

to those who have been laid off, which means their contribution to the GDP growth is *relatively* lower (per unit of income).[9]

Moreover, once the economic pressures arise, they might find "fertile land" in politics. The general public typically force politicians to adopt measures that contribute to the ease of potential performance. Among these measures there are, for instance, a possibility of early retirement, barriers to migration flows, stricter work permits for foreigners, higher unemployment benefits, foreign trade restrictions, etc. All these measures normally lower the level or growth of potential output, because they usually lead to a decrease in the participation rates (which is especially true of the most affected cohorts) as well as the overall employment rate.

Most importantly, *hysteresis* frequently takes place in the form of the *insider-outsider effect* and/or the *duration effect* (human capital losses). The *insider-outsider effect* generally refers to a situation where trade unions or any other interest groups act in favour of labour market incumbents. This is most frequently done in the form of wage negotiations which finally lead to lower employment of outsiders when the recession is over.[10] The *duration effect* is different: it refers to a situation where long-term unemployed become hardly "employable" at all, as their losses on human and social capital are perceived by possible employers as insurmountable. Moreover, in the course of time these unemployed also frequently become *discouraged*, which means that they completely give up searching for any job opportunities. The hysteresis effects have been very precisely analyzed by Olivier Blanchard and Lawrence Summers in their 1986 article called *Hysteresis and European Unemployment*. Since then, many other estimates have confirmed that European countries generally face higher dangers of their (long-term) unemployment rates turning into hysteresis than the OECD average (De Lucia, 2010; Reinhart and Rogoff, 2009).

Concerning the two aforementioned hysteresis effects, we may also mention that they should not be confused with so-called *policy inertia* on the labour market. Although the two are necessarily interrelated, *policy inertia* takes form of a labour market regulatory framework, such as minimum wage legislation, income taxes, social and healthcare contributions, unemployment benefits, working conditions or probation and notice periods. Unlike in the case of *hysteresis*, all these measures are put into effect *intentionally*, as a part of country's respective economic policy.

Finally, a very profound impact on the level of potential output is to be felt through the investment channel. The unprecedented drop in investment activity brought about by this crisis is likely to be present in the economy for quite a long time. This is connected with the pessimistic expectations of entrepreneurs concerning future prospects of the economy. Such expectations usually lead to a change in attitudes towards risk taking, making it more constrained and, *in extremis*, less likely to appear. Moreover, credit constraints and behaviour of the banking sector are expected to play their part

9 Such a statement is valid namely in recessions and/or for more considerable output slowdowns, where the mentioned propensities are typically low in general.

10 However, many additional illustrations of the *insider-outsider* effect can be singled out even without trade unions or interest groups playing part in them.

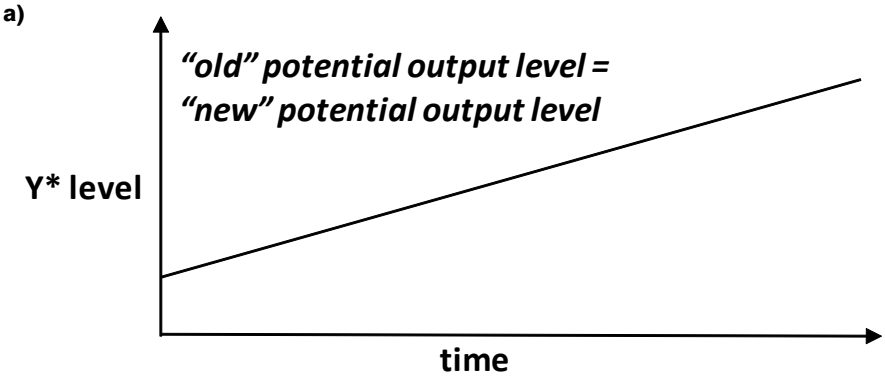
as well. Hence, restructuring of production will end up being much more costly than would be desirable. Likewise, as firms do not have sufficient access to credit, they tend to get entrenched in less productive capacities, not being able to employ their resources in more efficient production possibilities. Even here, hysteresis effects play their role in the form of *capital* and *credit granting hysteresis*[11] (similar and more elaborated arguments are listed in EC, 2009).

Apparently, the reaction of the economic policy targeting potential output is extremely important as it should aim at stabilizing or even increasing labour supply. However, the Czech economic policy is not grossly equipped for such crises not only due to its great openness, but also due to the fact it has not experienced anything similar during its post-1989 history.

Generally − no matter whether with or without proper economic policy reaction − we are now facing four plausible scenarios of potential output development: firstly, no loss in potential output at all will be inflicted. In other words, we could analyze the 2009 recession as not having any impact on potential output in terms of material loss/growth deceleration. Such a scenario, however, is not very probable (reasons suggested, e.g., in Blanchard, 2009, or in Reinhart and Rogoff, 2009) given the presented context. The second scenario works with a temporary loss in potential output, forecasting that it will ultimately – in a matter of a few years – return to its pre-crisis path. We could also call it a "full-recovery" scenario. The third one suggests there will be a permanent loss in potential output in the wake of the crisis, but its growth will remain unaffected. Finally, the worst possible scenario works with a "widening gap", caused by a slower pace of potential output growth in the long run. These four scenarios – together with "their" simplified corresponding growths – are exposed in the following charts.

Figure 1
"No impact on potential output" scenario[12]

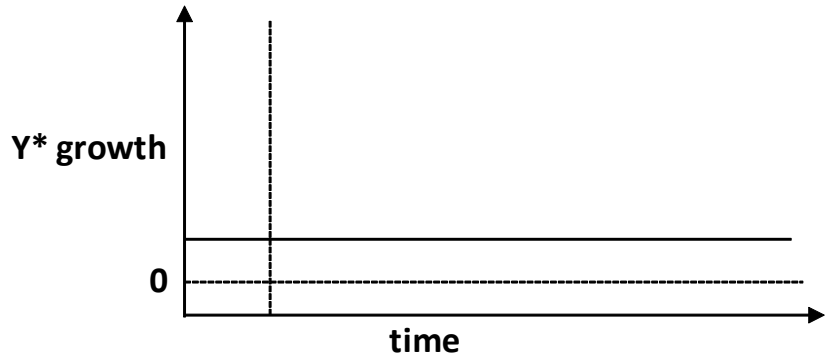
a)



b)

11 This is specifically true when the economic crisis is more protracted.

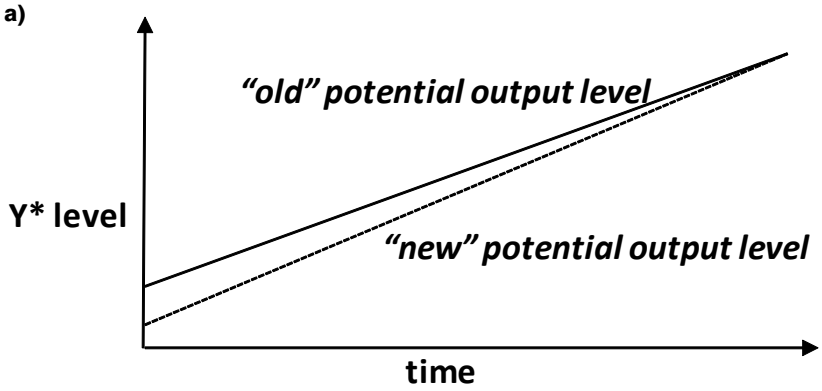
12 In the following four figures, both the level and growth of potential output are absolute values. In all ad b) charts, the dashed vertical line stands for the beginning of the financial and economic crisis.



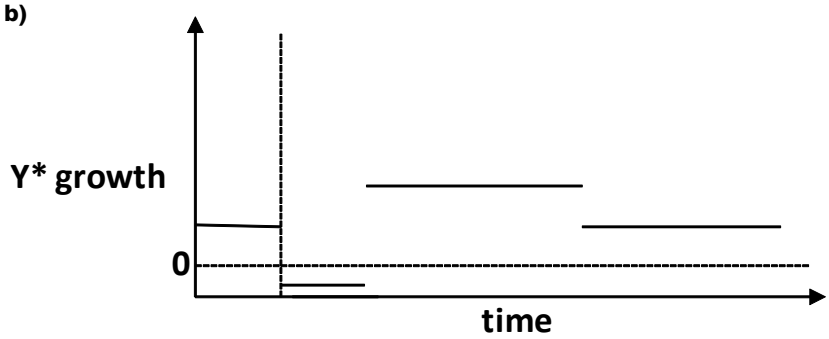
Source: authors' own hypotheses.

Figure 2
"Full recovery" scenario

a)



b)

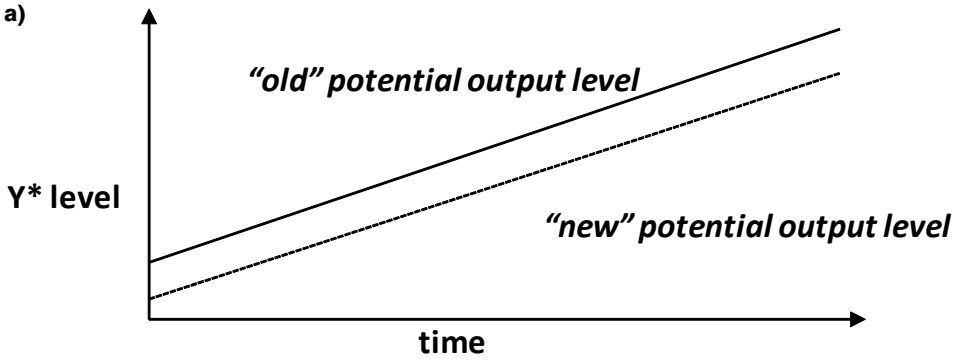


Source: authors' own hypotheses.

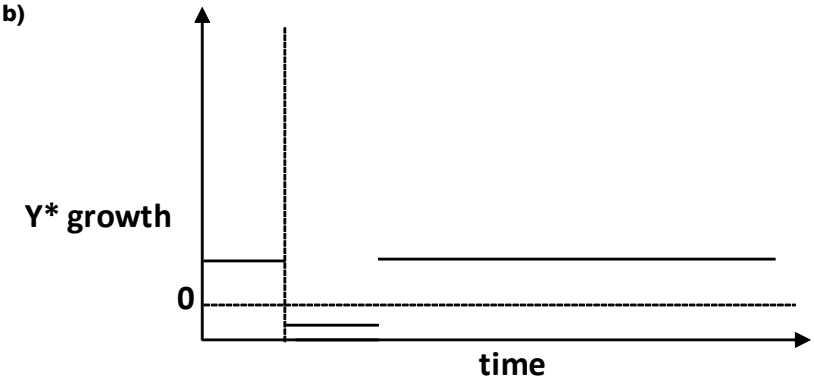
Figure 3

"One-off decrease" scenario

a)



b)

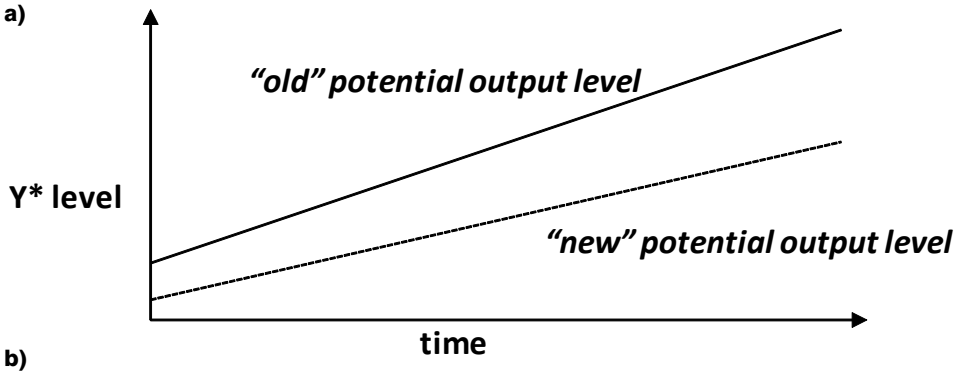


Source: authors' own hypotheses.

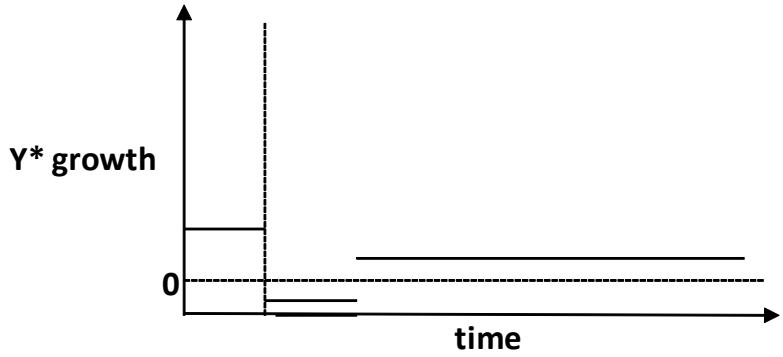
Figure 4

"Progressively widening gap" scenario

a)



b)

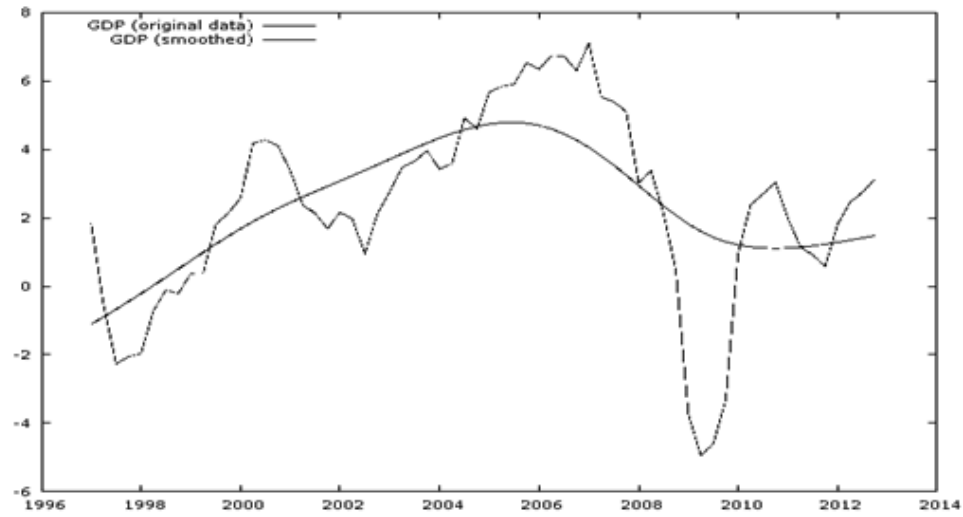


Source: authors' own hypotheses.

2. Behaviour of components: unemployment and real GDP

We have collected available quarterly data for the Czech Republic over the period of 2006-2013 (including a forecast for 2011-2013) and adjusted the in a way that they fit into the following HP filter. At the first glance, it might appear that the scenario for the Czech Republic would perfectly match the scenario called "one-off decrease". In any case, the analysis would have been made more inaccurate if we had kept an argument based solely on filtering.

Figure 5
Smoothed GDP growth (incl. forecast)
1996-2013 (y-o-y; in %)

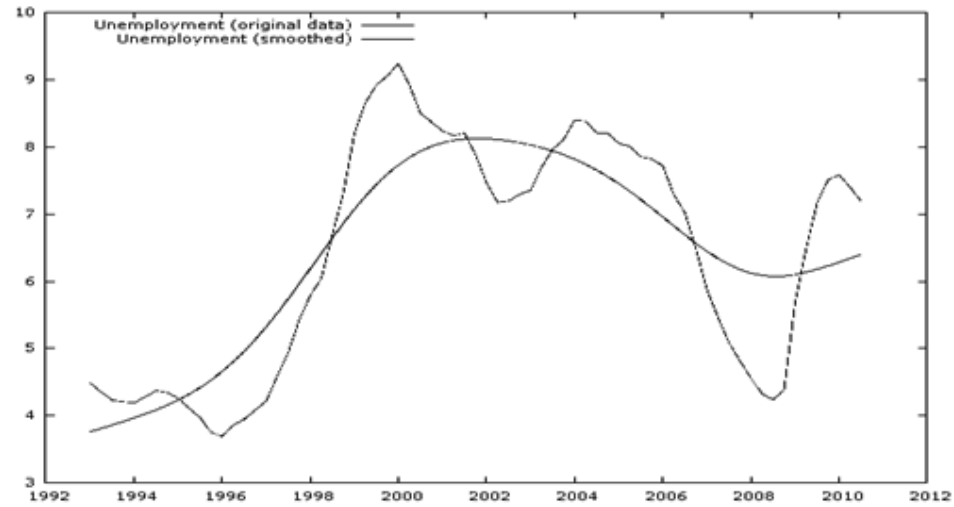


Source: own elaboration based on data from CZSO and MoF.

In terms of assessing an impact on potential output, we have opted for the labour market as a driving force, holding other components *constant*. This session presents the results for the Czech Republic that were obtained by time series analysis.

Having used the Hodrick-Prescott filtering (parameter $\lambda = 1600$, which is conventionally used for quarterly observations) and given the data for the year from Czech Ministry of Finance (Macroeconomic Forecast, 2011), we get the following results: while Fig. 6 shows smoothed unemployment levels from 1993 to 2011, Fig. 7 illustrates how much it was actually affected in terms of percentage point changes.

Figure 6
Smoothed ILO[13] unemployment rates 1993-2010 (in %)

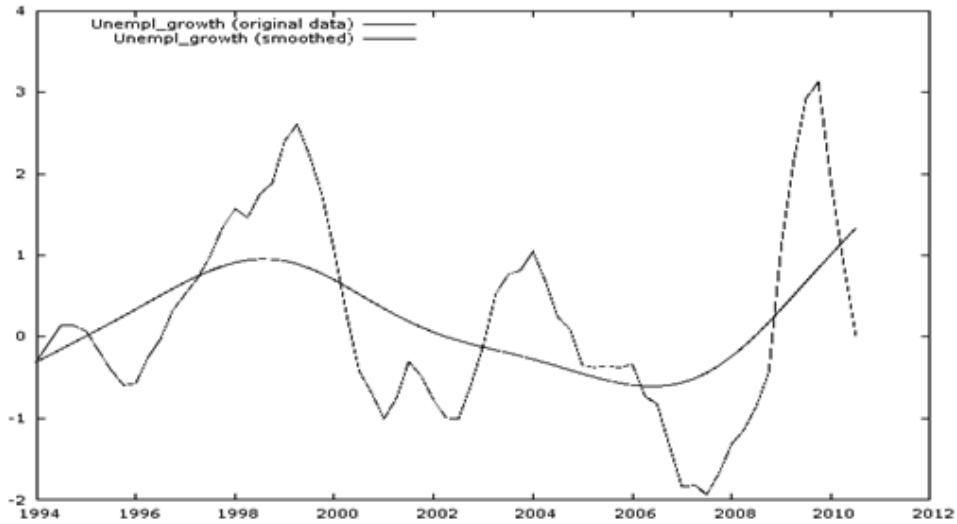


Source: own elaboration based on data from CZSO, 2011.

13 International Labour Organization

Figure 7

Smoothed changes in ILO unemployment rates 1993-2010 (y-o-y; in p.p.)



Source: own elaboration based on data from CZSO, 2011.

Concerning the Czech labour market data, we could probably stress a couple of relatively important observations: given the gravity of the financial and economic crisis, long-term unemployment increased by approximately 2 percentage points over the period 2009-2010. According to general literature (e.g., Blanchard and Summers, 1986; Elmeskov and Pichelman, 1993), hikes in long-term unemployment always lead to a one-off decrease in potential output because of its adverse effects on skills and work and/or social habits of the people concerned. Many authors suggest, and it has repeatedly been demonstrated by empirical studies (e.g., Llaudes, 2005), that it is not solely a problem of productivity that prevents re-employment, but also a problem of labour demand. Employers/firms are often rather reluctant in employing labour that has been unemployed for a relatively long period. Most importantly, such reluctance is frequently caused by higher real costs of labour force caused by its "wasting". Such costs include re-taken social and work integration processes, training expenses, uncertainty and unpredictability concerning employees' behaviour, loss of motivation to work caused by long-lasting unemployment, and, once employed, limited labour availability for an employer due to the shorter period to remain in available workforce. In addition, long-term unemployed are often very much stigmatized by employers without any real substance. As in other cases, even here we can see a certain mixture of justifiable and reasonable behaviour with one which is rather emotional and/or subjective.

3. Proliferation channels

3.1 Long-term unemployment

According to the 2011 survey made by the Czech Ministry of Finance, the economic crisis appears to have led to moderately lower utilization of workforce (Macroeconomic Forecast, 2011).[14] Such utilization is by and large a coincident indicator and typically finds its roots in *labour hoarding* effects, which lead businesses to keep part of their workforce, so that they do not have to hire it again once the recession is over. Also, since laying off redundant workforce, re-hiring and (re-)training are costly exercises, businesses may be inclined to wait some time to see how the situation evolves. This may be seen as one of the reasons why the unemployment rate is conventionally considered a lagged variable (Millard, Scott and Sensier, 1997).

In the course of the financial and economic crisis, both unemployment and long-term unemployment have been experiencing very different scenarios as is demonstrated in the table below:

Table 1

Unemployment and long-term unemployment in the Czech Republic (2004-2010)

(as of December)	2004	2005	2006	2007	2008	2009	2010
Number of people unemployed (in thousands)	541.4	510.4	448.5	354.8	352.2	539.1	561.3
Number of long-term unemployed (in thousands)	219.8	212.8	175.9	136.9	101.5	123.9	178.5
% share on total unemployment	40.6	41.7	39.2	38.6	28.8	23.0	31.8

Source: MoLSA, 2011.

Apparently, even though the long-term unemployment increased considerably in the wake of the crisis, its share in the total unemployment decreased in 2009. This fact is essentially driven by purely "technical" reasons as the laid off workers cannot simply become long-term unemployed right from the beginning of their unemployment "regime". Referring to the above table, one can clearly see the long-term unemployment has shown a rather increasing trend in recent years. This is very likely a consequence of the economic recession as the most considerable hike was in 2010 (increase by approximately 44% compared to 2009).

While the spells of long-term unemployment are namely apparent in human capital destruction and technically in a hike in the NAIRU, there is yet another problem

14 The utilization, measured as the number of hours worked per person employed, increased by 0.4 per cent in 2008, but then decreased by 2 per cent in 2009, and increased again by 1.7 per cent in 2010.

impeding labour market to return towards equilibrium. Essentially, in the long run, "incumbents" on the labour market (i.e., people currently employed) exert substantial advantages compared to "entrants", which in other words mitigates the dampening effect on the wage claims the entrants normally have. This also prevents entrants from being hired by the companies. Such a process has been put forth by a number of modern economists focusing on labour market conditions, among whom Blanchard and Summers (1986) are perhaps the most cited ones.

Judging from the above table, we can see there was a constant decrease in long-term unemployment beginning in 2004, while over the period 2004-2008 the amount of long-term unemployed more than halved. Moreover, without some kind of *path dependence*, which could have been present in the Czech economy to a certain extent for approximately 13 years since the vast banking crisis in 1998, this decrease could have been even more pronounced. Also, the driving forces most probably lay in the cuts in unemployment benefits (in both amount and length), deemed to be directly affecting the "willingness" to remain unemployed. Besides this, the general rate of unemployment was steadily decreasing as well, which partially led to a drop in the share of the long-term one.

Long-term unemployment is commonly defined as an unemployment lasting more than 12 consecutive months (Eurostat, Czech Statistical Office, etc.); however, in some countries like the U. S., only 27 weeks (i.e., half a year) suffice for an unemployment period to be classified as long-term (US Bureau of Labour Statistics). In the Czech Republic, this type of unemployment increased substantially soon after the beginning of the crisis, and continued to rise even after the recession subsided. In 2010, it reached approximately 31.8% of all the unemployed people. Such a high number is also typical of most European countries as their hysteresis effects are considered more significant than those of the US and Japan (De Lucia, 2010). Most often, the less flexible labour market conditions in the European countries are typically taken for the main culprit. On the other hand, this theory is now put in question since the general persistence of unemployment is currently higher in the US than elsewhere. Additional research on the impact of flexible labour market conditions should thus be performed after the crisis is completely over.

For the purpose of demonstration, we can construct a simple model in which we investigate how much of the (short-term) unemployment was transformed into long-term. For this reason, we have estimated a dynamic equation in the following form[15]:

$$LTU_t = \sum_{i=1}^{2} \alpha_i LTU_{t-i} + \sum_{i=0}^{2} \beta_i U_{t-i} + \varepsilon_i \ , \tag{2}$$

where *LTU* stands for the long-term unemployment and *U* for total (general) unemployment. In the Czech Republic, it seems there is empirical evidence that the proposed relationship holds true. Taking 42 observations (n=42) from 3Q 2000 to 4Q

15 A very similar equation can be found, for instance, in De Lucia (2010).

2010 filtered through the HP filter and using standard $\lambda = 1600$, the simple OLS model for one-quarter lagged *LTU* and *U* reveals the following:

Table 2

Dependent variable = Long-term unemployment rate

VARIABLE	*COEFFICIENT*	*STD ERROR*	*T STAT*	*P-VALUE*
const	*-0.331134*	*0.180035*	*-1.839*	*0.0778**
LTU (-1)	*0.740528*	*0.0557538*	*13.28*	*7.91e-013 ****
U (-1)	*0.130154*	*0.0311408*	*4.180*	*0.0003 ****
(Selected criteria)[16]				
Mean dependent variable = 2.879214				
Standard deviation of dependent var. = 0.809855				
Sum of squared residuals = 0.776498				
Standard error of residuals = 0.176238				
Unadjusted R-squared = 0.956151				
Adjusted R-squared = 0.952643				
Durbin-Watson statistic = 2.613494				

Hence, according to the results, there are still significant hysteresis effects on the Czech labour market, which essentially means a certain number of the unemployed eventually end up being long-term unemployed. Although there have been many attempts to counter this pattern, the economic crisis has made the problem more accentuated once again. It is very likely that through this transmission mechanism the possible impact on potential product might have been the most important.[17]

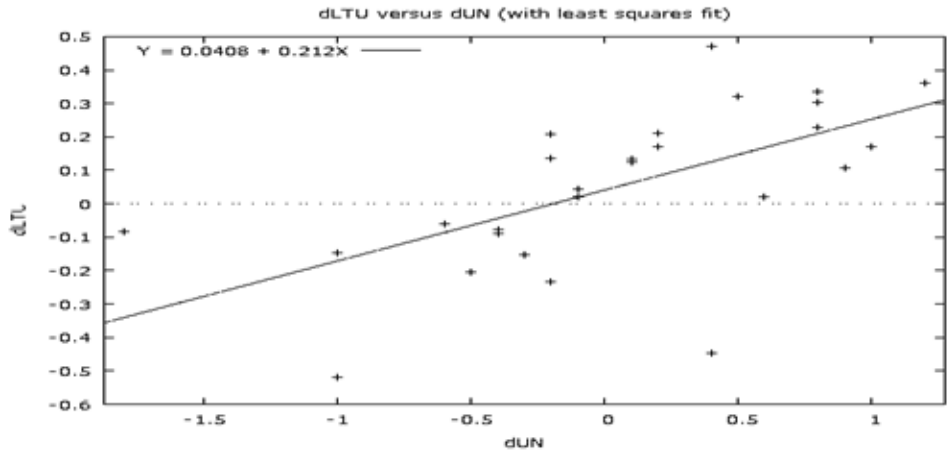
Figure 8 then illustrates the relatively strong relationship between unemployment and long-term unemployment. In other words, the Czech labour market tends to be experiencing more intensive carryover from normal unemployment into long-term than is typical for other developed countries. According to what has been presented above, even though the Czech Government has been trying hard to lower the rate by cutting unemployment benefits and generally tightening up the eligibility (which has admittedly been successful to an extent), the economic crisis has put a halt on such efforts. Certainly, more research will be needed to find out whether significant levels of long-term unemployment are still present in the economy several years ahead of the end of the crisis.

16 A full list of the criteria can be received from the authors upon request.

17 On the other hand, the presence of colinearity due to the non-disjunctive nature of *LTU* and *U* may somewhat misrepresent the results.

Figure 8

Changes in unemployment rate vs. changes in long-term unemployment rate (y-o-y; in %)



Source: own elaboration based on data from CZSO, 2011.

3.2 Employment

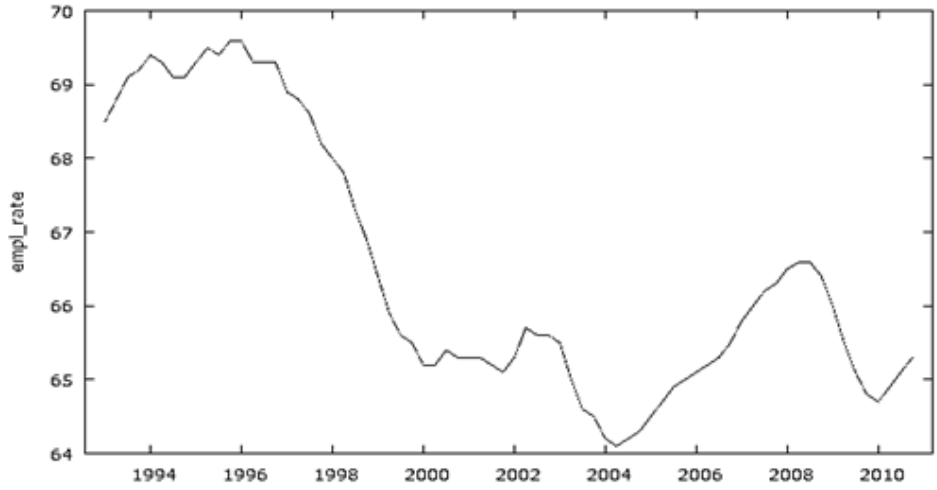
Yet another variable possibly influenced by 2008 and 2009 crisis is *employment*. Overall employment and participation rates[18] are in general handy economic variables as they can play a double role of a cyclical indicator and at the same time exert an impact on potential output. Most economists assume, which could also be accepted as conventional wisdom, that potential output is likely to be higher in countries where overall employment and general economic participation are higher and *vice versa* (e.g. Lemoine and Pavot, 2009).

In the case of the Czech Republic, the labour force (given as the number of people aged 15 to 64 who are either employed or unemployed) was nearly constant during the crisis and right before it, which means the conclusions can be drawn with respect to the employment rate only (Macroeconomic Forecast, 2011). On the other hand, it could well be expected that the 15-64 population share in the whole population will be declining over time as demographic pressures start to be felt more deeply.[19]

18 Participation rate conventionally depicts available workforce – employed plus unemployed − over the population aged 15+. Sometimes it can also be defined as the available workforce over the population aged 15 to 64.

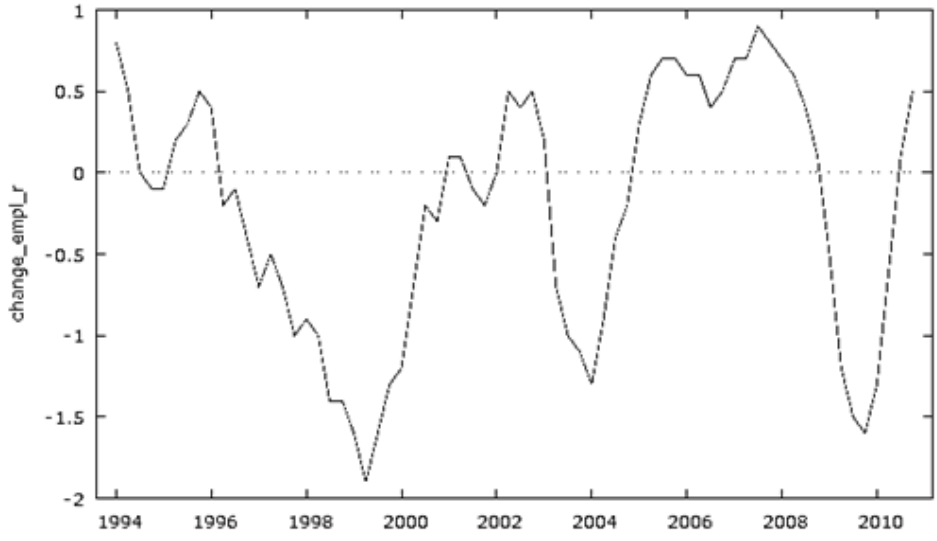
19 According to the statistics, we should reckon on a slow decline in population aged 15-64 already in 2012 − by 0.8 per cent year-on-year (Macroeconomic Forecast, 2011).

Figure 9
Employment rate, 1993-2010 (in % of population 15-64)



Source: own elaboration based on data from CZSO, 2011.

Figure 10
Changes in employment rate, 1994-2010 (y-o-y; in p.p.)



Source: own elaboration based on data from CZSO, 2011.

In order to compare the results for long-term unemployment and employment, let us examine the impact of the economic slackdown on the employment figures. We can estimate such an impact through the following equation:

$$E_t = \alpha_j + \sum_{j=0}^{2} \beta_j Y_{t-j} + \varepsilon_j \ . \tag{3}$$

Taking 42 observations (n=42) from 3Q 2000 to 4Q 2010 filtered through the HP filter and using standard $\lambda = 1600$, we can see the model is, based primarily on the Akaike information criterion, significant for the lag of two quarters. However, the adjusted R-squared is not so convincing: it equals only 0.6, therefore showing a relatively mesoscale relationship.

Table 3
Dependent variable = Employment rate

VARIABLE	*COEFFICIENT*	*STD ERROR*	*T STAT*	*P-VALUE*
const	*-0.568111*	*0.0844387*	*-6.728*	*<0.00001 ****
GDP_dif_2	*2.29905E-05*	*2.90988E-06*	*7.901*	*<0.00001 ****
(Selected criteria)[20]				
Mean of dependent variable = -0.104457				
Standard deviation of dep. var. = 0.621892				
Sum of squared residuals = 6.1926				
Standard error of residuals = 0.393465				
Unadjusted R-squared = 0.60946				
Adjusted R-squared = 0.59970				
Durbin-Watson statistic = 0.40918				

Once we focus purely on the period of the crisis itself, i.e., from 2Q 2007 until 4Q 2010 (n=15) it might be seen the model proves significant for a lag of one quarter. Again, this is based primarily on the Akaike information criterion. Essentially, this suggests that the proliferation of the slowdown on employment follows a typical relationship between GDP growth and unemployment as at the same time the ILO rate of unemployment reached 7.3% at the beginning of 2010, and happened to be the highest since 2004. In other words, we are *once again* testing the following equation:

$$E_t = \alpha_j + \sum_{j=0}^{2} \beta_j Y_{t-j} + \varepsilon_j \ . \tag{4}$$

20 A full list of the criteria can be obtained from the authors upon request.

Table 4
Dependent variable = Employment rate

VARIABLE	*COEFFICIENT*	*STD ERROR*	*T STAT*	*P-VALUE*
const	*-0.553273*	*0.0526762*	*-10.503*	*<0.00001 ****
GDP_dif_12.67697E-05		*1.74674E-06*	*15.326*	*<0.00001 ****
(Selected criteria)[21]				
Mean of dependent variable = -0.261817				
Standard deviation of dep. var. = 0.800541				
Sum of squared residuals = 0.470557				
Standard error of residuals = 0.190254				
Unadjusted R-squared = 0.94755				
Adjusted R-squared = 0.94352				
Durbin-Watson statistic = 1.36761				

In this case, the R-squared proves to be very high, explaining more than 90% of the variability. Such a relationship might be caused chiefly by the short time series used; however, it points in the direction of a somewhat more significant tie between the two variables with the economic crisis coming in. The proposed models are not entirely able to show any considerable incidence of GDP slowdown/drop on employment, and therefore empirically proved the expected link between employment and potential output.

Besides, looking more closely at the participation rates and the unemployment rate behaviour, while abstracting from the long-term one, it seems that employment has predominantly played the role of a cyclical indicator instead of one affecting potential output. We can thus assume the number of discouraged workers, quitting the labour market because of the economic crisis, has been rather low. Therefore, analyzing and comparing the two results, we cannot draw any strong conclusions in either way. [21]

3.3 Okun's law and hysteresis

Finally, we are going to examine the contemporary usefulness of Okun's law in the case of the Czech Republic. The following analysis enables us to examine the possible link between unemployment and output gap. In other words, we will try to determine whether or not the changes in the cyclical component of the unemployment rate can be explained by the real output development. Let us define the *dynamized gap version*[22] of Okun's law as follows:

$$-\omega \cdot \left(\ln Y_t - \ln Y_t^* \right) = (u_t - u_t^*) \ , \tag{5}$$

21 Full list of criteria can be obtained from the authors upon request.

22 As suggested for instance in Grant (2002) and Knotek (2007).

where ω stands for the factor relating changes in unemployment to changes in real output[23], Y_t is the actual real output, Y_t^* denotes potential (real) output, $u_t^*$is the natural rate of unemployment[24] given by HP filtering (as per Fig. 6; $\lambda = 1600$), and finally u_t is the actual rate of unemployment. Using Box-Jenkins methodology for modelling the cyclical part of unemployment $\left(u_t^c\right)$, and testing for stationarity in this time series (*unit-root test*), we may claim that the following relation proves to be statistically significant[25]:

$$\Delta u_t^{cycl} = \gamma_1 \Delta u_{t-1}^{cycl} + a_t \ , \tag{6}$$

where u_t^{cycl} and u_{t-1}^{cycl} are differences in the cyclical part of unemployment defined as $u_t - u_t^*$, and $u_{t-1} - u_{t-1}^*$ respectively, γ_1 is a parameter, and a_t stands for a non-systematic observation. In this regard, we make use of a simple VAR model, which allows for time series causality observation based on the *impulse-response function.* The matrix for a *two-dimension* process should have the following form:

$$\begin{vmatrix} Y_{1t} \\ Y_{2t} \end{vmatrix} = \begin{vmatrix} \gamma_{11}\gamma_{12} \\ \gamma_{21}\gamma_{22} \end{vmatrix} . \begin{vmatrix} Y_{1t-1} \\ Y_{2t-1} \end{vmatrix} + \begin{vmatrix} a_{1t} \\ a_{2t} \end{vmatrix} \ . \tag{7}$$

This can be easily transformed into the following two equations:

$$\begin{aligned} Y_{1t} &= \gamma_{11} Y_{1t-1} + \gamma_{12} Y_{2t-1} + a_{1t} \\ Y_{2t} &= \gamma_{21} Y_{1t-1} + \gamma_{22} Y_{2t-1} + a_{2t} \end{aligned} \ , \tag{8}$$

where Y_{1t} stands for Δu_t^{cycl} , defined as before, while Y_{2t} is Δy_t^{cycl} . In the upper equations, we define Y_{1t} to be dependent on Y_{1t-1} and Y_{2t} lagged by one quarter. The remaining part remains unchanged (as per the above definition). Taking 56 observations for the period of 1Q 1997 until 4Q 2010, we obtain the following results:

$$\Delta u_t^{cycl} = 0.67 \Delta u_{t-1}^{cycl} - 0.19 \Delta y_{t-1}^{cycl} + a_{1t} \ , \tag{9}$$

$$\Delta y_t^{cycl} = 0.07 \Delta u_{t-1}^{cycl} + 0.42 \Delta y_{t-1}^{cycl} + a_{2t} \ . \tag{10}$$

In relatively good conformity with the results already mentioned in Section 3.1 (and partially also in 3.2), we can see that there is a certain link between the cyclical part of unemployment and the same variable lagged by one period, while the relation

23 Based on the US data, this coefficient was estimated to around 0.32 by A. Okun (in 1962). Since then, however, the elasticity has been modified several times, usually depending on the economic conditions for which it has been calculated.

24 By *natural rate of unemployment* we do not necessarily mean Friedman's original version, but rather a long-term level of sustainable employment.

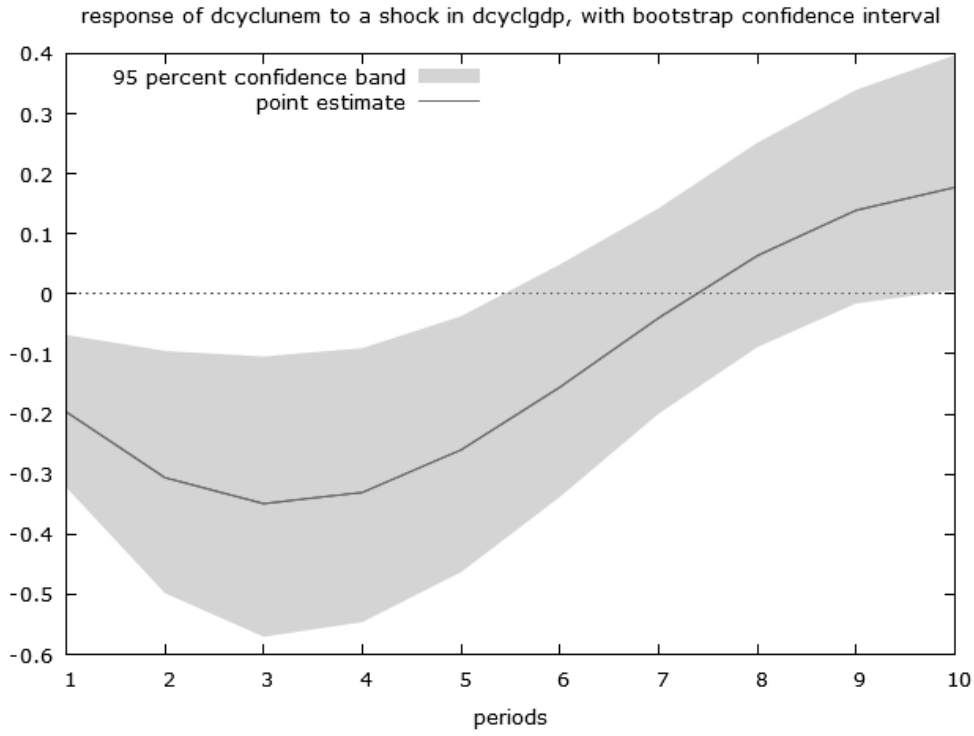
25 Based on diagnostic checks for autocorrelation (Portmanteau test), normality (Doornik-Hansen test), and stability/homoscedasticity (Autoregressive Conditional Heteroskedasticity; ARCH).

with the cyclical part of real output is considerably weaker (-0.19). On the other hand, the *inertia* for the cyclical component of the real output happens to be substantially higher (0.42).

These results underpin the evidence that the link between cyclical movements in unemployment and output are, in the case of the Czech economy, weaker than those suggested by A. Okun himself. Equally, our results are broadly in accordance with some cross-country studies, such as Železník (2010). These findings prove that the impact of recessions may not only be consequently visible in cyclical components of the Czech output, but could be partially transformed into a *persistent part* of it in the form of *hysteresis* on the labour market. For this reason, the general validity of Okun's law is put in question in the context of the Czech Republic, while the proliferation into the structural parts of the economy is further supported. (Figure 11 sketches in the mentioned rationale by the impulse-response reaction, simulating ten periods ahead of the shock.)

Figure 11

Impulse-response reaction of cyclical unemployment on cyclical output with 95% confidence band (in grey)



Source: own elaboration based on data from CZSO, 2011.

Conclusion

The main body of the article has attempted to examine whether the potential output in the Czech Republic might have been hit by the 2008–2009 economic crisis, primarily judging from the labour market evolution. This could essentially happen as a result of two aspects: first and foremost, because of the specificity and particular proliferation of the crisis, but also, secondly, given its almost unprecedented severity. Overall, we may conclude as follows: on the one hand, it seems that the potential output has been partially affected due to the persistent hysteresis effects in the Czech economy; on the other hand, we have to admit that the most important measures on the labour market do not signal any extreme disturbances. This is especially true comparing the development with the pre-crisis period. Nonetheless, a more significant impact on our potential product might be visible in the years ahead once longer and more accurate time series are available. Based on the entire analysis, whilst referring to the sketched scenarios depicted by Figures 1-4, we would therefore favour the *one-off decrease* in the potential output. This is most importantly with respect to the long-term unemployment spike, a moderate fall in the employment levels, and Okun's law insignificance, all of them essentially signalling that labour market hysteresis effects may still be present in the economy.

Regarding a proper economic policy response, together with Lemoine and Pavot (2009) and/or De Lucia (2010) we can argue that the most important one is to abstain from pro-cyclical fiscal policies, while at the same time implementing suitable and sustainable structural ones. More than ever this is a very important economic policy recommendation. To be more specific, any such economic policy should chiefly target long-term unemployment, insider-outsider issues, and lack of proper human capital investment and training activities. In contrast, not all the recommendations allegedly targeting structural problems in the economy are to be considered as necessary. This holds even truer when economic context and country specificities are not properly taken into account.

Nonetheless, we do expect, once the financial and economic crisis is completely over, more thorough and rigorous conclusions about potential output development to be made, although their relevance for economic policy recommendations will be apparently much weaker. Therefore, their major role rests in a possible "lesson learnt" for the future. Moreover, they can prove right or wrong all the attempts to estimate the impact more upfront than might actually be desirable in terms of accuracy.

Finally, a more significant impact on the potential output in the Czech Republic is to be expected with the (adverse) demographic changes that are still a few years ahead. Provided that no appropriate economic policy measures are adopted, the potential output will likely be affected not only in volume, but also in terms of its growth.

References

AGHION, P.; BACHETTA, P. Financial development and the instability of open economies [Working Paper No. 10246]. Cambridge, Ma : NBER, 2004.

BLANCHARD, O. The Crisis: Basic Mechanisms and Appropriate Policies [Working Paper No. 09/80]. Munich : IMF, 2009.

BLANCHARD, O.; SUMMERS, L. Fiscal Increasing Returns, Hysteresis, Real Wages and Unemployment [Working Paper No. 429]. Cambridge, Ma : Massachusetts Institute of Technology (MIT), Department of Economics, 1986.

BLANCHARD, O.; SUMMERS, L. Hysteresis in Unemployment [Working Paper No. 2035]. Cambridge, Ma : NBER, 1989.

CZECH STATISTICAL OFFICE. Rate of unemployment. (ILO/VŠPS method). www.czso.cz/ [cit. on 2011-05-10].

DE LUCIA, C. Crise financière et potentiel de production. Paris : Conjoncture, BNP Paribas, 2010. s. 3–15. http://research.bnpparibas.com/applis/www/RechEco.nsf/ConjonctureByDateFR/C0B5AD3C00AB43DBC12576E300345BBC/$File/C1003_F1.pdf?OpenElement [cit. on 2011-06-30].

DUMÉNIL, G.; LÉVY, D. La finance capitaliste: rapports de production et rapports de classe. In *La finance capitaliste*, 1st ed. Paris : Presses Universitaires de France, 2007. ISBN 978-2-13-055430-1.

ELMESKOV, J.; PICHELMAN, K. Unemployment and Labour Force Participation [Working Paper No. 130]. Paris : OECD, 1993.

EUROPEAN COMMISSION. Impact of the current economic and financial crisis on potential output. [Occasional Paper No. 49]. Brussels : EC, 2009.

EUROSTAT. Long-term unemployment. http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home/ [cit. on 2011-10-19].

GRANT, A. P. Time-varying Estimates of the Natural Rate of Unemployment: A Revisitation of Okun's Law. *The Quarterly Review of Economics and Finance*. 2002, no. 42, s. 95–113.

HAYEK, F. A. VON. Prices and Production. 2nd revised ed. London : Augustus M Kelley Pubs, 1967.

HURNÍK, J. Potential Output: What Can the Production Function Approach Tell Us? *Economic Research Bulletin*. 2005, vol. 3, no 1. Prague : Czech Nation Bank.

JUSTINIANO, A. ET AL. Investment shocks and business cycles. *Journal of Monetary Economics*. 2010, no. 57, s. 132–145.

KNOTEK, E. S. How Useful is Okun´s Law? Kansas City : Federal Reserve Bank of Kansas City, 2007. http://www.kc.frb.org/publicat/econrev/PDF/4q07Knotek.pdf [cit. on 2011-10-28].

KYDLAND, F. E.; PRESCOTT, E. C. Time to Build and Aggregate Fluctuations. *Econometrica*. 1982, vol. 6, no. 50, s. 1345–1370.

LAVOIE, M. The New Consensus on Monetary Policy Seen from a Post-Keynesian Perspective. In LAVOIE, M.; SECCARECCIA, M. *Central Banking in the Modern World: Alternative Perspectives.* Northampton, Ma : Edward Elgar, 2004, s. 14–34.

LEBRUN, I. Impact de la crise financière sur le PIB potentiel de la Belgique [Working Paper No. 10-09]. Bruxelles : Bureau fédéral du Plan, 2009.

LEMOINE, M.; PAVOT, J. Les effets de la crise sur la croissance à long terme. Paris : Banque de France, 2009. www.banque-france.fr/fr/publications/revues/questions-actuelles/telechar/questions-actuelles-num2-102009.pdf [cit. on 2011-06-11].

LLAUDES, R. ThePhillipscurve and long-term unemployment [Working Paper No. 441]. Frankfurt : ECB, 2005.

MANKIW, N. G. Small Menu Costs and Large Business Cycles: A Macroeconomic Model of Monopoly. *The Quarterly Journal of Economics*. 1985, vol. 100, no. 2, s. 529–537.

MILLARD, S.; SCOTT, A.; SENSIER, M. The labour market over the business cycle: Can theory fit the facts? *Oxford Review of Economic Policy*. 1997, vol. 13, no. 3, s. 70-92.

MINISTRY OF FINANCE OF THE CZECH REPUBLIC. Macroeconomic Forecast. October 2011. www.mfcr.cz [cit. 2011-11-11].

MINISTRY OF LABOUR AND SOCIAL AFFAIRS OF THE CZECH REPUBLIC. Rate of unemployment. www.mpsv.cz [cit. 2011-06-20].

OCDE. Au-delà de la crise : Enjeux moyen terme concernant la production potentielle, le chômage et les situations budgétaires. Paris : Perspectives économiques, 2009.

RAZIN, A. Aggregate Supply and Potential Output [Working Paper No. 10294]. Cambridge, Ma : NBER, 2004.

REINHART, C. M.; ROGOFF, K. S. The Aftermath of Financial Crises [Working Paper No. 14656]. Cambridge, Ma : NBER, 2009.

US BUREAU OF LABOR STATISTICS. Long-term unemployment. www.bls.gov/ [cit. on 2011-11-01].

VOŠVRDA, M. Markovian Model of Unemployment. *Bulletin České ekonometrické společnosti.* 1996, roč. 2, č. 3, s. 65–77.

ŽELEZNÍK, M. Odhad Okunovho zákona: Porovnanie Rakúska a Českej republiky [Working Paper no. 06/2010]. Brno : Centrum výzkumu konkurenční schopnosti české ekonomiky, 2010.

POSSIBLE IMPACT OF THE 2008-2009 ECONOMIC CRISIS ON CZECH POTENTIAL OUTPUT THROUGH THE LABOUR MARKET

Abstract: The paper deals with the possible impact of the 2008-2009 financial and economic crisis on the potential output in the Czech Republic. Given the general difficulty in sketching out all the consequences of the crisis itself, the article is primarily focused on the labour market, which is regarded as an important driving force in terms of potential output fall or its growth slowdown. First, principal reasons why the potential output could have been hit by the 2008-2009 crisis are discussed in detail. The paper then analyzes a number of transmission mechanisms through which potential output could be generally impacted by severe recessions. Further, the output gap of the Czech Republic is estimated and a potential output development is drawn up. Finally, an approximate impact of the crisis on the potential product through the labour market is demonstrated. The results show that the potential output in the Czech Republic has been partially and temporarily affected in volume. This is specifically due to an adverse long-term unemployment and, to a much lesser extent, employment behaviour, in both cases seemingly in relation to the recent crisis. Likewise, Okun's law has been found to be relatively weak in the case of the Czech economy, thus further supporting the "hysteresis explanation". However, such a drop in potential output will likely not persist in the long run, provided that appropriate economic policies – in particular aiming at re-integration of long-term unemployed/discouraged workers and an increase in the employment and participation rates – are implemented.

Keywords: potential output; total factor productivity; financial and economic crisis; external economic shocks; labour market hysteresis; human capital investment; discouraged workers

JEL Classification: E01, E32, E22, E27, F41, J21