CPB Netherlands Bureau for Economic Policy Analysis

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Three scenarios for European economic recovery

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1 Introduction

This background document describes in more detail how the three scenarios for European economic recovery that are presented in *Roads to Recovery* (Gelauff *et al*., 2014) have been constructed. To ensure consistency of the scenarios use was made of the National Institute Global Economic Model (NiGEM) of the British National Institute for Economic and Social Research (NIESR). At our request, NIESR supplied us with a baseline that was used - with some modifications - to represent *Moderate Recovery*. Section 2 of this background document presents the characteristics of the *Moderate Recovery* baseline. Section 3 indicates how the two other scenarios, *Accelerating* and *Delayed Recovery,* have been obtained from this baseline. The final section summarizes the characteristics of the three scenarios, reflects on the construction process and indicates two areas that deserve further attention.

2 Characteristics of the *Moderate Recovery* baseline

As explained in *Roads to Recovery* weak opportunities and sluggish responses lead to *Moderate Recovery* in Europe. This baseline is characterized by sluggish technological progress and a stagnating internal market. Both exports and private demand lack the stimulus needed to return to pre-crisis growth rates, and labour markets recover only gradually. In the Euro area unemployment remains rather high and the government debt ratio, though decreasing, exceeds on average the 60% threshold with more than 20% (see Table 2.1). Growth in the US and Japan returns to pre-crisis levels and growth in China remains high, albeit China grows at a lower than pre-crisis pace because of a gradual shift from investment to domestic consumption. Global GDP-growth is somewhat smaller than pre-crisis and the growth of world export volume is relatively low in relation to the growth of world GDP.

NiGEM was used to construct the *Moderate Recovery* baseline and the *Accelerating* and *Delayed Recovery* scenarios were developed as counterfactuals of this baseline. NiGEM is a macro-econometric model with global coverage.[1] Using NiGEM as a tool for scenario development has as obvious advantages that macro-economic accounting relationships - both at the national and the global level - are automatically maintained in all scenario's and that the behaviour of the economic agents is in accordance with the behaviour they have shown in the past. Particularly valuable is NiGEM's well-developed trade component that endogenously determines export market size, the competitors' price and a variety of import prices for the Netherlands. These trade opportunity indicators serve as inputs for the Dutch

[1] NiGEM covers 47 individual countries and 5 less detailed regions. Global balances are imposed for trade, foreign assets and liabilities and the income derived from these assets. Steady state conditions are imposed for a ten-year period after the baseline horizon. Monetary rules determine the price level. Counterfactuals can be run in adaptive expectations mode or in rational expectations mode. All counterfactuals have been prepared in adaptive expectations mode. This implies that exchange rates (which only move in rational expectations mode) are kept at baseline levels in all counterfactuals.

macro-econometric model that in turn analyses in more detail the scenario implications for the Dutch economy.

Table 2.1 Moderate Recovery baseline characteristics, 2016/2023

	1992/1999	2000/2007	2008/2015	2016/2023
% annual growth rate:				
Gross domestic product, Euro area	2.0	2.2	0.0	1½
Gross domestic product, USA	3.8	2.6	1.4	3
Gross domestic product, China	10.8	10.0	8.5	6½
Gross domestic product, Japan	0.7	1.5	0.2	1
Gross domestic product, world	3.2	4.2	3.1	3¾
World export volume	7.6	7.7	3.4	6
Dutch export market size	6.3	6.4	5.0	5
Private demand, Euro area	2.0	2.0	-0.7	1½
Average labour productivity, Euro area	1.6	0.9	0.2	1¼
Employment, Euro area	0.3	1.3	-0.2	¼
End of period level:				
Unemployment (%), Euro area	9.6	7.6	10.8	9¾
Inflation, Euro area	n.a.	2.2	1.7	1¾
Long interest rate, Euro area	4.6	4.3	2.6	4
Investment risk premium, Germany	2.0	2.0	2.0	2
Interest spread consumer loans, Germany	4.2	2.3	3.1	1¾
Government balance as % of GDP, Euro area	-1.4	-0.7	-2.1	-1¾
Government debt ratio, Euro area	71.7	66.4	94.4	83¾

Source: NiGEM database and own calculations (Moderate Recovery baseline).
Note: Euro area consists of 14 countries (Cyprus, Luxembourg, Malta and Slovakia are not included).

3 *Accelerating* and *Delayed Recovery* as counterfactuals of the baseline

From the *Moderate Recovery* baseline the other two recovery scenarios were obtained by applying shocks to the baseline to meet the targets of different 'building blocks'. All shocks start in 2016. Interest rates, exchange rates, risk premia and interest spreads were kept exogenous in the baseline, and they have been kept exogenous in the counterfactuals as well. Keeping interest rates exogenous implies that the monetary adjustment mechanisms of NiGEM are not available to determine the price level. Instead inflation has been targeted by appropriate demand or supply shocks or by shocking commodity prices. In this section I describe the building blocks for the two other recovery scenarios and present their contribution to Euro area GDP-growth in deviation from the *Moderate Recovery.*

Accelerating Recovery

The high pace of recovery in this scenario is due to structural reforms in the Euro area, a lower investment risk premium, the successful conclusion of the Transatlantic Trade and Investment Pact (TTIP) and the impacts of virtuous circles that strengthen both consumer confidence and productivity in Europe. On the opposite side a rise of interest rates to prevent overheating reduces growth. Thus, the building blocks are:

- Structural reforms
  - In the periphery of the Euro area product market reforms (PMRs) are adopted; the GDP-impacts of shocks on total factor productivity (tfp) have been calibrated to the GDP-impacts estimated in Anderson *et al.* (2014), 5 years (2.4%) and 10 years (6.0%) after the start of the reforms.
  - In the core of the Euro area services market reforms are taking place; it is assumed that more jobs become available in the service sector and labour participation will increase; the GDP-impacts of labour participation shocks have again been calibrated to the GDP-impacts of services market liberalization estimated in Anderson *et al.* (2014), 5 years (0.8%) and 10 years (2.4%) after the start of the reforms.
  - In selected countries labour market reforms are adopted; the impacts on the unemployment rate of wage shocks have been calibrated to a lowering of the rate below baseline of 5% in Greece, Portugal and Spain en of 3% in France and Italy.
- Lower investment risk premium; the risk premium is reduced with 1%-point.
- Conclusion; of the TTIP; the impact of shocks on import volumes is calibrated to raise Dutch export market size by 2%-points.
- Miscellaneous shocks for the US (consumer confidence and tfp), China (tfp), and Japan (tfp) to raise their GDP growth with 0.5%-point and in addition shocks to commodity prices to raise Euro area inflation with 0.5%-point.
- Raising the interest rate; to prevent overheating the policy interest rate is raised such that the long term interest rate rises with 0.5%-point.
- Strengthening of consumer confidence and productivity; these final shocks to private consumption and total factor productivity in Europe are calibrated such that the overall increase of the Euro-area GDP meets the target of the Euro-area GDP growth of about 1%-point in excess of the baseline.

Figure 3.1 Impacts of *Accelerating Recovery* building blocks on average annual GDP-growth (2016/2023) in the Euro area in deviation of *Moderate Recovery*

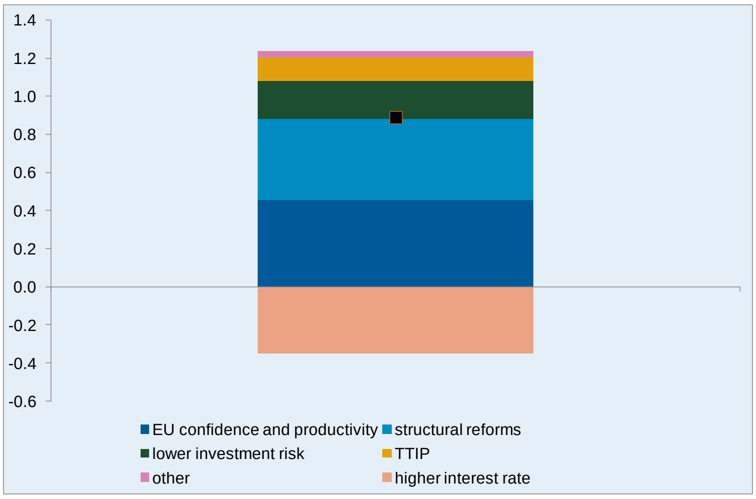


Figure 3.1 shows the impacts on Euro area GDP growth in deviation of the baseline for each of the building blocks. The largest positive contributions are due to structural reforms and positive productivity and confidence shocks. Smaller contributions come from the lower investment risk and the conclusion of TTIP. The impact of miscellaneous other shocks (which includes the interaction effects of the different building blocks) is quite small. On the opposite side: a relatively small rise of the long interest rate (¾%-point) reduces the average growth rate with 0.3%-point.

Delayed Recovery

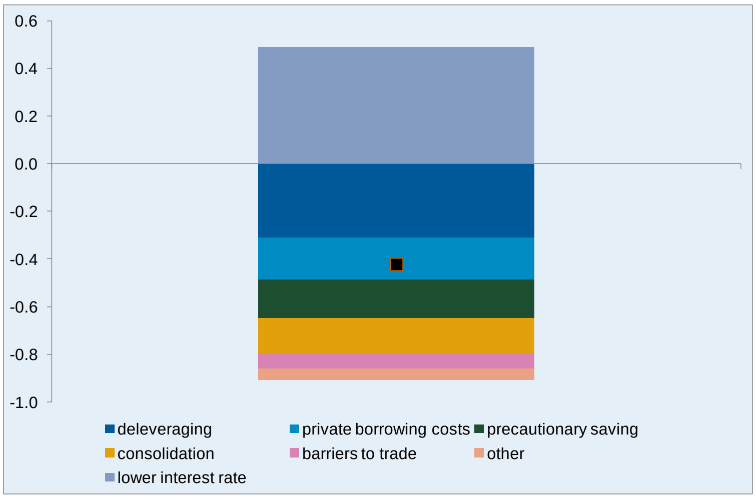
The extensive delay of recovery is due to deleveraging of households and non-financial corporations, credit constraints for private borrowing, low consumer confidence reflected in extra precautionary savings, consolidation of government budgets and increasing barriers to trade. On the opposite side a decrease of interest rates fosters economic growth. Thus, the building blocks are:

- Deleveraging
    - Households deleverage in proportion to their mortgages being uncovered by the value of their house; the rule-of thumb is used that for each percent decrease in nominal house price between the top and the last quarter of 2013 0.7% of mortgages goes under water (see section 7.4 and in particular Figure 7.7 in *Roads to Recovery*); savings are calibrated such that the under water mortgages are being restored in 2023.
    - Non-financial corporations deleverage to restore their net financial assets to GDP ratio (measured in 2012) to the level of 2000 (see Figure 7.8 in *Roads to Recovery*); investments are being reduced to restore the financial position of non-financial corporations.
- Constrained private sector borrowing
    - the investment risk premium is raised by 1%-point;
    - the rate spread for borrowing by households is increased by 0.5%-point.
- Precautionary savings; households reduce consumption such that their savings ratio exceeds the baseline level by 1%-point in 2023.
- Governments consolidate their budgets; in an attempt to stem the rise of government debt ratio's European governments raise their budget targets with 1/20th of the excess of the debt ratio over 60% (as measured in the year 2015).
- Increasing trade barriers; TTIP does not fly; instead, increased protection measures hamper trade; the impact of shocks on import volumes is calibrated to decrease Dutch export market size by 1½ %-points.
- Miscellaneous shocks for the US (consumer confidence and tfp), China (tfp), and Japan (tfp) to mitigate GDP growth somewhat in these countries and in addition shocks to commodity prices to lower Euro area inflation.
- Lowering the interest rate; in order to stimulate inflation the policy interest rate is lowered such that the long term interest rate falls short of the baseline level with 1¾ %-point; we observe that NiGEM outcomes are quite sensitive to interest rate shocks; as there are reasons to believe that monetary policy in an uncertain world is less effective near the Zero Lower Bound (see e.g. Nakata, 2013), we decided to halve the interest rate

impact on Euro area GDP (by introducing compensating shocks that lowered consumption in Europe).

Figure 3.2 shows the impacts on Euro area GDP growth in deviation of the baseline for each of the building blocks. The largest negative contributions are due to deleveraging and increased private sector borrowing costs. Smaller negative contributions come from precautionary saving, government budget consolidation and increased barriers to trade. The impact of miscellaneous other shocks (which includes the interaction effects of the different building blocks) is very modest. On the opposite side: a relatively large decrease of the long interest rate (1¾ %-point) raises the average rate of growth of GDP with 0.5%-point.

Figure 3.2 Impacts of *Delayed Recovery* building blocks on average annual GDP-growth (2016/2023) in the Euro area in deviation of *Moderate Recovery*



4 Summary and concluding remarks

In *Accelerating Recovery* structural reforms and virtuous circles in productivity growth and consumer confidence raise labour productivity while liberalization of the services markets raises employment (see Table 4.1). Unemployment falls relatively to *Moderate Recovery*. Virtuous circles and the successful conclusion of TTIP also boost world trade. In spite of the relative high growth of GDP and relatively high inflation the government debt ratio is hardly falling though, because governments do not raise their budget targets and the real interest rate is relatively high (2½%).

In *Delayed Recovery* deleveraging by households and firms, high borrowing costs, sovereign debt consolidation and vicious circles keep the economy in a state of low growth and low inflation. Labour productivity remains low and employment is not expanding. Vicious circles and increasing protectionism lower the export potential of the Dutch economy. Both GDP growth and inflation are relatively low. Hence, sovereign debt ratios are soaring in spite of governments' attempts to consolidate the budget and notwithstanding the relatively low real interest rate (1½%).

Table 4.1 Characteristics of the three roads to recovery, 2016/2023

	Accelerating Recovery	Moderate Recovery	Delayed Recovery
% annual growth rate:			
Gross domestic product, Euro area	2¾	1½	1
Gross domestic product, USA	3½	3	3
Gross domestic product, China	7	6½	6¼
Gross domestic product, Japan	1¾	1	¾
Gross domestic product, world	4½	3¾	3¾
World export volume	8¼	6	5
Dutch export market size	7¼	5	3¼
Private demand, Euro area	2¼	1½	0
Average labour productivity, Euro area	2	1¼	¾
Employment, Euro area	¾	¼	¼
End of period level:			
Unemployment (%), Euro area	7	9¾	9¼
Inflation, Euro area	2¼	1¾	¾
Interest rate, Euro area	4¾	4	2¼
Investment risk premium, Germany	1	2	3
Interest spread consumer loans, Germany	1¾	1¾	2¼
Government balance as % of GDP, Euro area	-1½	-1¾	½
Government debt ratio, Euro area	83	83¾	97¼

Source: own calculations with NiGEM.
Note: some of the data presented in this table slightly differ from the data in Table 8.2 in *Roads to Recovery*. The latter table presents - in spite of its heading - data for the 2014/2023 period.

The process of constructing the three roads to recovery can be characterized as a process of developing alternative storylines and attaching numbers to the stories (for GDP growth, the characteristics of supply and demand developments, interest and inflation rates). Thus both baseline development and the construction of the counterfactual alternatives with NiGEM were bound to meet a limited number of predetermined targets. Meeting these targets was a smooth but time-consuming operation using the well-designed software interface of NiGEM. The successful construction of the scenarios with NiGEM basically shows that the impacts of the different building blocks can explain the different paces of recovery.

In the process we became aware that inflation and GDP are quite sensitive to interest rate changes in NiGEM. In view of the current real-world experience of very limited responses to changes in central banks' policy rates, this certainly is an area that deserves further attention. We also observe that - though world GDP-growth is returning to the pre-crisis level in the *Moderate Recovery* scenario - world export growth does not return to the levels before the crisis (see Table 2.1). Though current real-world experience indicates that the elasticity of world exports to world GDP has indeed fallen dramatically, the elasticity might rise again to pre-crisis levels if recovery accelerates. Support for this presumption is provided by the fact that international fragmentation is on a path returning to pre-crisis levels since 2010 (see Los *et al.*, forthcoming). Hence, this is another area that deserves attention in the future.

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