EARLY INCOMPLETE DRAFT

Simulating the U.S. recession

by
Peter B. Dixon and Maureen T. Rimmer of the Centre of Policy Studies

June 9, 2009

1. Introduction

The paper submitted for the conference simulated the effects of a credit squeeze (similar to a reduction in investor confidence) on the U.S. economy. The size of the squeeze was scaled so that the drop in GDP in 2009 relative to control was consistent with the change that took place in the OECD forecast when the forecasters became aware of the credit squeeze (a comparison of the November 2007 forecast and the November 2008 forecast).

Our aim in conducting the simulations was: (a) to use our CGE model (USAGE) to trace out the implications of the credit squeeze for variables not forecast by the OECD such as industry outputs and employment; and (b) to provide a baseline incorporating the credit squeeze from which to calculate deviations caused by proposed fiscal stimulation.

Some results from the submitted paper are shown in Charts 1 and 2. Key features of these results are as follows.

- Consistent with the change in the OECD forecast, employment and GDP fall about 3 or 4 per cent below the business-as-usual baseline (no credit squeeze) for 2009 and 2010.
- Investment falls by about 25 per cent below the baseline in 2009 and 2010.
- Household consumption fall about 3 or 4 per cent below the baseline in 2009 and 2010.

So far so good. But what about exports? In 2009 and 2010 exports move about 25 per cent above control. In reality, U.S. exports have sharply declined in 2009.

This leaves us with two questions:

(1) Why has our model shown strong growth in exports?

(2) What should we do to force the model to generate a realistic export response to the downturn in investment?

In sections 2 and 3 we answer these questions. Then in section 4 we describe the set up for two recession simulations, one without fiscal stimulation and one with the Obama stimulation package. Sections 5 and 6 describe the results from the two simulations. Concluding remarks are in section 7.

2.. Why has our model shown strong growth in exports?

The simulations in the submitted paper were conducted under standard USAGE assumptions. The most important among these are the treatments of the factor markets. For capital we assume that rental rates adjust each year to ensure that capital in each industry is fully used. For labor we assume that wage rates adjust in a sticky fashion to the level of employment. This is done according the equation:

$$\left\{\frac{RW(t)}{RW_f(t)}-1\right\} = \left\{\frac{RW(t-1)}{RW_f(t-1)}-1\right\} + \alpha_1\left\{\frac{LTOT(t)}{LTOT_f(t)}-1\right\}. \qquad (1)$$

In this equation the subscript f indicates a baseline forecast value, that is, a value in a simulation without the policy or other shock (in this case a credit crisis) under consideration. $RW_f(t)$ and $LTOT_f(t)$ are the real wage rate and the level of employment in year t in the baseline forecast. W(t) and LTOT(t) are the real wage rate and the level of employment in year t in the policy simulation, that is the simulation with the shock. α_1 is a positive coefficient.

Under (1), we assume in policy simulations that the deviation in the real wage rate from its baseline forecast level increases at a rate which is proportional to the deviation in aggregate hours of employment from its basecase forecast level. The coefficient of proportionality is chosen so that the employment effects of a shock to the economy are largely eliminated after 5 years. This labor market assumption is consistent with conventional macro-economic modelling in which the NAIRU is exogenous.

Under these assumptions, how should we expect exports to react to a downturn in investment? Three useful equations are:

$$RW = MPL\left(\frac{K}{L}\right) \qquad (2)$$

$$Y = A * F(K, L) \qquad (3)$$

$$Y = C + I + G + X - M \qquad (4)$$

In the short run, we can think of RW as fixed (sticky real wage adjustment) and K as fixed (full capital utilization). Equation (2) then indicates that we should expect little change in the short run in L in response to a downturn in I. With no change in technology (A), equation (3) now indicates that we should expect little change in Y. Under standard USAGE assumptions, C is closely linked to Y and G is exogenous and unchanged. Thus from (4) we see that the main macro effect of a decrease in I is likely to be an improvement in the trade balance, an increase in X-M. This is facilitated under standard USAGE assumptions by real devaluation which increases X and reduces M.

This story is obviously a little too simple. The results in Chart 1 show short-run decreases in both Y and L (K is unaffected in 2009). To understand the decrease in L we need to recognize that our sticky wage assumptions applies to the real wage defined as the nominal wage deflated by the price index for consumption whereas the real wage in equation (2) refers to the nominal wage deflated by the price index for GDP. We rewrite equation (2) as

$$\frac{W}{P_c} = \frac{P_g}{P_c} * MPL\left(\frac{K}{L}\right) \quad (5)$$

With an increase in exports, the U.S. suffers a reduction in its terms of trade. This reduces P_g/P_c . We can think of the LHS of (5) as being fixed in the short run. Thus, MPL rises. With K fixed, L must fall. Then from (3) we see that Y must also fall.

So this is how, under standard USAGE assumptions, a reduction in I causes decreases in Y and L that are realistic but an increase in X that in the circumstances of 2009 is unrealistic. At first glance, the problem seems to be that in reality the U.S. is not experiencing the real devaluation that would be necessary to generate the increase in X -M consistent the USAGE simulation.

3. What should we do to force the model to generate a realistic export response to the downturn in investment?

We started by trying to damp the export response in USAGE to a decrease in I by introducing a contraction in world demand for U.S. exports. But to get exports down to the 10 per cent decline that now seems likely for 2009 required an unrealistically huge inward movement in foreign demand curves for U.S. products. These inward shifts generated a totally unrealistic real devaluation and decline in the U.S. terms of trade.

Next we thought about the assumption of full capital utilization. Of course we knew that a severe recession leads to excess capacity. In preparing the submitted paper, we thought that excess capacity could be adequately represented in an industry by an increase in its K/L ratio, brought about by a decrease in L with a fixed K. The problem with this approach is that it involves sharp reductions in rental rates on capital, especially in industries producing non-traded goods such as construction. With sharp reductions in rental rates in non-traded-goods industries, real devaluation (a reduction in the price level in the U.S. relative to the price level in the rest of the world) is inevitable. Thus it appears that under the full capacity assumption it is virtually impossible to generate short-run results for the effects of an investment downturn without an export upturn.

This logic lead us to the conclusion that we must introduce sticky adjustment in rental rates, thereby allowing less than full use of capital. Consequently we made a distinction in USAGE between capital in use in industry i in year t [KU(i,t)] and capital in existence in industry i in year t [KE(i,t)]. In the recession years, 2008 and 2009, we limit the fall in real rentals via sticky rental adjustment equations. This allows capital in use in each industry to fall below capital in existence. The sticky rental adjustment assumption can be justified by thinking of the rental rate as a profit markup on variable costs with the markup adjusting downwards slowly in response to excess capacity. We keep the sticky rental adjustment equation for industry i in place in the years beyond the recession until the industry regains full capacity utilization. Once an industry regains full capacity utilization, we assume that this is maintained in subsequent years.

In mathematical terms we introduce these ideas in policy simulations[1] via the following relationships:

---

1 In the baseline forecast we continue to adopt the full utilization assumption.

$$\left\{\frac{RQ(i,t)}{RQ_f(i,t)}-1\right\} = \left\{\frac{RQ(i,t-1)}{RQ_f(i,t-1)}-1\right\} + \alpha_2\left\{\frac{KU(i,t)}{KE(i,t)}-1\right\} + S(i,t) \text{ for all t ,} \quad (6)$$

$$RQ(i,t) = \Psi_i\left(KU(i,t), ...\right) \quad \text{for all t} \quad (7)$$

$$S(i,t) = 0 \quad \text{for} \quad t < t_c(i) \quad (8)$$

$$S(i,t) \geq 0 \quad \text{for} \quad t = t_c(i) \quad (9)$$

$$KU(i,t) = KE(i,t) \quad \text{for} \quad t \geq t_c(i) \quad (10)$$

$$KU(i,t) \leq KE(i,t) \quad \text{for all t} \quad (11)$$

In these relationships, RQ(i,t) and RQ_f(i,t) are the real rental rate in industry i in year t in policy and baseline forecast, and S(i,t) is a slack variable. α_2 is a positive parameter and t_c(i) is the year in which industry i regains full capacity utilization. Equation (6) is the sticky rental adjustment specification and equation (7) is the normal capital demand equation derived from the condition that the real rental on capital is the marginal product of capital in use.

What do these relationships mean and how do they work? Will capital in use in industry i be equal to capital in existence in year t =2010? Assume for a moment that this is the case, implying that t_c(i) = 2010.[2] In computing the solution for 2010, we know capital in existence. It is predetermined (capital in existence at the end of 2009). On the assumption that capital in use is equal to capital in existence, we can determine the real rental rate for industry i via equation (7). Then we can check in equation (6) to see if S(i,t) satisfies condition (9). If so, then t_c(i) is in fact 2010 and we can assume in our solutions for 2010 and subsequent years that KU(i,t) is KE(i,t). If on the other hand condition (9) is violated then we assume that S(i,t) =0 for t =2010. This allows us to compute RQ(i,t) and KU(i,t) via a simultaneous solution of (6) and (7). We can be confident that the value for KU(i,t) obtained this way is less than KE(i,t). This is because the replacement in (6) of the negative value for S(i,t) [obtained under the assumption that KU(i,t) = KE(i,t)] with zero will tend to raise RQ(i,t) and thereby lower KU(i,t) [the derivative of the ψ with respect to KU(i,t) is negative]. Having found for 2010 that KU(i,t) is less than KE(i,t), we proceed to year 2011 knowing that t_c(i) is greater than or equal to 2011. This enables us to repeat the above procedure and find a solution for 2011.

As well as allowing for excess capacity, we made two adjustments to the USAGE investment specification for each industry. First, we introduced the idea that expected rates of return on investment are likely to be lowered by the emergence of excess capacity. Second, we allowed demands for additional capacity in year t to be partially satisfied by re-commissioning excess capacity from year t-1. Algebraically, we specified investment via:

---

[2] 2010 is less than or equal to t_c(i) because every industry had excess capacity in both 2008 and 2009.

$$KE(i,t+1) = KE(i,t)*\left[1 - D(i)\right] + I(i,t) \quad \text{for all t} \tag{12}$$

$$KGR(i,t) = \frac{KE(i,t+1)}{KE(i,t)} - 1 \quad \text{for all t} \tag{13}$$

$$KGR(i,t) = g_i\left[EROR(i,t)\right] - \alpha_3 * \left[1 - \frac{KU(i,t-1)}{KE(i,t-1)}\right] \quad \text{for all t} \tag{14}$$

$$EROR(i,t) = \left[\frac{KU(i,t)}{KE(i,t)}\right] * h_i\left(RQ(i,t), ...\right) - \left[1 - \frac{KU(i,t)}{KE(i,t)}\right] * D(i) \quad \text{for all t} \tag{15}$$

Equation (12) specifies that capital in existence for industry i at the beginning of year t+1 is the depreciated capital from the beginning of year t plus investment during year t. Equation (13) defines growth in capital in existence through year t. The first term on the RHS of (14) is the standard USAGE function relating capital growth through year t to the expected rate of return on investment made in year t. The second term damps growth in capital in existence by allowing some of industry i's capital requirements to be satisfied by re-commissioning capital that was unused in year t-1. To see how this works suppose that $\alpha_3 = 0.33$. If expected rates of return justify capital growth through year t of 5 per cent ($g_i = 0.05$) but excess capacity was 10 per cent in year t-1, then KGR(i,t) is reduced to 1.7 per cent (= 5 – 0.33*10). Finally, in equation (15) we assume that the expected rate of return is a waited average of the standard rate of return (h_i) for capital in use computed via its marginal product and the negative of the depreciation rate. The weights are the share of capital in existence that is in use and the share not in use. We assume that capital not in use has a rate of return of the negative of the depreciation rate (it earns no rental and deteriorates at the depreciation rate).

4. Setting up two recession simulations

We undertake two simulations with our model enhanced by relations (6) to (15). In the first simulation there is no policy response in the U.S. to the recession. In the second simulation we introduce the Obama stimulation package.

The top part of Table 1 shows the growth rates in expenditure components of GDP that we judge would apply in the absence of the Obama stimulation package. In making these judgments we were guided by forecasts published by the Congressional Budget Office and by National Accounts data available up to April 2009. The figures are only judgments because both the CBO forecasts and the actual data incorporate the effects of the Obama package.

In imposing the numbers in the top part of Table 1 on USAGE, we needed to endogenize several shift variables. To allow growth in private consumption to be set exogenously, we endogenize the average propensity to consume. As can be seen in the bottom part of Table 1, the imposed growth rates for consumption were accommodated by small negative movements in the average propensity to consume. This seems reasonable for a recessionary situation in which consumer confidence is low. To exogenize investment growth we endoenize a shift variable that changes the amount of investment undertaken at any given expected rate of return. To exogenize imports we endogenize a shift variable that changes preferences of industries and households

between imported and domestically produced goods. To endogenize export growth we endogenize the position of export demand curves. Reassuringly, with our enhanced model, we no longer need huge inward movements of export demand curves accompanied by unrealistic real devaluation and strong terms-of-trade decline to accommodate the 10 per cent reduction in exports that is likely to apply in 2009. The inward movement in export demand curves corresponds to a 6.2 per cent reduction in world demand for U.S. exports at any given world price (denominated in foreign currency). This is accompanied by tiny movements in the real exchange rate and the terms of trade (0.7 per cent real appreciation and 0.2 per cent increase in the terms of trade.

So how does the enhanced model work? With sticky adjustments in both real rentals on capital and real wage rates[3] there can be little movement in the real exchange rate. For convenience we assume that the nominal exchange rate is fixed. Thus, we get little movement in the U.S. price level. Both the lack of movement in the nominal exchange rate and the price level seem realistic.

Under standard USAGE assumptions, stickiness in real wage rates and fixity of capital severely limit the scope for short-run movements in employment, especially if there is little movement in the terms of trade, see equation (2) and the related discussion. In the enhanced model, capital in use can fall, dragging employment with it. Thus, employment can move in the short run without requiring movements in real wage rates or the terms of trade. Consistent with Keynesian logic we can think of Y in equation (3) as being set by demand (C+I+G+X-M) and K and L adjusting together to accommodate the demand-determined movement in Y. The movement in the K/L ratio is limited by the assumption of sticky real factor prices, implying rather little movement in relative factor prices.

For 2010 we assume that the shift variables that were moved in the imposed recession for 2008 and 2009 remain at the positions they reached in 2009. We think of 2010 as a pause year. Recovery commences in 2011. Over the period 2011 to 2015 we return the shift variables to their baseline values.

In the second simulation we introduce the Obama package. We represent this as additions to public consumption and private benefits (additional to levels in the first simulation). The additions to public consumption are 0.85 per cent in 2009 and 2.7 per cent in 2010, while the additional benefits to households are worth about 1.6 per cent and 3.2 per cent of household consumption in 2009 and 2010. Beyond 2010 we assume that

---

[3] For 2008 and 2009 we implemented equation (1) with nominal wage rates replacing real wage rates. Technically this was necessary because with Y fully specified from the RHS of (4) and real rental rates determined by our stickiness assumptions, we cannot specify (1) in real terms. To see this assume that (1) *is* specified in real terms. With real rentals given by the stickiness assumption we can deduce the K/L ratio from the marginal productivity condition for capital. Given K/L we can deduce the real wage rate from the marginal productivity condition (2) for labor. Now we can deduce L from equation (1). Going back to the K/L ratio we can deduce K. Then via the production function we can deduce Y. But Y is already known from the demand side, so we have over determination and a potential contradiction. In the event, our simulations showed little change in the price level in 2008 and 2009 implying that stickiness in nominal terms was not much different to stickiness in real terms.

these additions to public consumption and private benefits are unwound so that by 2015 public consumption and benefit rates have returned to their baseline paths.

In simulating the Obama package it would be inappropriate to set growth in consumption and other expenditure aggregates exogenously in 2009 and 2010: we want to know how these expenditure aggregates are affected by the package. Instead we set the shift variables (e.g. the average propensity to consume) exogenously on the paths that they had in the first simulation. This is true not only for 2009 and 2010 but for all subsequent years. In the absence of the package, the second simulation would have reproduced the results from the first simulation. The package moves the results for the second simulation away from those in the first simulation. Comparison of results in the two simulations reveals the effects of the package.

5. Results: the recession without the Obama stimulation package

Chart 3 presents results for the first simulation in year-on-year growth terms. For 2008 and 2009 it shows the exogenously imposed growth rates from Table 1. For example, it shows growth rates of 0.4 and -3.5 per cent for private consumption in these years. Even without the Obama package, Chart 3 indicates that in growth rate terms, the economy recovers in 2010. GDP growth moves from -4.7 per cent in 2009 to 1.7 per cent in 2010. The main source of recovery is export growth, which moves from -10 per cent in 2009 to 21 per cent in 2010. The upsurge in export growth reflects our assumptions: (a) that export demand curves in 2010 stop moving to the left; and (b) that U.S. real wage rates fall (allowing real devaluation) as high unemployment overcomes wage stickiness. Investment growth remains strongly negative in 2010 (-17 per cent following -25 per cent in 2009). Investment continues to show strong negative growth in 2010 because excess capacity develops in 2009 which must be worked off in 2010. Consumption and import growth in 2010 recover broadly in line with GDP growth. Import growth is a little above GDP growth despite real devaluation. This reflects high import intensity of U.S. exports.

Beyond 2010, Chart 3 shows strong growth in GDP in 2011, reflecting a strong recovery in investment. GDP growth then resumes a fairly normal pattern. Growth rates in investment and exports are quite volatile and offsetting, but eventually settle down as the echo of the recession dies away.

Charts 4 and 5 present results from the first simulation as deviations from a no-recession baseline. This baseline was formed from forecasts by U.S. organizations such as the Congressional Budget Office made in 2007 before the recession was apparent. The deviation results bring out the seriousness of the recession. For example, Chart 5 shows that the recession (without the Obama package) reduces employment in 2008, 2009 and 2010 by 3, 10 and 12 per cent relative to where it would have been in the absence of the recession. These deviations reflect baseline employment growth in each year of 1.1 per cent and recession growth rates in the three years of -1.5, -7.0 and -1.2 per cent.

Although the economy recovers from the recession in year-on-year growth terms by about 2011, Charts 4 and 5 imply that the recession will cause lasting damage. In 2015 the recession simulation without the Obama package shows GDP and consumption deviations of -4.4 and -3.4 per cent (Chart 4). In Chart 5, the employment and capital deviations in 2015 are -2.9 and -11.6 per cent. If we integrate the GDP and private consumption deviations from 2008 to 2015 we see that the recession over this period

costs the economy 59 per cent of a year's GDP and 52 per cent of a year's private consumption. A partial offset to these losses is that the recession improves the trade balance for most of the simulation period. By 2015 the ratio of net foreign liabilities to GDP in the first recession simulation is 38 per cent, down from 46 per cent in the baseline forecast.

From a modeling point of view, one interesting aspect of Chart 5 is the relationship between the deviation paths for aggregate capital in use (KU) and aggregate capital in existence (KE). The recession strongly weakens investment: even in 2015 investment is still below its baseline level. Consequently, KE falls relative to the baseline throughout the simulation period. Capital in use falls dramatically relative to the baseline in the recession years of 2008 to 2010. Beyond 2010, KU recovers with the recovery of the economy. With KU increasing and KE falling excess capacity is eliminated by 2012.

6. Results: the effects of the Obama stimulation package

The Obama package provides a direct stimulation to GDP of about 1.3 per cent in 2009 and 2.7 per cent in 2010.[4] As can be seen from Chart 6, these direct stimulations generate increases in GDP in the two years of 2.2 per cent (=10.1-7.9) and 4.9 per cent (=12.2-7.3). Thus, our simulations give multipliers of 1.7 (=2.2/1.3) and 1.8 (=4.9/2.7).

From USAGE simulations conducted under standard assumptions, we are used to thinking of multipliers that are close to zero. If we stimulate public or private consumption then under standard assumptions we get a largely offsetting deterioration in the trade balance brought about by real appreciation triggered by sharp increases in rental rates on capital in industries producing non-traded goods. Now, under our excess capacity assumption, an increase in demand produces relatively little effect on the real exchange rate and therefore only small reductions in exports and small increases in imports (Charts 12 and 13). Thus, the trade balance provides only a small offset to the direct effect on GDP of demand stimulation. With the direct effect not being significantly offset, USAGE now generates substantial indirect effects (multiplier effects). Direct increases in GDP expand employment of both labor and capital (Charts 7 and 8). This stimulates consumption and investment (Charts 9 and 10), thereby providing increases in demand and GDP beyond the direct effects.

In the long run the package has little effect on any of the variables shown in Charts 6 to 13. However, in the years before 2015 the package reduces exports and increases imports (Charts 12 and 13). Consequently by 2015 the package has a noticeable effect on net foreign liabilities. As mentioned already, in the recession simulation without the package, the ratio of net foreign liabilities to GDP reaches 38 per cent at the start of 2015. With the package in place it reaches 44 per cent at the start of 2015.

Despite causing an increase in net foreign liabilities, the package generates considerable benefits. With the package, the accumulated losses in GDP and private

[4] As mentioned earlier, in 2009 and 2010 the package provides additions to government consumption of 0.85 and 2.7 per cent (Chart 11) and additions to household income worth about 1.6 and 3.2 per cent of private consumption. We translate these percentages into direct effects on GDP using expenditure weights in GDP, 16.6 per cent for government consumption and 71 per cent for private consumption.

consumption over the period 2008 to 2015 are limited to 46 per cent of a year's GDP and 31 per cent of a year's private consumption, down from 59 per cent and 52 per cent without the package. Taking account of net foreign liabilities, we conclude that the package generates a benefit worth about 7 per cent of a year's GDP [= (59-46) – (44-38) or about 10 per cent of a year's consumption.

7. Concluding remarks *** TO BE COMPLETED ***

References (not yet incorporated into the text)

Dixon, P.B., A.A. Powell, and B.R. Parmenter (1979), *Structural Adaptation in an Ailing Macroeconomy*, Melbourne University Press.

Dixon, P.B. and M.T. Rimmer (2002), *Dynamic General Equilibrium Modelling for Forecasting and Policy: a Practical Guide and Documentation of MONASH*, Contributions to Economic Analysis 256, North-Holland Publishing Company, pp.xiv+338.

United States International Trade Commission (2004), *The Economic Effects of Significant U.S. Import Restraints: Fourth Update 2004*, Investigation No. 332-325, Publication 3701, June.

United States International Trade Commission (2007), *The Economic Effects of Significant U.S. Import Restraints: Fifth Update 2007*, Investigation No. 332-325, Publication 3906, February.

Table 1. Year-on-growth in recession years without the Obama stimulus package

		2008	2009
Exogenous settings for expenditure aggregates			
Real private consumption	C	0.4	-3.5
Real investment	I	-6.6	-25.0
Real public consumption	G	2.0	2.0
Export volumes	X	6.4	-10.0
Import volumes	M	-3.4	-18.0
Real GDP	Y	0.7	-4.7
Endogenous outcomes for some key macro variables			
Real appreciation	realapp	1.7	0.7
Horiz. shift in export demand curves	f4gen	0.7	-6.2
Terms of trade	toft	0.2	0.2
Ave. propensity to consume	apc	-1.2	-0.9
Employment	E	-1.5	-7.0
Capital in use	KU	0.9	-3.4
Capital in existence	KE	3.3	2.6

Chart 1. GDP, employment and capital: financial crisis simulation, standard USAGE assumption (percentage deviation from baseline)

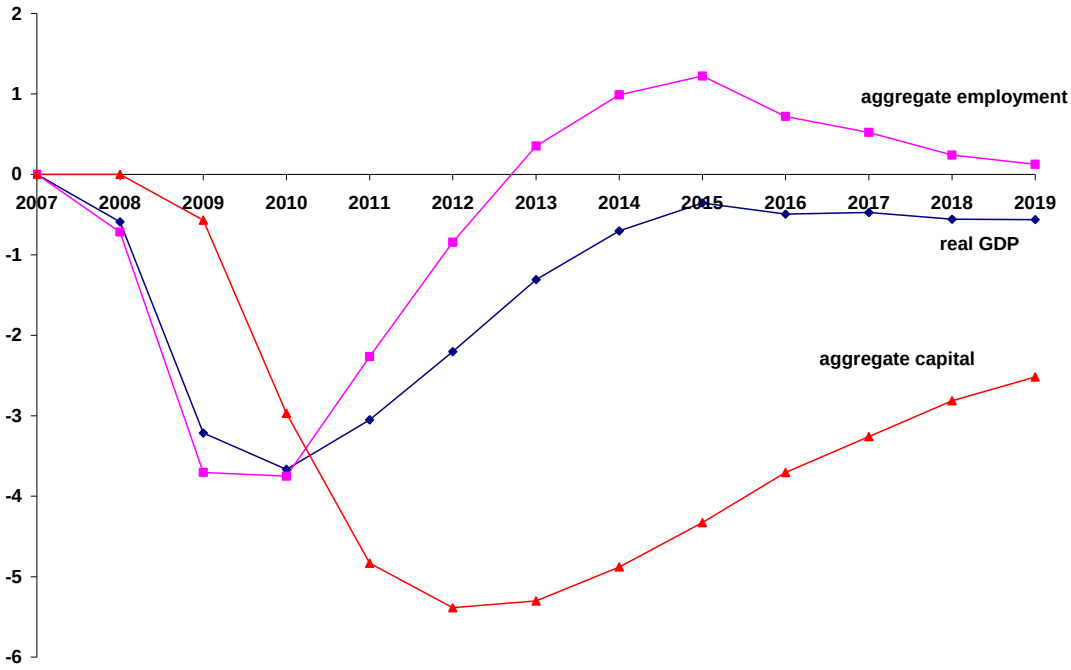


Chart 2. Expenditure aggregates: financial crisis simulation, standard USAGE assumption (percentage deviation from baseline)

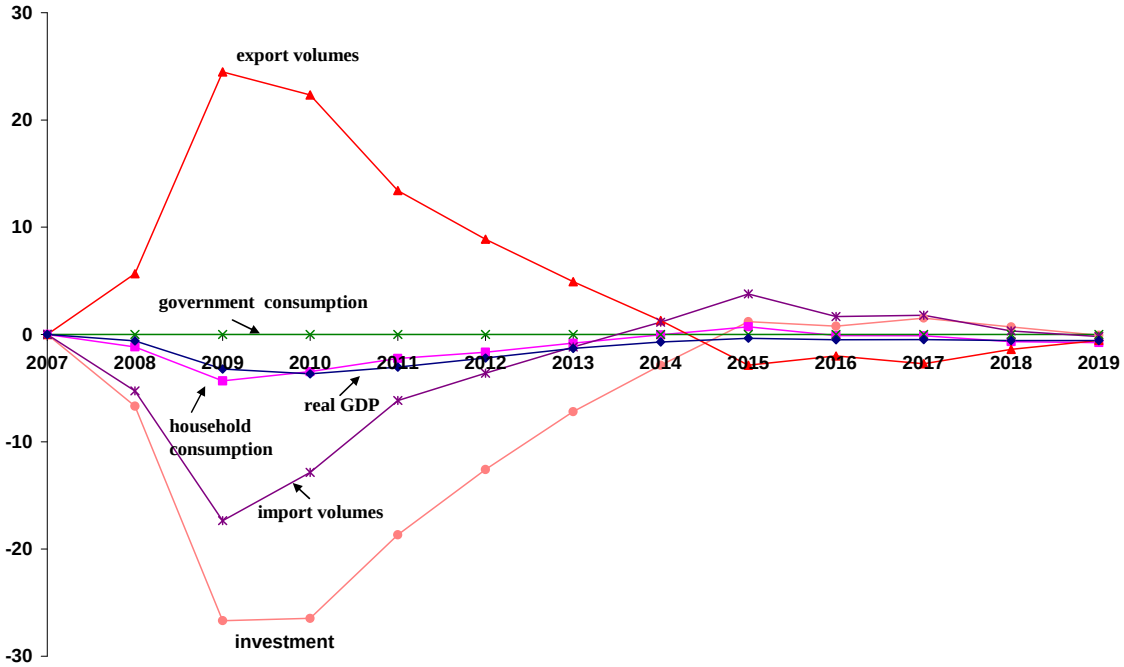


Chart 3. Expenditure aggregates: recession with no package, excess capacity assumption (year-on-year growth rates)

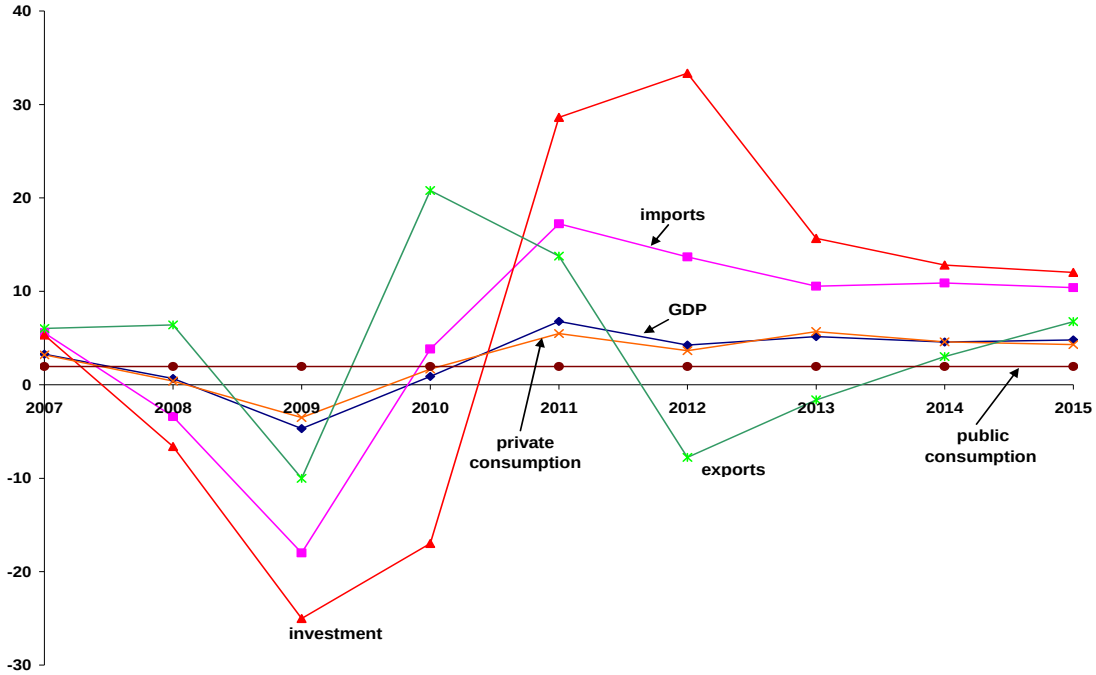


Chart 4. Real expenditure aggregates: recession with no package, excess capacity assumption (percentage deviation from baseline)

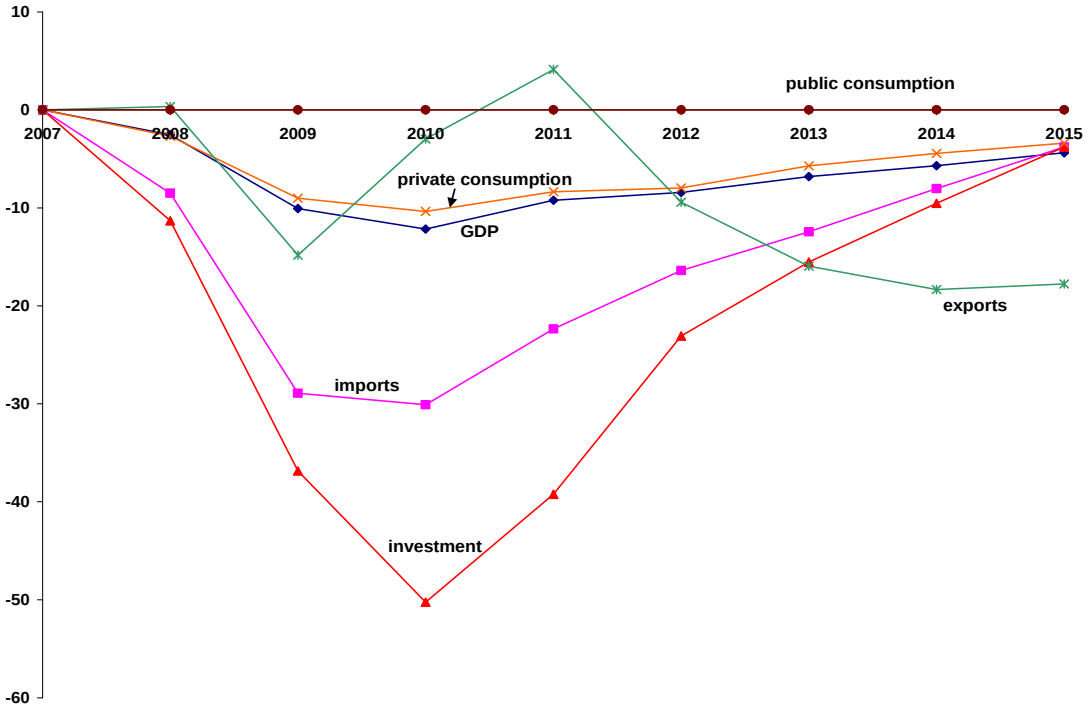


Chart 5. Real GDP, employment and capital: recession with no package, excess capacity assumption (percentage deviation from baseline)

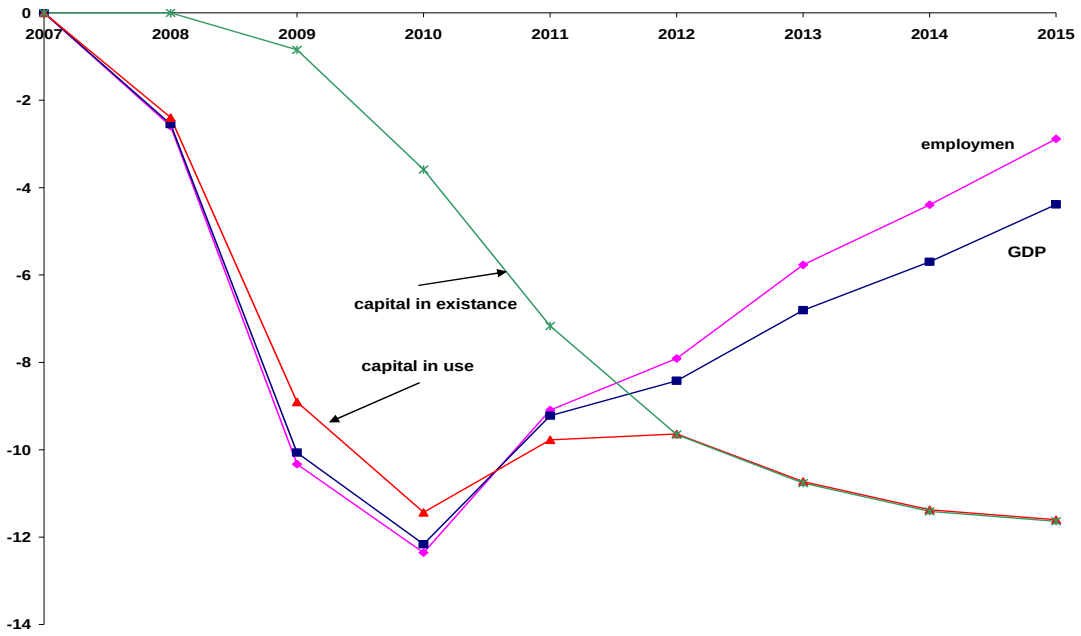
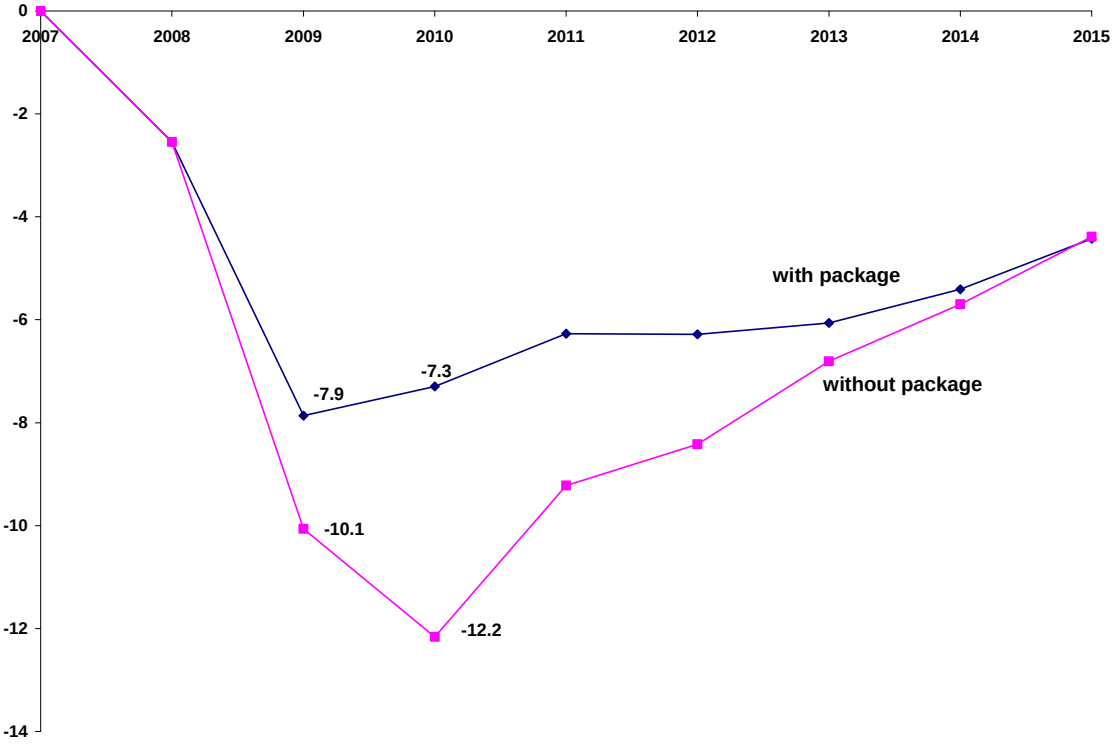
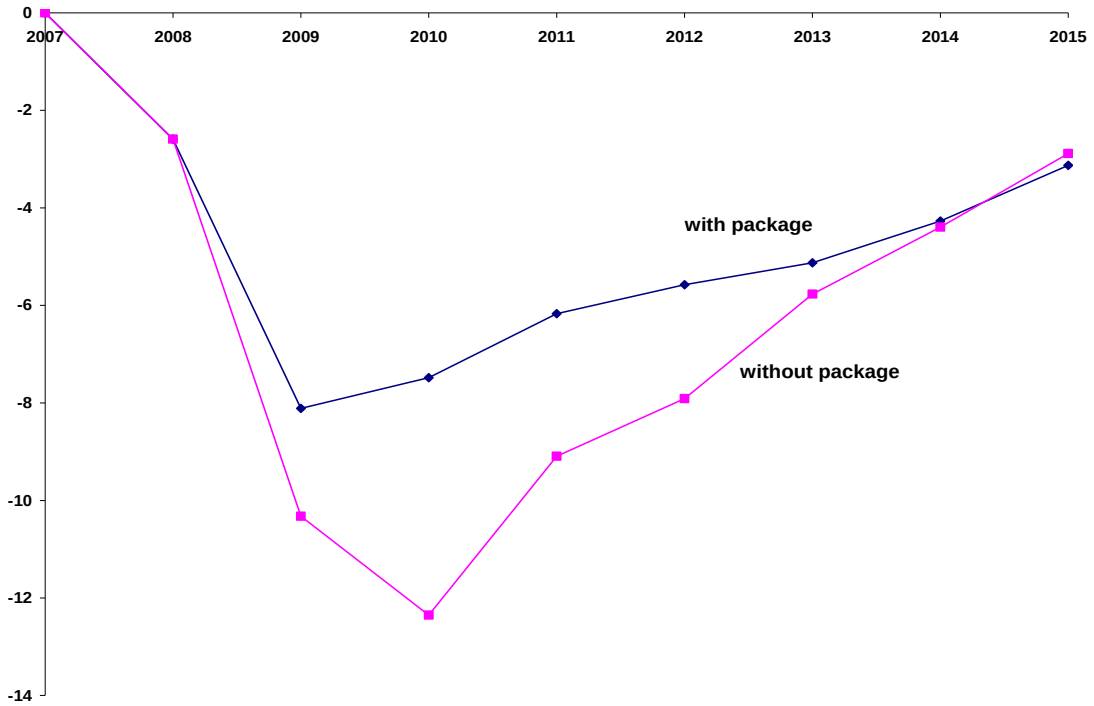


Chart 6. Real GDP: recession simulations with and without Obama package (percentage deviation from baseline)



C*hart 7. Employment: recession simulations with and without Obama package (percentage deviation from baseline)*



C*hart 8. Capital in use: recession simulations with and without Obama package (percentage deviation from baseline)*

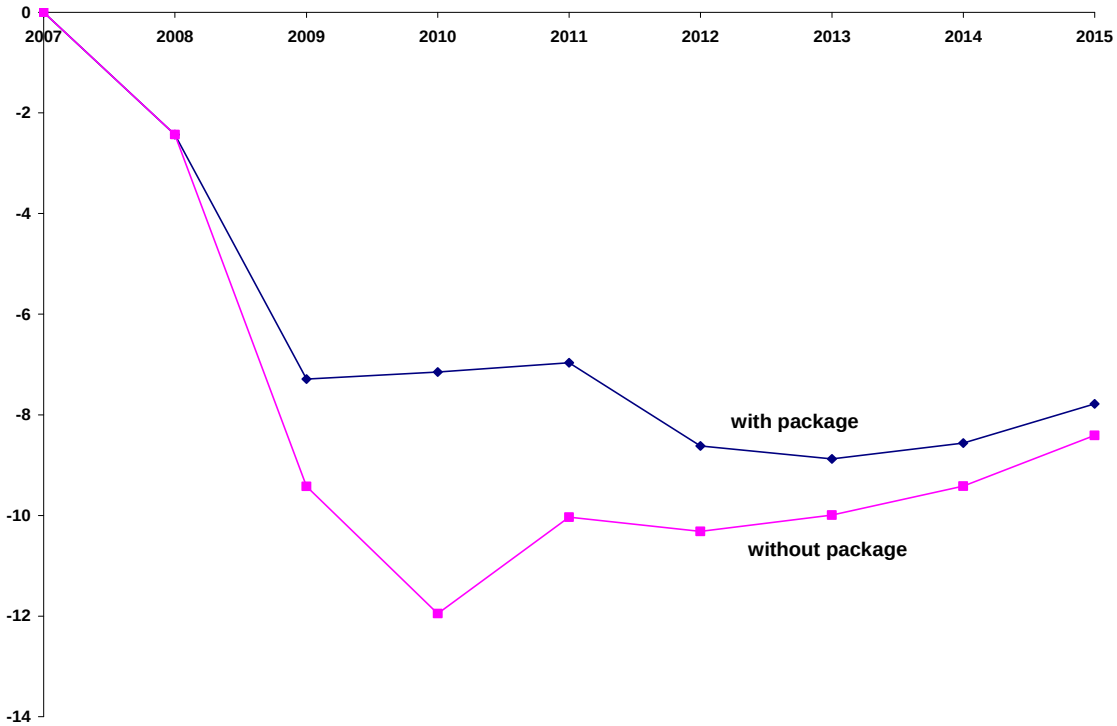


Chart 9. Real private consumption: recession simulations with and without Obama package (percentage deviation from baseline)

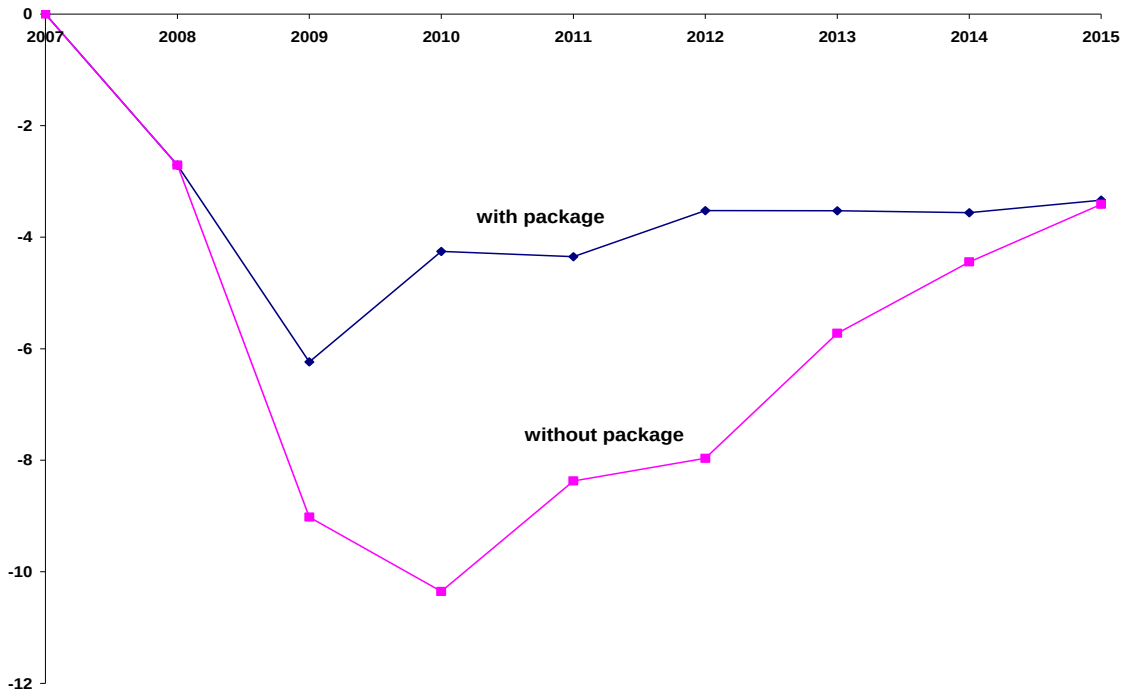


Chart 10. Real investment: recession simulations with and without Obama package (percentage deviation from baseline)

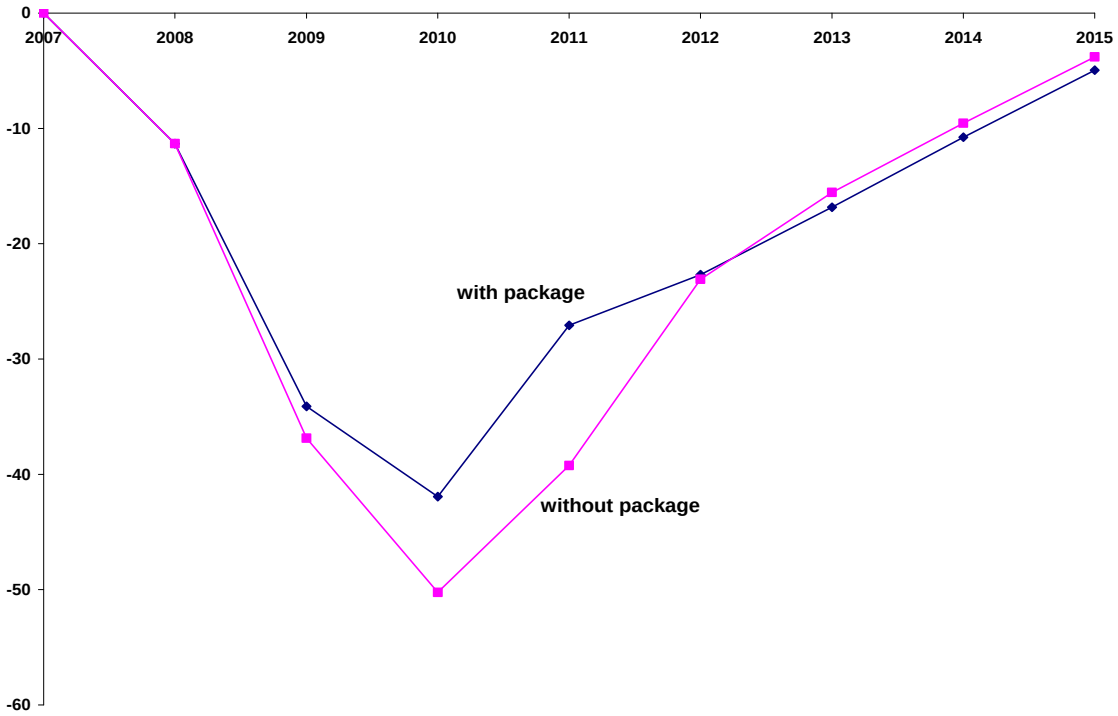


Chart 11. Real public consumption: recession simulations with and without Obama package (percentage deviation from baseline)

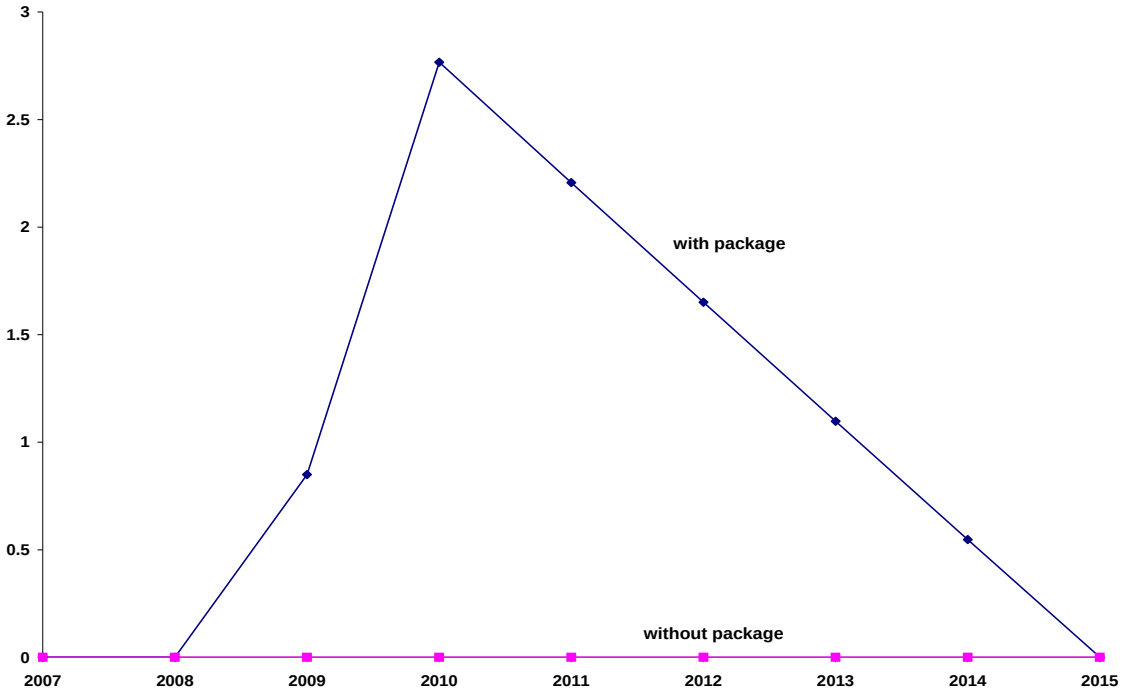


Chart 12. Export volumes: recession simulations with and without Obama package (percentage deviation from baseline)

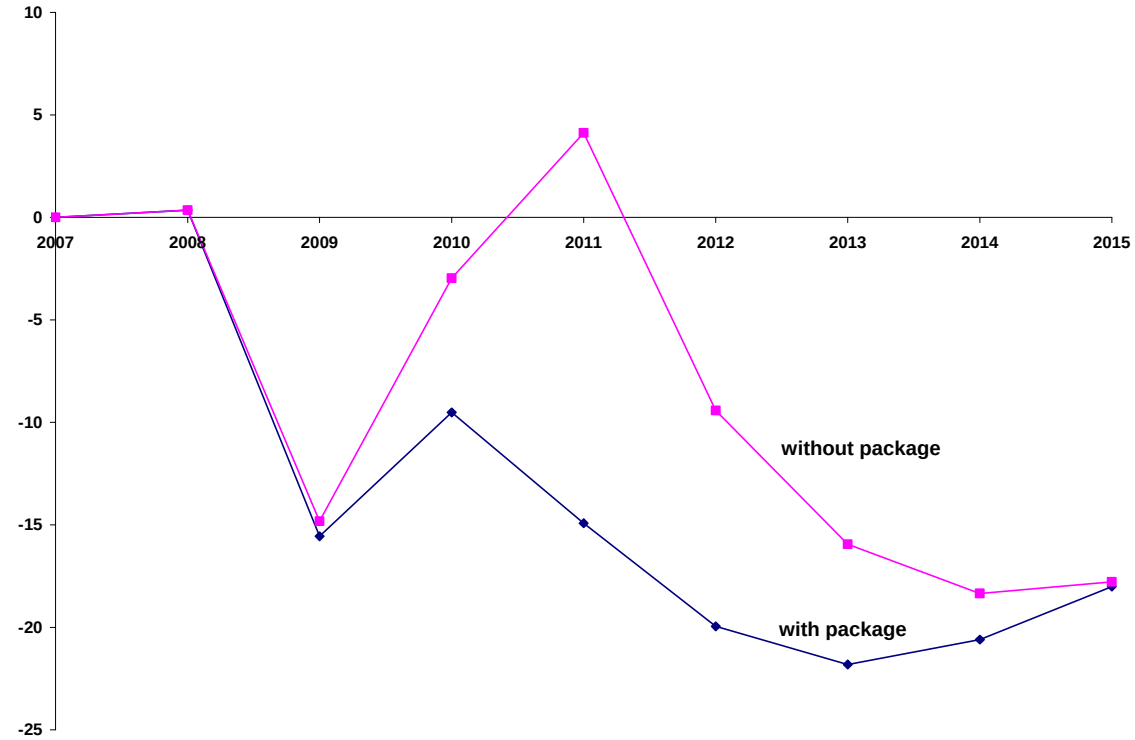


Chart 13. Import volumes: recession simulations with and without Obama package (percentage deviation from baseline)