Macroeconomic effects of unemployment benefits in small open economies:

A Stock–Flow–Consistent approach

Byrialsen, Mikael Randrup; Raza, Hamid

Published in:
European Journal of Economics and Economic Policies : Intervention

DOI (link to publication from Publisher):
10.4337/ejeep.2018.0032

Publication date:
2018

Document Version
Accepted author manuscript, peer reviewed version

Aalborg University

MaMTEP

Macroeconomic effects of unemployment benefits in small open economies: A Stock–Flow–Consistent approach

Mikael Randrup Byrialsen[1]
Hamid Raza[2]

Abstract

This paper attempts to analyse the macroeconomic effects of unemployment benefits in a small open economy. We adopt a Stock–Flow–Consistent (SFC) approach with an emphasis on the dynamics of the labour market. We numerically solve the model using a combination of estimation and calibration to generate statistics for our key variables, reflecting features of the Danish economy. We then analyse the effects of a fall in the unemployment compensation rate on the economy. The results indicate that a fall in the compensation rate at a macro level leads to a trade-off between a fall in aggregate demand and a rise in net exports. Due to this trade-off, the net effect of a fall in the compensation rate on the aggregate unemployment rate tends to be weak. Our analyses in this paper raise several questions on the existing views regarding unemployment benefits adopted by a large strand of the economic literature.

[1]MaMTEP, Department of Business and Management, Aalborg University, email: randrup@business.aau.dk
[2]MaMTEP, Department of Business and Management, Aalborg University, email: raza@business.aau.dk

This paper was presented at the 4th Nordic Post Keynesian Conference, 20 - 21 April 2017 at Aalborg University. The authors would like to thank Robert Smith and two anonymous readers, as well as the participants in the conference for their comments on a previous version. All errors are exclusively ours

1 Introduction

How do unemployment benefits (UB) affect the labour market and macroeconomic outcomes? A high compensation rate on the one hand secures the unemployed against the loss of income, but on the other hand, it is widely believed to negatively affect the incentive for the unemployed to work. The effects of unemployment benefits on individual workers, the labour market, and the associated macroeconomic outcomes are still some of the least understood issues.

The dominant narrative – which argues that increasing UB can increase unemployment – can be theoretically explained from both the supply and demand perspectives. On the demand side, higher benefits lead to a higher demand for real wages from workers, which can result in a lower level of demand for labour from firms (Diamond, 1982; Shapiro/Stiglitz, 1984). On the supply side, higher benefits imply that the unemployed sacrifice a smaller part of their future consumption, which can generate a disincentive effect in the labour market (Baily, 1978; Hopenhayn/Nicolini, 1997). However, the empirical evidence regarding the relationship between UB and the level of unemployment is inconclusive. Some studies have found a positive correlation between UB and unemployment (e.g, Meyer (1990); Scarpetta (1996)), while other studies have questioned the existence of any significant correlation (e.g, (Narendranathan/Stewart, 1993; Howell/Rehm, 2009; Howell/Azizoglu, 2011)). In general, the relationship – if existing at all – has been found to be very weak in most cases (see, Atkinson/Micklewright (1991), for a survey). In addition, quantifying the effects of UB on macroeconomic outcomes is challenging, as described in Chodorow-Reich/Karabarbounis (2016), and the empirical mishandling of the issue is highlighted in several studies.

The literature on UB has mostly focused on the effects related to consumption and worker-behaviour towards the job market, at a micro level or by considering the labour market in isolation. A few recent studies, notably Krusell et al. (2010); Nakajima (2012); Mitman/Rabinovich (2015); Kekre (2016) have addressed macroeconomic effects of UB, incorporating labour market frictions. These studies, while adopting the views put forward in classical search and matching theory, have reached very different conclusions. Consequently, the macroeconomic outcomes linked to unemployment benefits still remains unclear. Theoretically, the macroeconomic effects associated with UB could greatly differ from those highlighted in micro studies and in models of the labour market. Unemployment benefits not only have direct effects on consumption at an individual level but also on wage setting, welfare, and aggregate demand at a macro level. These macro effects in turn can have significant feedback–effects on employment and the balance of payments of a small open economy.

The negative views regarding the effects of unemployment compensation on the economy have greatly influenced policy choices in Denmark. Over the last few decades, unemployment compensation rates[3] have been reduced, as confirmed by Danish Economic Councils (DØRS).[4] In the beginning of the 1980s, the rate at which the unemployed were compensated for the loss of income was set at 65% of the average wage in the industry. The compensation rate declined to less than 50% by 2015 (DØRS, 2014; Cevea, 2015). In particular, the recent decline in unemployment compensation is clearly linked to changes in labour market policy during this period.

This paper attempts to analyse the macroeconomic effects of unemployment benefits in a small open economy like Denmark. We adopt a Stock–Flow–Consistent (SFC) approach with an emphasis on the dynamics of the labour market. Our paper makes three important contributions. First, we develop a SFC model by integrating the dynamics of a labour market in a small open economy framework. To the best of our knowledge, this is the first paper addressing the issue of unemployment benefits at a macro level, using a SFC framework. Second, we critically analyse the proposals calling for a reduction in unemployment benefits as an appropriate policy to reduce unemployment. Third, our paper contributes to the ongoing debate on the possible effects of unemployment benefits on the level of unemployment, and macroeconomic outcomes. This paper raises several questions about the existing views on unemployment benefits adopted by a large strand of the economic literature.

The paper is organised as follows. Section 2 reviews relevant literature on the subject, highlighting some prominent contributions as well as discussing post-Keynesian views on the issue. Section 3 explains some core features of the Danish labour market along with its system of unemployment benefits. Section 4 proposes a SFC macroeconomic model of unemployment benefits. Section 5 numerically solves the

[3]Note: while unemployment benefits have increased in levels, the gap between benefits and salaries has widened over the last few years, i.e., the compensation rates have fallen.

[4]Danish Economic Councils referred to as De Økonomiske Råd Sekretariat(DØRS).

model and introduces three main scenarios, followed by a discussion of the simulation results. Section 6 concludes this paper.

2 Literature Review

There is an extensive literature on the effects of unemployment benefits on the labour market. Most of the literature on the link between compensation rates and employment is based on the classical search theory (see Rogerson et al. (2005) for a survey).[5] In general, a change in the unemployment benefits in these models has an effect on a worker's reservation wage and thereby whether a given job–offer is accepted; a reduction in the unemployment benefits therefore leads to a reduction in the reservation wage, which can result in a shorter duration of unemployment (Rosholm, 2006). While addressing the issue, a large strand of theoretical literature has focused on the trade–off between consumption–smoothing and moral hazard effects of unemployment benefits (e.g., Baily (1978); Flemming (1978); Shavell/Weiss (1979); Hopenhayn/Nicolini (1997); Chetty (2006)).[6]

On the empirical front, several studies have tested these theories by investigating the correlation between incentives to work and job–search behaviour mainly using administrative data (see, e.g., Meyer (1990) and Katz/Meyer (1990)). A number of empirical studies in this area are reviewed by Andersen et al. (2015). Overall, the results in these studies indicate partial evidence, that higher unemployment benefits are associated with lower traffic from unemployed to employed. The findings in some studies reject the existence of any significant correlation between unemployment benefits and the level of unemployment as described in Howell/Rehm (2009). On the contrary, the evidence in Howell/Rehm (2009) indicates that the causality could run in the opposite direction, i.e., a change in unemployment may have the effect of changing unemployment benefits. The link between unemployment benefits and work incentives is also discussed in (Howell/Azizoglu, 2011). Their results indicate that the link between benefits and work incentives may not be as strong as widely believed.[7] The authors argue that

> "...the evidence overwhelmingly shows that in the real world holding a job is typically highly valued independently of the income it generates, and if it is so, changes in UI [unemployment insurance] generosity may have nothing to do with changes in the disutility of work".

Not only is there a question of causality between unemployment benefits and unemployment in empirical studies, but even the theoretical link between the two factors seems to lack coherence in the literature. The simplistic views, regarding the relationship between unemployment benefits and unemployment, adopted by a large strand of literature are critically discussed in Atkinson/Micklewright (1991).

In general, the critics of a higher UB have usually pointed to the adverse effects by highlighting the disincentive effect it might induce in the labour market. In contrast, the proponents of UB have focused on the potential benefits by considering the consumption–smoothing effects (see, e.g., Gruber (1997)). Some authors have also focused on the welfare and macroeconomic effects of UB. For example, Acemoglu/Shimer (2000) argued that in a less generous welfare system, workers tend to accept low productivity jobs to avoid unemployment, which in turn can have adverse effects on output and welfare. On the other hand, a more generous benefit system allows the workers to bear the risk of being unemployed and search for jobs with higher productivity, which can increase welfare and output.

In contrast to the mainstream theory, the post-Keynesian literature on the labour market clearly distinguishes the characteristics of a labour market from the goods market.[8] At an aggregate level, the level of employment and real wages are determined by effective demand and pricing policies (Davidson, 1998); (Arestis/Sawyer, 2013, p.311); (Lavoie, 2014, p.277). This implies that an increase in aggregate demand will raise the level of economic activity, creating more jobs.

[5] Earlier surveys on search theory in the labour markets can be found in Lippman/McCall (1976), Mortensen (1986), and Mortensen/Pissarides (1999).

[6] The famous Baily-Chetty formula in public finance determines the optimum level of UI by resolving this trade-off. Chetty (2008) derives a formula to determine the optimal level of UI by incorporating liquidity effects in the model.

[7] In contrast to the standard utility assumption, Rätzel (2009) finds a positive relationship between work and happiness.

[8] The level of employment in basic neoclassical models is established in the labour market, and then enters the production function. The wage in the model is seen as a price of labour. This treatment of the labour market is comparable to the goods market.

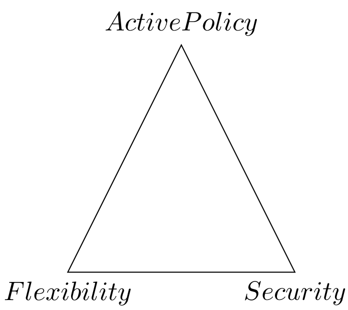
Focusing on the effects of unemployment benefits, the post-Keynesian theory implies that an increase in unemployment benefits, if not reducing unemployment, may prevent a rise in unemployment via aggregate demand effects. However, the direct effects of unemployment benefits on the supply of labour are not obvious. Regarding the supply of labour, it has been argued that the decision to work along with conventional variables - such as wage rates - also depends on a number of factors, including norms, wages relative to other workers, consumption levels, and the standard of living. This implies that an increase in unemployment benefits may not force people to leave their jobs or stay unemployed for longer periods. In addition, there is no specific post-Keynesian view of the labour market at a micro level as highlighted by (Lavoie, 2014, p.277), however, the author argues that post-Keynesians in this regard may agree with the ideas of Institutionalist labour economists or industrial relations labour economists.[9]

In general, post-Keynesians have proposed redistributive policies, favouring an increase in social expenditures – including unemployment benefits – which are important for income distribution. In particular, two main distributive policies – namely pro-labour and pro-capital – are described by Lavoie/Stockhammer (2013). The objective of a pro-labour policy is to strengthen the welfare state, labour market institutions, labour unions, and the ability to engage in collective bargaining. An active pro-labour policy at an aggregate level may result in stable or increasing wage shares. An increase in unemployment benefits is therefore part of a pro-labour policy. A pro-capital policy on the other hand has the target of increasing labour market flexibility and weakening the bargaining power of the union, which may result in falling wage shares.[10]

The outcome of these policies, however, depends upon the growth regime of a country as discussed in Lavoie/Stockhammer (2013), i.e., whether an economy is wage-led or profit-led plays a central role in this debate.[11] A pro-capital policy in a profit-led growth regime will lead to a higher level of aggregate demand, which is likely to have positive effects on output and employment. On the other hand, a pro-capital policy in a wage-led growth regime, will lead to a fall in aggregate demand, which is likely to have adverse effects on output and employment, unless such effects are offset by other factors, such as technological shocks, export growth or private debt, which can stimulate economic growth.

3 A System of Unemployment benefits

We now turn to explaining some core features of the Danish labour market along with its system of unemployment benefits. The aim of the unemployment benefits system is to provide a security net by compensating workers in the event of a loss of income due to unemployment, i.e., the system reduces the risks associated with unemployment. This generous system has been an important component of the well–known Flexicurity system. This system is famous for the combination of flexibility in the labour market, security for the single worker, and an active labour market policy (Bredgaard et al., 2011). This trinity is known as *the golden triangle*, which can be visually represented as follows:



[9]Some of the economists of the 1950s mentioned by (Lavoie, 2014, p.277) include John Dunlop, Clark Kerr and Richard Lester, whereas as some of the recent ones include, Lester Thurow, Michael Piore, Peter Doeringer, Barry Bluestone, David Howell and Frank Wilkinson.

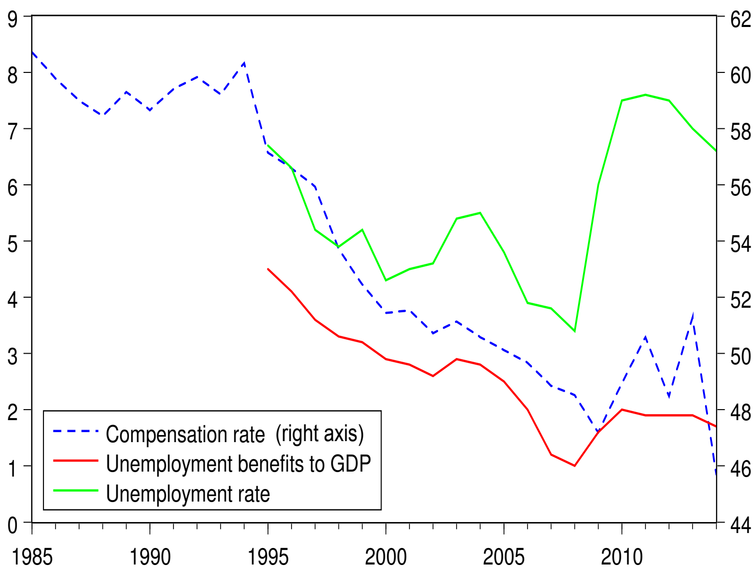
[10]Due to pro-capital policies, most advanced economies – including Denmark – have experienced a decline in wage shares over the last few decades, which is well-documented in the post-Keynesian literature on financialisation.

[11]An economy is wage-led if an increase in the profit share leads to a fall in the overall private aggregated demand (Hein 2014, 263). However, an economy can also be characterized as profit-led if an increase in the profit share is associated with an increase in aggregate demand. This issue has received considerable attention in recent post-Keynesian literature (see, e.g., Onaran et al. (2011); Stockhammer (2013); Onaran/Galanis (2013)).

From the perspective of the employer, the model is attractive because, i) it involves low employment protection, and ii) the employers do not have to guarantee the income of workers if they decide to fire them. The labour unions accept this, despite the risk of being fired, because of the social security net, which provides high compensation for the loss of income (Bredgaard et al., 2011). The last corner of the triangle represents an active labour market policy, which is executed at a municipality level. This policy pursues the objective of putting unemployed individuals back to work, or to improve and upgrade their skills – e.g., through education (Madsen, 2011) – in order to prepare them for new employment opportunities. Together, the forces in this *golden triangle* have the purpose of increasing the dynamics of the labour market, resulting in low rates of unemployment.

Despite the success of the flexicurity model, the security for workers – measured by both unemployment benefits (compensation rate) and the duration of benefits – has significantly declined over the last few decades. The average compensation rate, where the average unemployment benefit is compared to the average salary in the industry sector for the period 1980 to 2014, shows a significant decrease as can be seen in Figure 1 below. Figure 1 shows the co-movement between unemployment rate and expenditures on unemployment benefits as a percentage of GDP in Denmark. It can be seen that UB expenditures to GDP automatically increases (decreases) in response to a rise (fall) in unemployment rates.

Figure 1



The Danish parliament in 2010 implemented certain reforms targeting the system of unemployment benefits, which had two notable constituents: i) the duration of unemployment benefits was reduced from 48 months to 24 months, and ii) eligibility requirements for unemployment benefits were increased from 6 months to 12 months of full–time employment. The purpose of the reform was to increase employment and reduce government spending in order to improve the government's budget (DØRS, 2014, p, 159).

In 2014, a commission was charged with the task of investigating how to make the existing system of unemployment benefits contemporary to the modern labour market. The recommendations from the labour market commission argued that the incentive to work must be increased by reducing unemployment benefits. A decline in the compensation rate, a tightening of the eligibility requirements, and a reduction in the duration of unemployment benefits – all of which were backed by the recommendations from the commission – clearly indicate a tightening of the unemployment benefits system in Denmark. The security side of the golden triangle is therefore continuously deteriorating, which erodes the foundation of the flexicurity model (Madsen, 2011, 2015).

4 Model

In order to understand the macroeconomic effects linked to unemployment benefits in a small open economy, we develop a simple dynamic SFC model following the approach of Godley/Lavoie (2012).[12] Although there are many ways to address this issue, a SFC model incorporates many of the holistic modelling capabilities of other macroeconomic models. In addition, the SFC framework is the most appropriate to analyse the macroeconomic effects of UB from a post-Keynesian perspective.[13] Post-Keynesian views on the labour market can be coherently integrated with the goods and financial markets in a SFC framework, as will be discussed.

Since the core objective of the model is to address the issue of UB, we integrate labour market dynamics in an open economy with limited financial activities. The economy is divided into five key sectors: Households, Firms, Government, the Central Bank, and the rest of the world. The model will be explained in two key steps as follows: First, we will explain all the transactions taking place in the economy. Alongside which, we will also discuss the type of assets traded in the economy. Second, we will explain the structure of the model while focusing on the key equations regarding UB in the economy.

4.1 Transaction flow and balance sheet matrices

The transaction flow matrix is presented in Table 1. The production in the economy takes place in the firms, which is represented as a standard expenditure approach to GDP in the national accounts. The firms hire workers (household) and pay them wages. They also pay taxes to the government, and trade with the rest of the world. Following the approach of Dos Santos/Zezza (2008), we assume firms have a fixed equity to capital ratio. They issue new equities whenever they decide to increase their capital.[14] Firms make profits, a proportion of which is retained to finance investment expenditures and hold currency as an asset.[15]

Households at an aggregate level finance their consumption through wages, unemployment benefits, and income on their asset holdings. Households hold three assets, namely government bills, domestic currency, and equities. They also pay income taxes to the government.

The government expenditures consist of two main components, i) government spending (G), and ii) unemployment benefits UB transferred to the unemployed households. These expenditures are financed through taxes (received from households and firms) and bills. The central bank in the model acts as a clearing sector, i.e., it fulfils the demand for local currency, and also holds any outstanding government bills in the economy. It also accumulates foreign currency reserves to ensure a fixed exchange rate.

Finally, the last column representing the interaction of the small economy with the rest of the world fulfils the balance of payments identities, i.e., a surplus (deficit) on the current account equals a deficit (surplus) on the financial account.

[12] Also known as the post-Keynesian SFC model. For a survey on the SFC approach to modelling, see Caverzasi/Godin (2014); Nikiforos/Zezza (2017).

[13] We prefer to use a SFC approach because it deviates from the approach based on the utility maximisation problem of the workers, widely adopted in public finance and mainstream macroeconomics, i.e., the decision to work in this framework negatively affects utility. As discussed earlier, post-Keynesian views on the labour market differ from those in public finance and mainstream macroeconomics.

[14] The stock of capital does not grow over time in the steady state, therefore the change in equities (i.e., the emission of new equities) is zero, and investment is financed by a proportion of retained profits. As a simplifying assumption the firms issue equities irrespective of the cost, and any existing stock of equities is held by the household sector in the model. The rest of the portfolio choice of the households follows a standard portfolio allocation as in Godley/Lavoie (2012). Moreover, there are no capital gains as the price of equities is fixed.

[15] The holding of currency by the firms should be seen as an accounting identity from the perspective of the balance of payments, i.e., the current account (trade) balance is equal to the financial (capital) account.

Table 1: Transaction Flow Matrix (TFM)

	Small Economy					ROW
Flows	**Households**	**Firms**		**Govt**	**Central Bank**	
		current	capital			
Consumption	$-C$	$+C$				
Investment		$+I$	$-I$			
Gov. exp		$+G$		$-G$		
Exports		$+X$				$-X$
Imports		$-M$				$+M$
Wages	$+WB$	$-WB$				
Tax	$-T^h$	$-T^f$		$+T$		
Unemployment Benefits	$+UB$			$-UB$		
Interest on bills	$+r_{t-1}.B^h_{t-1}$			$-r_{t-1}.B_{S_{t-1}}$	$+r_{t-1}.B^{cb}_{t-1}$	
Profits (Firms)	$+F_h$	$-F$	$+F_f$			
Profits (Central bank)				$+r_{t-1}.B^{cb}_{t-1}$	$-r_{t-1}.B^{cb}_{t-1}$	
Change in bills	$-\Delta B^h$			$+\Delta B_S$	$-\Delta B^{cb}$	
Change in equities	$-\Delta e^d.P^e$		$+\Delta e^s.P^e$			
Change in domestic currency	$-\Delta H^h$		$-\Delta H^f$		$+\Delta H_S$	
Change in foreign currency					$-\Delta Fx.XR$	$+\Delta Fx.XR$
	0	0	0	0	0	0

The balance sheet matrix is presented in Table 2. A plus (+) sign indicates an asset, while a minus (-) sign represents a liability.

Table 2: Balance sheet matrix

	Small Economy				ROW	
Assets	**Households**	**Firms**	**Govt**	**Central Bank**		$\sum$
Bills	$+B^h$		$-B_S$	$+B^{cb}$		0
Equities	$+e^s.P^e$	$-e.P^e$				0
Domestic currency	$+H^h$	$+H^f$		$-H_S$		0
Foreign currency				$+Fx.XR$	$-Fx.XR$	0
Fixed capital		$+K$				$+K$
Net worth	V_h	V_f	V_g	V_{cb}		

4.2 Structure of the model

The overall structure of the model is a combination of standard accounting identities and the behavioural equations.[16] The aggregate income of the household sector is an accounting identity, which can be determined as follows,

$$YD_t = WB_t + r_{t-1}.B^h_{t-1} + F_h + UB - T^h_t \tag{1}$$

where YD_t is the disposable income, WB_t represents the wage bill, r_t is the interest received by the household sector on its assets B^h_t (government bill), F_h represents the distributed profits, UB is the unemployment benefits, and T^h_t is the income tax paid by the household sector.

Following the standard post–Keynesian consumption function as generally used in SFC frameworks,[17] the household sector consumes a portion of their disposable income and a fraction of their wealth. The consumption function can be represented as follows,

$$c_t = \alpha_1.yd_t + \alpha_2.v_{t-1} \tag{2}$$

where c_t[18] represents aggregate real consumption, α_1 is the parameter which represents the propensity

[16]The complete model along with the parameter values can be seen in the appendix.

[17]See, Godley/Lavoie (2012) for a detailed discussion and motivation of several behavioural equations not discussed in this paper due to space and time.

[18]Note that variables represented by small letters represent real values whereas the ones written in capital letters represent nominal values.

to consume out of real disposable income yd_t, while α_2 represents the propensity to consume out of real wealth v_{t-1}.

Production of goods takes place in the firms sector. The decision to invest is determined in a standard way, following the partial adjustment accelerator model as shown below,

$$i_t = \gamma.(k^T - k_{t-1}) + da \tag{3}$$

Equation 3 simply states that real investment i_t is determined by a partial adjustment γ of the existing stock of capital k_{t-1} towards a desired stock of capital k^T, plus a level of depreciation DA. The targeted capital (or desired stock of capital) is determined by a previous level of real sales (see equation 28 in the appendix).

Prices P_t^s are set as a mark–up ϕ over unit cost measured as the sum of wage–bill WB_t and imports M_t, divided by real sales of goods s_t.

$$P_t^s = (1 + \phi).UC_t \tag{4}$$

$$UC_t = (WB_t + M_t)/s_t \tag{5}$$

The level of employment is determined in the goods market, where firms will hire as many workers as needed to fulfil the demand for goods.[19] The total cost of labour for the firms, as represented by the wage bill WB_t, can therefore be written as,

$$WB_t = W_t.N_t \tag{6}$$

where N_t represents the number of workers hired by the firms and W_t represents nominal wages paid to the workers. The difference between the labour force Lf and the number of employed equals the number of unemployed individuals. The rate of unemployment can be expressed as follows,

$$UR_t = 1 - \frac{N_t}{Lf} \tag{7}$$

Labour force Lf is determined by the labour participation rate of the total population, represented as follows,

$$Lf = act.Pop \tag{8}$$

The participation rate (act) in the model is determined by real wages and the employment rate. This setting for the Danish labour market is consistent with Statistics Denmark, ADAM (2003), as well as Godin (2014) in the SFC context.[20] If real wages rise, the participation rate is expected to be higher, as individuals will search for jobs to increase their incomes, and become part of the labour force. If the rate of employment increases, the participation rate is expected to rise as more and more individuals enter the labour force. The equation can be represented as follows,

$$ln(act) = \Phi_0 + \Phi_1.ln(w_t) + \Phi_2.ln(ER_{t-1}) \tag{9}$$

The level of unemployment benefits (UB) paid to the unemployed households is represented as follows,

$$UB_t = \xi.W_t.UN_t \qquad\qquad 0 < \xi < 1 \tag{10}$$

where ξ is the compensation rate in the model, which is exogenously determined by the government. For the unemployed, the UB represent present income, thus they prefer the compensation rate to be higher. In addition, the employed also have an interest in a high compensation rate in case of a sudden redundancy.

Workers have some real wage aspirations, represented by the target real wage w^*, which is influenced by the compensation rate (ξ), the rate of employment (ER), and productivity (A) as shown in equation 11 below.[21]

$$ln(w_t^*) = \beta_0 + \beta_1.ln(A_t) + \beta_2.ln(\xi) + \beta_3.ln(ER_t) \tag{11}$$

[19] In particular, the demand for labour is determined by real output over labour productivity as shown in equation 53, i.e., the firms produce a certain level of output by hiring workers with a given level of labour productivity, which is exogenously determined in our model.

[20] Annual Danish Aggregated Model (ADAM) is the official model used by Statistics Denmark and Ministry of Finance in Denmark.

[21] β_0 is the autonomous component of wages, while the rest of the parameters in the equation represent elasticities.

This setting is similar to the wage equation in the benchmark model of Godley/Lavoie (2012) where the targeted real wage is a function of employment and productivity. However, our decision to incorporate the compensation rate in this equation is in line with standard models of 'wage setting', which argue that the compensation rate plays an important role in the determination of target real wages (see, e.g., (McDonald/Solow, 1981); (Shapiro/Stiglitz, 1984); (Sørensen/Whitta-Jacobsen, 2005, pp.526–527)). According to this argument, if the compensation rate goes up - for example, as a result of a more generous welfare system - workers will demand an increase in wages to maintain their incentive to work as against being unemployed.

Firms, in contrast to the higher demand for wages from workers, would prefer to pay lower wages in order to reduce costs. Therefore, a change in wages is the outcome of a bargain between the labour union and the firms which can be represented as follows,

$$\Delta W_t = \Omega_0.(w^*_{t-1} - w_{t-1}) \tag{12}$$

The term W_t/P_t^{ds} represents real wages, while Ω_0 is the parameter of wage adjustment, which also represents the bargaining power of the union.[22] Thus in the case of firms, the compensation rate has a dual effect in the model; a high compensation rate may stimulate demand at an aggregate level (see equations 1 and 2), but at the same time a high rate may affect wage negotiations and thereby the unit cost of an individual firm (see equation 5).

In an open economy, a rise in the unit cost of firms due to an increase in wages will also affect their international competitiveness as can be shown in equations 13 and 14.

$$ln(m_t) = \mu_0 - \mu_1.ln\left(\frac{P^m_{t-1}}{P^y_{t-1}}\right) + \mu_2.ln(y_t) \tag{13}$$

$$ln(x_t) = \epsilon_0 - \epsilon_1.ln\left(\frac{P^x_{t-1}}{P^{y^*}_{t-1}}\right) + \epsilon_2.ln(y^*_t) \tag{14}$$

where μ_0 and ϵ_0 represent autonomous components of the trade flows. μ_1 and ϵ_1 represent price elasticities of imports and exports, respectively. For example, if domestic prices P_t^y increase relative to import prices P_t^m, the country will experience reduced competitiveness, resulting in higher imports m_t and lower exports x_t. Similarly, if prices in the rest of the world $P_t^{y^*}$ increase relative to export prices of the domestic economy P_t^x, the competitiveness of the country will increase. The parameters μ_2 and ϵ_2 show the income elasticities of imports and exports, respectively. For example, if domestic income y_t increases, imports will increase. Likewise, an increase in foreign income y_t^* will increase exports. In our trade equations, we rely on a small economy assumption, i.e., economic activity in the small economy has a negligible impact on the rest of the world. Hence, the prices P^{y^*} and output y^* abroad are exogenously determined in the model.

Equation 15 and 16 explain the prices of tradables from the perspective of our domestic economy.

$$ln(P^m_t) = \nu_{m_0} + \nu_{m_1}.ln(P^{y^*}_t) + (1-\nu_{m_1}).ln(P^y_t) + \nu_{m_1}.ln(xr) \tag{15}$$

$$ln(P^x_t) = \nu_{x_0} + \nu_{x_1}.ln(P^{y^*}_t) + (1-\nu_{x_1}).ln(P^y_t) + \nu_{x_1}.ln(xr) \tag{16}$$

Trade prices are affected by domestic prices, foreign prices and the exchange rate. The setting of the parameters implement some logical constraints on price movements of tradables. The model implies that, given a fixed exchange rate, a simultaneous increase in inflation of equal magnitude in the domestic economy and abroad will have the same effect on import and export prices, i.e., the terms of trade will not be affected. This is ensured by setting the sum of the coefficients on domestic (P_t^y) and foreign ($P_t^{y^*}$) prices equal to unity. However, based on the well–established empirical fact, the parameter (ν_{m_1}) in the imports equation is greater than the parameter (ν_{x_1}) in the exports equation. This implies that following a devaluation, the prices of both exports and imports will increase, but the terms of trade will fall due to a stronger increase in import prices, resulting in a positive effect on net exports. The above pricing equations, along with the specified constraints, have been used by a number of authors in the

[22] It should be highlighted that this parameter reflects the bargaining power of the union for an increase in wages only, i.e., a union with stronger bargaining power will be faster in reinforcing higher wages, whereas it may be slow in reinforcing lower wages.

SFC framework for open economies, such as Lavoie/Daigle (2011), Mazier/Tiou-Tagba Aliti (2012), and Greenwood-Nimmo (2013).

The government wants to reduce its expenditures but at the same time, it needs to fulfil its responsibility in the welfare state by paying UB to unemployed households. The government in the model finances its expenses by issuing bills as follows,

$$\Delta B_{S_t} = G_t + UB_t + r_{t-1}.B_{S_{t-1}} - T_t - r_{t-1}.B^{cb}_{t-1} \tag{17}$$

where B_{S_t} represents the total supply of bills, G_t represents government consumption, T_t represents total tax receipts, and B^{cb}_t represents the interest payments by the Central bank on government bill holdings.

Before presenting the results of the model, we briefly discuss the process of calibration involved in solving the model with a focus on our key parameters. In setting the parameter values, our first priority is to rely on estimations reported for the Danish data by previous studies. However, in cases where estimations for the Danish data are not available, we rely on values tested to have generated stylised facts in previous SFC models.

5 Simulations

The parameters of the model are assigned values using a combination of estimation and calibration with the aim of generating statistics for our key variables, reflecting features of the Danish economy. Focusing on the key parameters, the compensation rate in our model is set to $\xi = 0.55$, which is similar to the value mentioned in Cevea (2015) and DØRS (2014). The compensation rate affects wages indirectly through targeted wages, whereas the direct effect of compensation rates on the targeted wage is set to $\beta_2 = 0.1$.[23] In the wage setting, the effect of employment rates on the targeted wage is set to $\beta_3 = 0.75$ in our model. Our decision to assign a value to β_3 in the wage-setting is consistent with the existing literature on wage curves, for which there is enough empirical evidence in several small economies.[24] However, we will later show the response of the model when this parameter approaches the value of zero.

The labour participation rate is estimated using OLS regression, where the coefficients (Φ_1) and (Φ_2) are estimated to be 0.05 and 0.23, respectively.[25] Our model replicates the participation rate in Denmark, which is roughly 0.75, as reported by Statistics Denmark. The expenditures on unemployment benefits as a percentage of GDP is 2.5, which is almost equal to the mean of expenditures on unemployment benefits (as a percentage of GDP) during 1995 – 2015. The parameters in the consumption function $\alpha_1 = 0.9$ and $\alpha_2 = 0.1$ are set accordingly to the results reported by Danmarks Nationalbank (2013). The price and income elasticities of the trade equations are based on the estimations for Denmark in ADAM (2013). The parameter on productivity – consistent with previous calibrated SFC models – is set to $\beta_1 = 1$. Other parameters appearing in the investment function and the price equations of the model are assigned values based on the analyses in previous SFC models, i.e., these values fall within the range widely used in the SFC modelling tradition for open economies, such as Lavoie/Daigle (2011), Godley/Lavoie (2012), Mazier/Tiou-Tagba Aliti (2012), and Greenwood-Nimmo (2013).

We create a very open wage-led economy with a trade openness of 90% of GDP, which is somewhat similar to the Danish economy where trade openness has fluctuated between 90–100% of GDP over the last two decades. The economy in our model maintains a fixed exchange rate, as is the case in Denmark. We generate an unemployment rate of 5.6%, which is very close to the mean of unemployment rates over the last two decades. Since the model is a large non-linear system of equations the model is simulated by using Eviews, where a solution to the system of equations is found.[26] However, this solution may not

[23]While the transmission channel of compensation rates differs in the Annual Danish Aggregated Model (ADAM, 2013), the effect of compensation on wages in the end is almost similar in magnitude to our setting.

[24]See, Blanchflower/Oswald (2005) for empirical evidence on the existence of the wage curve in more than 40 countries. Also, see, Nijkamp/Poot (2005), for a meta–analysis on this relationship.

[25]Based on the availability of data, the model is estimated using annual data for the period 1984 to 2015.

[26]The system of equations can be divided into three blocks of equations, where block 1 and 3 could be solved recursively, while block 2 must be solved simultaneously. To solve the system of equations in block 2 the Newton-method is used. The Newton method is an iteration algorithm, where a linear approximation around a specific set of values for the vectors of endogenous and exogenous variables is used to build an iteration process. An initial guess to solve the system begins the iteration process, which stops, when the changes in values of the vector with endogenous variables are below a pre-specified level of tolerance, which in this simulation is set to 1e-8. For further details on nonlinear solutions in eviews, see the users manual: http://www.eviews.com/help/helpintro.html#page/content%2Fpreface.html%23.

be a unique one since the existence of multiple solutions is a possibility. In case of multiple solutions, the chosen initial values restrict the achieved solution to be a local solution within a chosen domain[27] – a solution procedure that this study has in common with several other nonlinear SFC models, such as Lavoie/Daigle (2011); Greenwood-Nimmo (2013). Consistent with the standard practice in numerical SFC models, we first simulate the model to achieve a baseline steady state. We create three scenarios in the model as follows, i) reduce the compensation rate, ii) introduce downward real wage rigidity, and iii) decrease the effect of employment on targeted wages.

5.1 The effects of a lower compensation rate

We now turn to addressing the core question raised in this paper, i.e., what are the macroeconomic effects of unemployment benefits in a small open economy? To address this question, we generate a scenario in the model by reducing the compensation rate ξ from 0.55 to 0.5.

Focusing on the macroeconomic effects, a reduction in the compensation rate affects the economy in two ways. First, a decrease in the compensation rate directly affects the income of unemployed individuals, which can result in a demand compression. Second, reducing the compensation rate puts downward pressure on wages, which will increase international competitiveness via the price channel, and the economy can experience export–led growth. The latter argument is also used as a justification for a lower compensation rate.

Figure 2 shows unemployment benefits as a percentage of GDP;[28] it can be seen that a fall in the compensation rate leads to lower expenditures on UB, as expected. Figure 3 shows the effect of a lower compensation rate on the rate of unemployment in our model. In the short run, a negative shock to the compensation rate initially increases the unemployment rate, as the income of the unemployed labour force falls, resulting in a demand compression. The unemployment rate then falls as the effects of increased competitiveness – as a result of lower wages – dominate the effect of a demand compression. A decline in the terms of trade (or an increase in competitiveness) generates a current account surplus as shown in Figure 5.

Figure 2

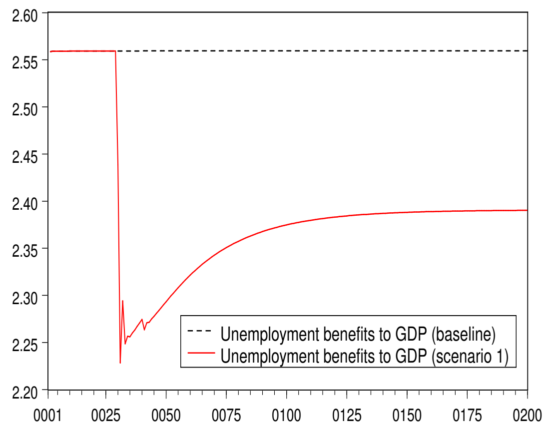


Figure 3

[27] The values of exogenous variables can be found in the Appendix. The model code is available upon request.

[28] Note that the y-axis on GDP and domestic demand represents real values, obtained from the simulated model. All graphs with the exception of the unemployment rate are represented as a percentage of GDP. The unemployment rate is expressed as a proportion of the labour force as defined in equation 7.

Figure 4

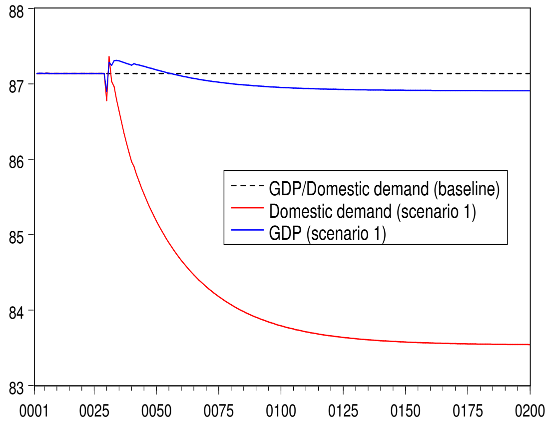
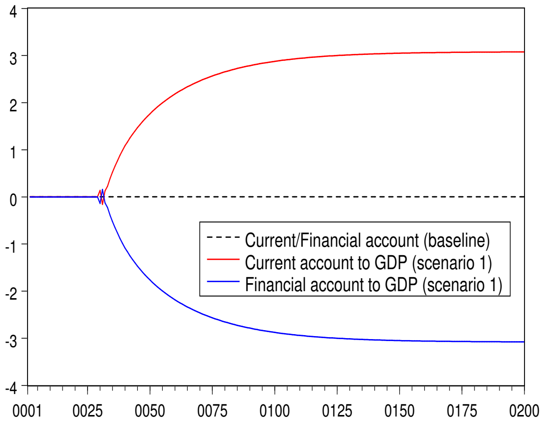


Figure 5



In the long run, the model stabilises at an unemployment rate slightly higher than the baseline scenario. This adjustment in the long run is due to a decline in competitiveness over time, stemming from the wage–curve effect, i.e., a reduction in the unemployment rate increases the targeted wages in the model.

5.2 Introducing downward real wage resistance

In our baseline model, the effect of the compensation rate on real wages is symmetric, i.e., the response of real wages to both negative and positive shocks is similar in magnitude. Thus, we did not restrict a negative compensation rate shock to have a significant downward pressure on real wages. However, there is now ample empirical evidence for the existence of downward wage rigidity, especially in advanced countries with strong labour unions.[29] The labour union resistance to a decline in wages in the bargaining process has now become an essential component of macroeconomic models.[30] From a behavioural perspective, as described by Kahneman/Tversky (1979), individuals are more reluctant to losses than they are attracted to the gains of similar magnitude.

The above discussion leads to another key question, what are the effects of unemployment benefits in a small open economy when there is a strong resistance to reductions in real wages? In order to address this issue, we adjust our model by decreasing the effect of the compensation rate on targeted wages; we reduce the value of β_2 from 0.1 to 0.05. It is important to highlight that after reducing the effects of the compensation rate on targeted real wages, we still generate the same baseline scenario as previously discussed.[31] After achieving the baseline scenario, we introduce a compensation rate shock by reducing the value of ξ from 0.55 to 0.50, as was done in scenario 1 discussed above.

[29] See, e.g., Agell/Lundborg (2003); Christofides/Li (2005); Holden/Wulfsberg (2009)

[30] see, e.g., Blanchard/Galí (2007); Hall (2005)

[31] We generate the same baseline scenario by re-adjusting the autonomous component (β_0) in equation 11. The purpose of maintaining the same baseline scenario is to consistently compare different scenarios.

Figure 6

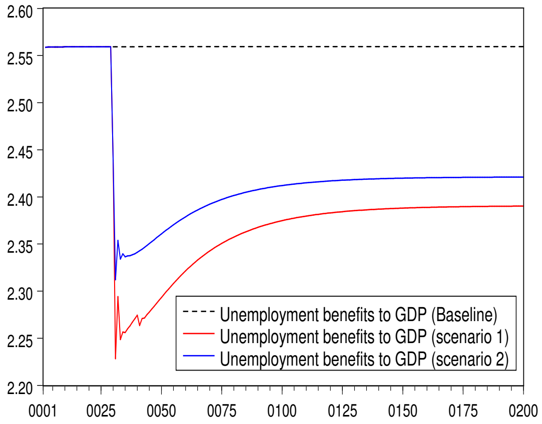


Figure 7

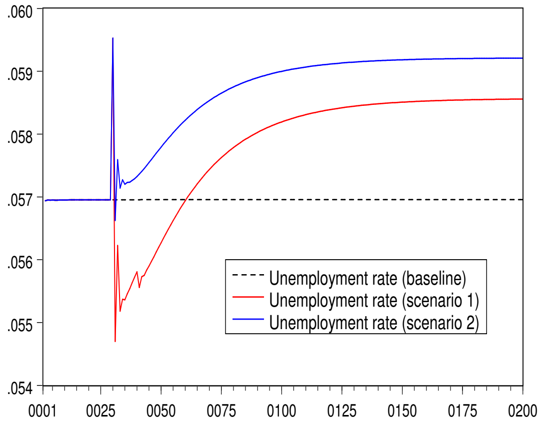


Figure 8

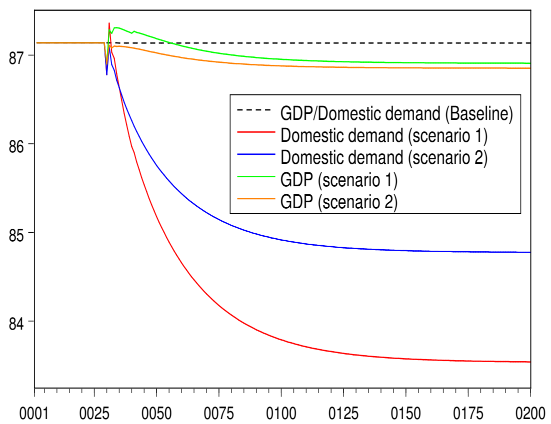
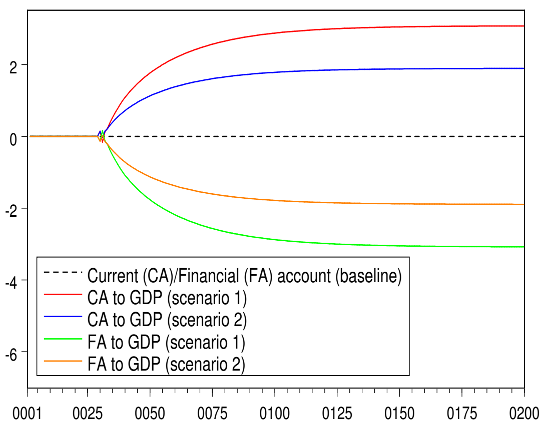


Figure 9



Looking at the figures above, the results are not surprising. A decrease in the compensation rate in an environment of downward real wage rigidity leads to a higher unemployment rate as compared to the baseline scenario. In the short run, the unemployment rate immediately increases due to a fall in aggregate demand. The unemployment rate then drops due to an increase in the level of competitiveness. However, the fall in the unemployment rate is much lower than in scenario 1. The difference between scenario 1 and scenario 2 is straightforward: a reduction in the compensation rate now has a lower impact on the relative prices (or the level of competitiveness), as targeted wages are resistant to falls. The diminished effect of competitiveness in the economy can be seen in a relatively lower current account surplus as compared to scenario 1. In the long run, the model stabilises, reaching an unemployment rate higher than in the case of scenario 1, where real wages were relatively more flexible. The adjustment mechanism of the model towards a new steady state remains the same as in scenario 1.

5.3 Decreasing the effect of employment on wages

In the baseline model, a change in the rate of unemployment affects the targeted real wages. This as discussed earlier can be seen as an argument for the existence of a wage Phillips–curve. However, in a number of studies, including Godley/Lavoie (2012), Hein/Stockhammer (2011) and Lavoie (2014), a Phillips–curve with a horizontal part is proposed. In these studies, it has been argued that fluctuations in the employment rate within certain bands (i.e., smaller changes in the employment rate) do not affect the targeted real wages. We introduce this feature in our model by lowering the elasticity of the employment rate (β_3) to the targeted real wage. In this scenario, the effects of a change in the compensation rate ξ are analysed within an environment of a relatively flatter Phillips–curve. Like in section 5.2, this is done by first creating the baseline scenario (after changing the value of β_3 from 0.75 to 0.5) and thereafter reducing the value of ξ from 0.55 to 0.5.

Figure 10

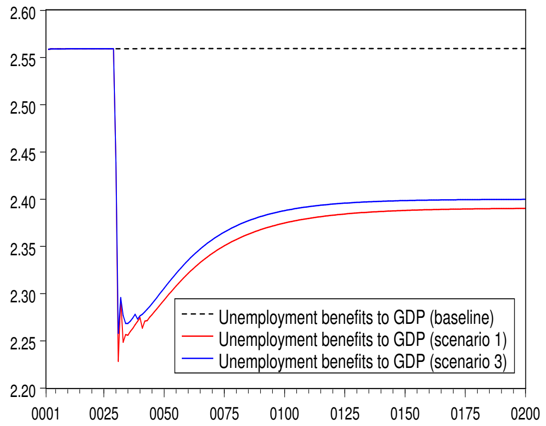


Figure 11

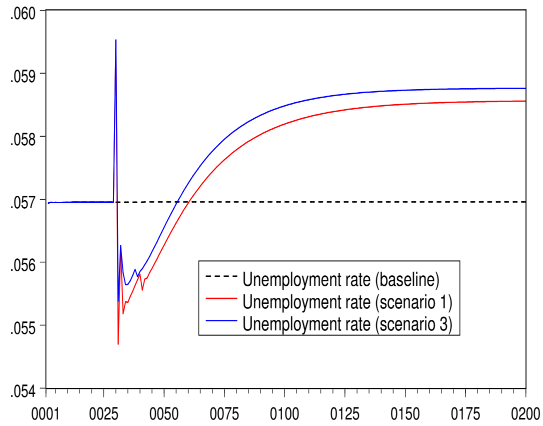


Figure 12

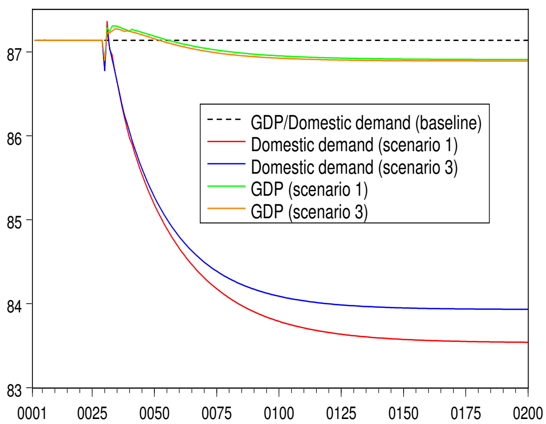
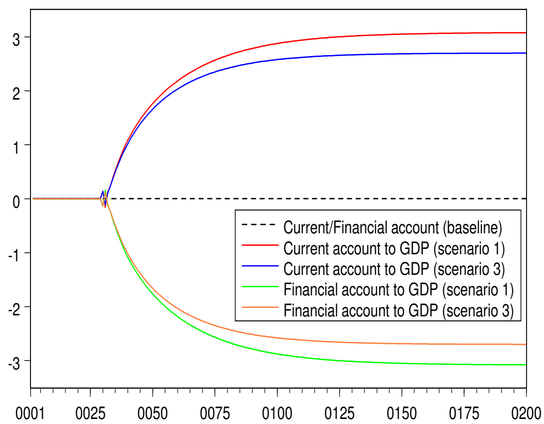


Figure 13



The result of this simulation looks quite similar to the results from the first scenario. In the short run, the reduction in the compensation rate lowers the income of the households, and thereby lowers the domestic demand. This fall in aggregate demand results in an increase in the rate of unemployment.

In the medium term, however, the effect of increased competitiveness starts to dominate the contraction of domestic demand. This increases competitiveness as can be seen by the positive current account balance as shown in Figure 13. The dynamics seem to be identical to scenario 1, but with some important distinctions: the effects of a lower compensation rate on the unemployment rate are slightly stronger in the long run as compared to scenario 1. This is due to a stronger fall in domestic demand and a relatively weaker response of the current account. In the current scenario, the effect of a change in the employment rate on real wages is set to be weaker. Therefore when the employment rate falls as a result of a fall in domestic demand, real wages do not fall as much as in scenario 1, resulting in a relatively weaker effect on the level of competitiveness.

5.4 Robustness

We perform several robustness tests by changing the values of parameters. After changing the parameters, we introduce the same three scenarios – as discussed earlier – and simulate the model. The new results are compared with those of the main model, referred to as the 'benchmark model'.

Our first experiment involves changing the key parameters in the trade equations. Overall, the parameter values in the trade equations are increased, which implies that the tradables are more sensitive to price movements and incomes variations.[32] We assign values to these parameters based on the empirical results reported for sensitive goods, i.e., the goods with the highest elasticities in the trade sector. In particular, ϵ_2 in the export equation is increased from 0.62 to 1, which is close to the elasticity reported for tourism and manufactured goods in the Danish export sector. The price elasticity of exports ϵ_1 is increased from 1.6 to 2, which is the elasticity of manufactured goods. At the same time, the price elasticity of imports μ_1 is increased from 0.4 to 1, which is close to the elasticity of primary goods. The income elasticity of imports μ_2 is increased from 1.11 to 1.47, which is close to the elasticity reported for manufactured goods.

Given that the demand for tradables is sensitive to price and income variations, a fall in the compensation rate would result in lower unemployment in the short run as compared to the benchmark model. This is due to the strong effect of relative prices on net exports, increasing output and reducing the unemployment rate as shown in Figure 14 and 15, respectively. However, the unemployment rate increases in the long run due to stronger feedback effects of income on imports. In the long run, the results for the three scenarios are quite similar across the two models.

Figure 14: Unemployment rate

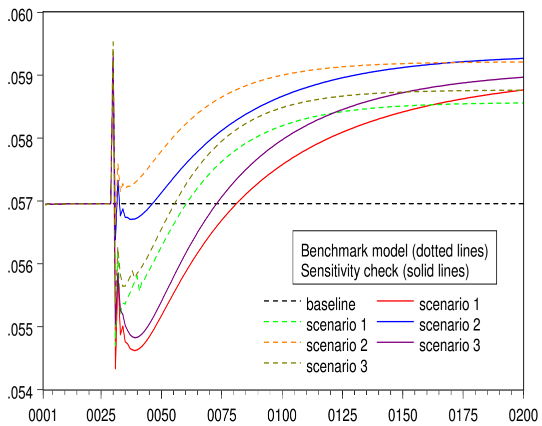
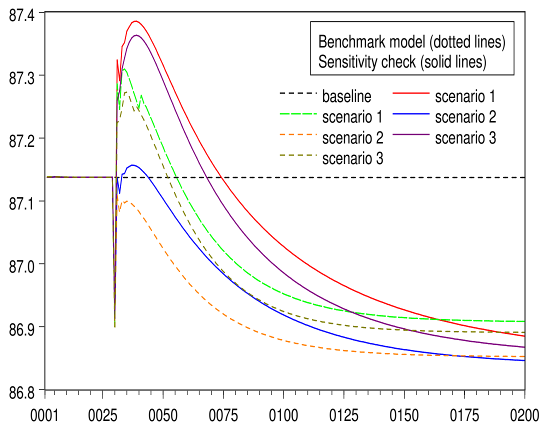


Figure 15: GDP



In addition, we perform a separate experiment in which we perform sensitivity checks on the equations involving the determinants of prices of imports and exports. In particular, we make the import prices more responsive to the developments in foreign prices and less responsive to domestic prices by increasing the value of ν_{m_1} from 0.7 to 0.8. At the same time, we make export prices less sensitive to foreign prices and more sensitive to domestic prices by reducing the value of ν_{x_1} from 0.4 to 0.2. These changes lead to a negligible impact on the overall model, as can be seen in Figure 16 and 17.

[32] Note that the parameters involved in this experiment are changed simultaneously.

Figure 16: Unemployment rate

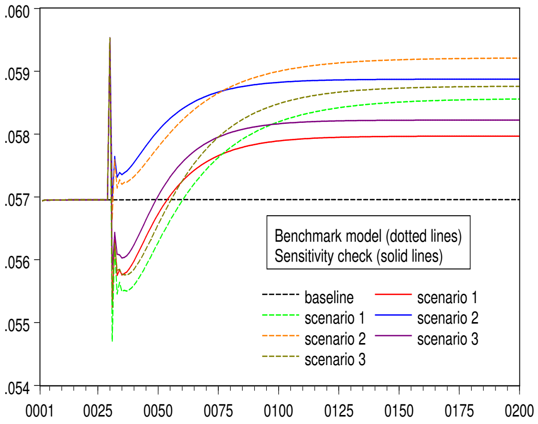
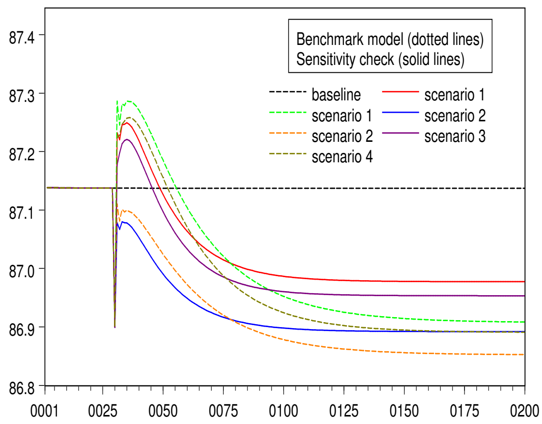


Figure 17: GDP



Second, we test the sensitivity of the model by changing a strategic parameter in the wage-setting equations, i.e., we change the speed of real wage adjustment (Ω_0) towards its targeted level. We perform two separate experiments in which we first reduce the value of (Ω_0) to 0.25, and then increase the value of (Ω_0) to 0.75. Overall, the results indicate that changes in the speed of wage adjustment lead to different responses in the short run. In particular, a higher speed of adjustment has a stronger effect on relative trade prices, which explains the fluctuation in unemployment and output.[33] In contrast, a low speed of wage adjustment has a small effect on the relative trade prices in the short run, which results in a lower fluctuation. These result are not consistent with those of our benchmark model in the short run. However, the response of the model in the long run is quite similar to our benchmark model.[34]

Figure 18: Unemployment rate

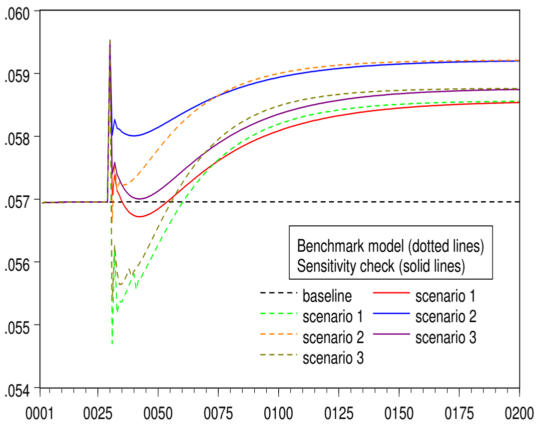
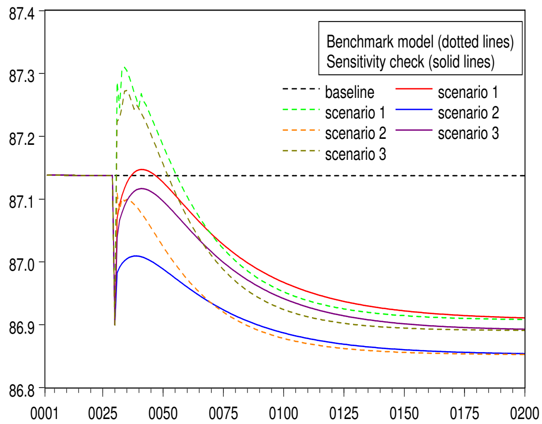


Figure 19: GDP



[33] As discussed earlier, a union with stronger bargaining power may not be so fast in reinforcing lower wages, in which case this result might not hold. The purpose of these simulations is merely to test the sensitivity of the model.

[34] We test the response of the model by changing the key parameters in the consumption function. We find that our results are quite robust to changes in these parameters.

Figure 20: Unemployment rate

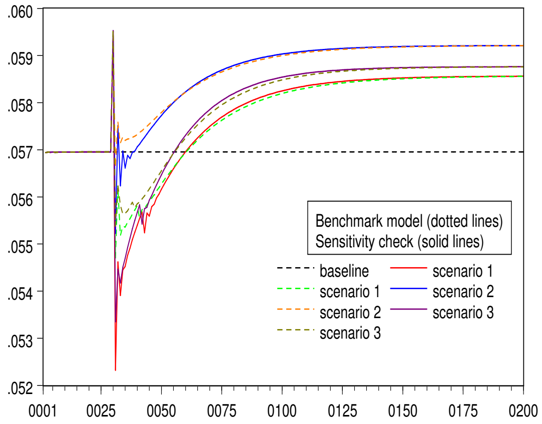
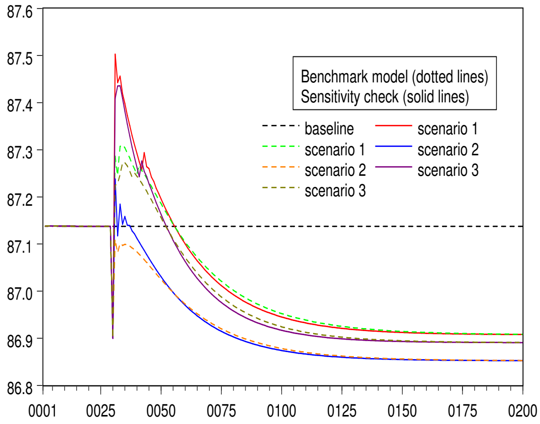


Figure 21: GDP



5.5 Discussion

The results from our simulations raise several questions on the economic gains of lower unemployment benefits (UB) in a small open economy. We show that reductions in UB lead to a clear tension between a fall in demand and a rise in net exports at a macro level. Our results demonstrate that a lower compensation rate (i.e., lower UB) in a small open economy can compress demand but it may or may not increase the level of competitiveness, depending on the level of real wage rigidity. If wages are rigid, reductions in UB will negatively affect demand while the level of international price competitiveness will not change to offset the effect of a demand compression. In contrast, if wages are flexible, reductions in UB will result in lower real wages, which will improve the level of competitiveness. However, in this case the gains from increased competitiveness are offset by a much stronger fall in demand due to a decrease in the income of both employed and unemployed households. It is important to highlight that this result may not be valid for profit–led economies, where the gains from increased competitiveness, in response to a fall in wage shares, might be stronger than a fall in domestic demand. However, if resistance to real wage reductions is stronger, then the economy may not benefit from a fall in the compensation rate, and as a result the adverse effects of a fall in domestic demand are likely to be dominant, regardless of the growth regime.

The negative effects of lower unemployment benefits on the income of unemployed households are straight forward, i.e., a fall in the compensation rate directly decreases the income of unemployed households. On the other hand, the positive macro effects – e.g., a rise in net exports or a reduction in unemployment rate – associated with unemployment benefits are not straight forward.

Focusing on the labour market, we demonstrated through our simulations that lowering unemployment benefits does not necessarily lead to a decrease in the unemployment rate in the long run. Our results are in sharp contrast to the studies arguing that a reduction in UB decreases the unemployment rate. There is a huge controversy regarding the effects of unemployment benefits on unemployment rate. This issue is typically analysed within the framework of utility maximisation, where an increase in unemployment benefits has a direct effect on the motivation of the individual to work. A fundamental flaw in the standard models is the exclusive focus on the economic incentive to work while ignoring other social aspects. As described by Van Staveren (2014), the decision whether to apply for a job or not does not depend solely on wages or the loss of income, but a number of social factors. According to Howell/Azizoglu (2011) and Forges Davanzati (2014), the loss of income is only a small part of the total cost of unemployment – personal costs of unemployment often exceed the economic costs. Larsen (2009) shows that in a majority of studies, non–economic factors increase the incentive to work amongst unemployed individuals. The non–economic factors, e.g., institutional norms, where unemployed people may be afraid of stigmatization and the need for an identity (workwise) and social belonging are especially strong in Denmark compared to the rest of the world (Larsen, 2009).

The recent developments in the Danish labour market, which reduced the level and duration of UB, accompanied by a tightening of the eligibility criteria for benefits, are elements of a pro-capital policy as described in Lavoie/Stockhammer (2013). The outcome of such a policy can be very damaging for the flexicurity system and the economy in the long run. From the point of view of the Danish labour market, the tightening of unemployment benefits leads to a fall in the income security of the workers. This may affect the interest that the unions have in accommodating the flexible nature of the labour market, specifically the flexibility in hiring and firing workers without any compensation. If so, both the flexibility and security aspects of the flexibility model are weakened, which can generate a less dynamic labour market. Another major concern, as pointed out by Lavoie/Stockhammer (2013), is that a pro-capital distribution policy in a wage-led economy leads to dampened growth, unless the effects are offset by other factors such as debt. In this regard, the Danish economy reveals some interesting statistics worth highlighting; Danish households increased their stock of gross debt from 160% of disposable income in 1995 to around 300% in 2010. At the same time, the Danish trade balance has been in a surplus; net exports have mostly been positive since 1995. Hence, it can be argued that the adverse effects of a falling welfare and wage shares on demand have been mitigated by a rise in private debt – a feature shared by many advanced economies.

For a moment, even if we accept the argument that a change in the compensation rate has an effect on the incentive to work, a natural question that follows is, can an increase in the incentive to work automatically generate employment? Our framework clearly deviates from the traditional assumption of linking employment to the utility maximisation problem of workers. In our framework, the level of employment is determined by the level of effective demand in the goods market. The supply of labour is not constrained by the incentive to work, and the compensation rate has no effect on the utility of workers but on the terms of union wage–bargaining. The aggregate effects on unemployment are thus a result of the macroeconomic impact and feedback effects of altering sectoral income and competitiveness, rather than the simplistic aggregation of a microeconomic behavioural assumption.

6 Conclusion

The effect of unemployment benefits has been at the centre of both political and economic discussions for the last few decades. According to the political argument, a high level of unemployment benefits affects the incentive to work, and people therefore choose to stay unemployed instead of applying for low–paid jobs. This line of reasoning is backed by a large strand of economic literature, where substitution and income effects are used as an explanation for the choice of whether to work or not. Within this framework, a decrease in the compensation rate leads to an increase in the labour supply, and thereby to an increase in the level of employment.

This paper explored the macroeconomic effects of unemployment benefits within the framework of a simple SFC model for a small open economy. We create three main scenarios: In the first scenario, we reduce the rate of compensation which immediately increases the rate of unemployment due to a fall in domestic demand. In the medium term however, the unemployment rate falls due to an increase in competitiveness and net exports. This short run to medium run response of the model is consistent with the (ADAM, 2013) model for Denmark. In the long run however, our story diverges from the short run results: a reduction in the rate of compensation leads to a permanent increase in the rate of unemployment as demand compression dominates the dynamics of the system. In the second and third scenarios, the prevailing story in the standard economic literature is further challenged. In scenario 2, when we introduce downward real wage rigidity, a lower compensation rate leads to an increase in the rate of unemployment both in the short run and long run. A lower compensation rate in this scenario has a very minor impact on the competitiveness as real wages are resistant to falls. In the third scenario, the elasticity of a change in the rate of employment on targeted wages is lowered, i.e., the wage Phillips-curve becomes relatively flatter. In this scenario, a reduction in the unemployment benefits shows similar results to the case of scenario 1. Overall, our results clearly suggest that reduced compensation does not necessarily reduce the unemployment rate. In contrast, we find that a lower compensation rate can increase the rate of unemployment, depending on the magnitude of a fall in demand.

Our conclusion – although in sharp contrast with several studies – finds some support in the literature. The critiques of the prevailing belief, such as Howell/Rehm (2009), have argued that the utility of workers is largely irrelevant for unemployment benefits. Frey/Stutzer (2002) find a positive relationship between employment and happiness. Moreover, it has been argued that the link between unemployment benefits and labour supply is not as obvious as is often stated in economic theory, and the decision to supply labour relies not only on financial motivations but also on social and institutional norms. Another critical point is that an increase in the labour supply does not automatically result in an increase in employment, as is implied by the arguments related to disincentive effects. We show that the level of employment is determined by effective demand in the goods market. This implies that unemployment is a demand–led problem, and not a function of high real wages or high unemployment benefits as is widely believed in the existing economic literature. The model we present in no way claims to have resolved this issue, but it reveals that the link between unemployment benefits and unemployment rates is more complicated than the type of treatment it has received in the existing literature. The results from our simulations show that a variety of scenarios are possible.

References

Acemoglu, D. and Shimer, R. (2000). Productivity gains from unemployment insurance. *European Economic Review*, 44(7):1195–1224.

ADAM (2003). *En modelskitse for arbejdsudbuddet i ADAM.* Danmarks Statistik.

ADAM (2013). *ADAM - a model of the Danish economy.* Danmarks Statistik.

Agell, J. and Lundborg, P. (2003). Survey evidence on wage rigidity and unemployment: Sweden in the 1990s. *The Scandinavian Journal of Economics*, 105(1):15–30.

Andersen, T. M., Svarer, M., and Vejlin, R. M. (2015). Litteraturreview af effekter af ydelsessystemer.

Arestis, P. and Sawyer, M. (2013). A modern kaleckian-keynesian framework for economic theory and policy. In Harcourt, G. C. and Kriesler, P., editors, *The Oxford Handbook of Post-Keynesian Economics, Volume 2: Critiques and Methodology*, chapter 15. Oxford University Press, Oxford.

Atkinson, A. B. and Micklewright, J. (1991). Unemployment compensation and labor market transitions: a critical review. *Journal of economic literature*, 29(4):1679–1727.

Baily, M. N. (1978). Some aspects of optimal unemployment insurance. *Journal of Public Economics*, 10(3):379–402.

Blanchard, O. and Galí, J. (2007). Real wage rigidities and the new keynesian model. *Journal of money, credit and banking*, 39(s1):35–65.

Blanchflower, D. G. and Oswald, A. J. (2005). The wage curve reloaded.

Bredgaard, T., Jørgensen, H., Madsen, P. K., and Rasmussen, S. (2011). *Dansk arbejdsmarkedspolitik.* Jurist-og Økonomforbundet.

Caverzasi, E. and Godin, A. (2014). Post-keynesian stock-flow-consistent modelling: a survey. *Cambridge Journal of Economics*, 39(1):157–187.

Cevea (2015). Pas på at dagpengenes værdi ikke udhules.

Chetty, R. (2006). A general formula for the optimal level of social insurance. *Journal of Public Economics*, 90(10):1879–1901.

Chetty, R. (2008). Moral hazard versus liquidity and optimal unemployment insurance. *Journal of political Economy*, 116(2):173–234.

Chodorow-Reich, G. and Karabarbounis, L. (2016). The limited macroeconomic effects of unemployment benefit extensions. *National Bureau of Economic Research.*

Christofides, L. N. and Li, D. (2005). Nominal and real wage rigidity in a friction model. *Economics Letters*, 87(2):235–241.

Danmarks Nationalbank (2013). Danmarks nationalbank kvartals oversigt 2. kvartal.

Davidson, P. (1998). Post keynesian employment analysis and the macroeconomics of oecd unemployment. *The Economic Journal*, 108(448):817–831.

Diamond, P. A. (1982). Wage determination and efficiency in search equilibrium. *The Review of Economic Studies*, 49(2):217–227.

DØRS (2014). Dansk økonomi, efterår 2014.

Dos Santos, C. H. and Zezza, G. (2008). A simplified, benchmark, stock-flow consistent post-keynesian growth model. *Metroeconomica*, 59(3):441–478.

Flemming, J. S. (1978). Aspects of optimal unemployment insurance: Search, leisure, savings and capital market imperfections. *Journal of Public Economics*, 10(3):403–425.

Forges Davanzati, G. (2014). Unemployment benefits, the'added worker effect'and income distribution in a monetary economy. Technical report, Post Keynesian Economics Study Group (PKSG).

Frey, B. S. and Stutzer, A. (2002). What can economists learn from happiness research? *Journal of Economic literature*, 40(2):402–435.

Godin, A. (2014). Job guarantee: a structuralist perspective. *Revue de la régulation. Capitalisme, institutions, pouvoirs*, (16).

Godley, W. and Lavoie, M. (2012). *Monetary economics: an integrated approach to credit, money, income, production and wealth*. Palgrave Macmillan UK, 2 edition.

Greenwood-Nimmo, M. (2013). Inflation targeting monetary and fiscal policies in a two-country stock–flow-consistent model. *Cambridge Journal of Economics*, 38(4):839–867.

Gruber, J. (1997). The consumption smoothing benefits of unemployment insurance. *The American Economic Review*, 87(1):192–205.

Hall, R. E. (2005). Employment fluctuations with equilibrium wage stickiness. *The American Economic Review*, 95(1):50–65.

Hein, E. and Stockhammer, E. (2011). A post-keynesian macroeconomic model of inflation, distribution and employment. *A Modern Guide to Keynesian Macroeconomics and Economic Policies*, pages 112–136.

Holden, S. and Wulfsberg, F. (2009). How strong is the macroeconomic case for downward real wage rigidity? *Journal of Monetary Economics*, 56(4):605–615.

Hopenhayn, H. A. and Nicolini, J. P. (1997). Optimal unemployment insurance. *Journal of political economy*, 105(2):412–438.

Howell, D. R. and Azizoglu, B. M. (2011). Unemployment benefits and work incentives: the us labour market in the great recession. *Oxford Review of Economic Policy*, 27(2):221–240.

Howell, D. R. and Rehm, M. (2009). Unemployment compensation and high european unemployment: a reassessment with new benefit indicators. *Oxford Review of Economic Policy*, 25(1):60–93.

Kahneman, D. and Tversky, A. (1979). Prospect theory: An analysis of decision under risk. *Econometrica*, 47(2):363–391.

Katz, L. F. and Meyer, B. D. (1990). The impact of the potential duration of unemployment benefits on the duration of unemployment. *Journal of public economics*, 41(1):45–72.

Kekre, R. (2016). Unemployment insurance in macroeconomic stabilization. *Working paper.*

Krusell, P., Mukoyama, T., and Şahin, A. (2010). Labour-market matching with precautionary savings and aggregate fluctuations. *The Review of Economic Studies*, 77(4):1477–1507.

Larsen, C. A. (2009). Ledighedsparadokset: information, netværk og selektion på arbejdsmarkedet.

Lavoie, M. (2014). *Post-Keynesian economics: new foundations.* Edward Elgar Publishing.

Lavoie, M. and Daigle, G. (2011). A behavioural finance model of exchange rate expectations within a stock-flow consistent framework. *Metroeconomica*, 62(3):434–458.

Lavoie, M. and Stockhammer, E. (2013). Wage-led growth: Concept, theories and policies. In *Wage-led Growth*, pages 13–39. Springer.

Lippman, S. A. and McCall, J. (1976). The economics of job search: A survey. *Economic inquiry*, 14(2):155–189.

Madsen, P. K. (2011). Flexicurity i modvind. *Tidsskrift for arbejdsliv*, 13(4):8–21.

Madsen, P. K. (2015). Dansk flexicurity under pres–både indefra og udefra. *Samfundsøkonomen.*

Mazier, J. and Tiou-Tagba Aliti, G. (2012). World imbalances and macroeconomic adjustments: A three-country stock-flow consistent model with fixed or flexible prices. *Metroeconomica*, 63(2):358–388.

McDonald, I. M. and Solow, R. M. (1981). Wage bargaining and employment. *The American Economic Review*, 71(5):896–908.

Meyer, B. D. (1990). Unemployment insurance and unemployment spells. *Econometrica*, 58(4):757–782.

Mitman, K. and Rabinovich, S. (2015). Optimal unemployment insurance in an equilibrium business-cycle model. *Journal of Monetary Economics*, 71:99–118.

Mortensen, D. T. (1986). Job search and labor market analysis. *Handbook of labor economics*, 2:849–919.

Mortensen, D. T. and Pissarides, C. A. (1999). New developments in models of search in the labor market. *Handbook of labor economics*, 3:2567–2627.

Nakajima, M. (2012). A quantitative analysis of unemployment benefit extensions. *Journal of Monetary Economics*, 59(7):686–702.

Narendranathan, W. and Stewart, M. B. (1993). How does the benefit effect vary as unemployment spells lengthen? *Journal of Applied Econometrics*, 8(4):361–381.

Nijkamp, P. and Poot, J. (2005). The last word on the wage curve? a meta–analytic assessment. *Journal of Economic Surveys*, 19(3):421–450.

Nikiforos, M. and Zezza, G. (2017). Stock-flow consistent macroeconomic models: A survey. *Levy Economics Institute Working Paper No. 891.*

Onaran, Ö. and Galanis, G. (2013). Is aggregate demand wage-led or profit-led? a global model. In *Wage-led Growth: An Equitable Strategy for Economic Recovery*, pages 40–70. Springer.

Onaran, Ö., Stockhammer, E., and Grafl, L. (2011). Financialisation, income distribution and aggregate demand in the usa. *Cambridge Journal of Economics*, 35(4):637–661.

Rätzel, S. (2009). Revisiting the neoclassical theory of labour supply–disutility of labour, working hours, and happiness. Technical report, FEMM Working Paper No. 5.

Rogerson, R., Shimer, R., and Wright, R. (2005). Search-theoretic models of the labor market: A survey. *Journal of economic literature*, 43(4):959–988.

Rosholm, M. (2006). Oversigt over litteratur om effekterne af økonomiske incitamenter. *København: Beskæftigelsesministeriet.*

Scarpetta, S. (1996). Assessing the role of labour market policies and institutional settings on unemployment: A cross-country study. *OECD Economic studies*, 26(1):43–98.

Shapiro, C. and Stiglitz, J. E. (1984). Equilibrium unemployment as a worker discipline device. *The American Economic Review*, 74(3):433–444.

Shavell, S. and Weiss, L. (1979). The optimal payment of unemployment insurance benefits over time. *The Journal of Political Economy*, pages 1347–1362.

Sørensen, P. B. and Whitta-Jacobsen, H. J. (2005). *Introducing advanced macroeconomics*. McGraw–Hill Education.

Stockhammer, E. (2013). Why have wage shares fallen? an analysis of the determinants of functional income distribution. In *Wage-led Growth: An Equitable Strategy for Economic Recovery*, pages 40–70. Springer.

Van Staveren, I. (2014). *Economics after the crisis: an introduction to economics from a pluralist and global perspective*. Routledge.

Appendix

Behavioural equations

FIRMS

National income

$$Y_t = C_t + I_t + G_t + X_t - M_t \tag{18}$$

Sales

$$S_t = C_t + I_t + G_t + X_t \tag{19}$$

Value of real output

$$y_t = s_t - m_t \tag{20}$$

GDP deflator

$$P_t^y = Y_t / y_t \tag{21}$$

Price of sales

$$P_t^s = (1 + \phi).(UC_t) \tag{22}$$

Unit Cost

$$UC_t = (WB_t + M_t)/s_t \tag{23}$$

Domestic sales price

$$P_t^{ds} = \frac{S_t - X_t}{s_t - x_t} \tag{24}$$

Real sales

$$s_t = c_t + g_t + i_t + x_t \tag{25}$$

Nominal value of sales

$$S_t = s_t.P_t^s \tag{26}$$

Real investment

$$i_t = \gamma.(k^T - k_{t-1}) + da \tag{27}$$

Targeted stock of capital

$$k^T = \mu.s_{t-1} \tag{28}$$

Depreciation of capital

$$da = \delta.s_{t-1} \tag{29}$$

Change in stock of capital

$$\Delta k_t = i_t - da \tag{30}$$

Nominal value of investment

$$I_t = i_t.P_t^{ds} \tag{31}$$

Supply of equity

$$e^s = e_{t-1}^s + \chi.\Delta k \tag{32}$$

Profit of the firms

$$F_f = S_t - M_t - WB_t - T_t^f \tag{33}$$

Retained profits

$$F_r = I + \Delta H^f - \Delta e^s.P^e \tag{34}$$

Distributed profits

$$F_h = F_f - F_r \tag{35}$$

Demand for domestic currency

$$H_t^f = H_{t-1}^f + X_t - M_t \tag{36}$$

Taxes of the firms

$$T_t^f = \theta.\Big(Y_t - WB_t\Big) \tag{37}$$

HOUSEHOLDS

Households disposable income

$$YD_t = WB_t + r_{t-1}.B^h_{t-1} + UB + F_h - T^h_t \tag{38}$$

Taxes paid by the households

$$T^f_t = \theta.\Big(WB_t + r_{t-1}(B^h_{t-1}) + UB\Big) \tag{39}$$

Real disposable income

$$yd_t = \frac{YD_t}{P^{ds}_t} - \frac{v_{t-1}.(\Delta P^{ds})}{P^{ds}_t} \tag{40}$$

Wealth accumulation

$$V_t = V_{t-1} + YD_t - C_t \tag{41}$$

Real wealth

$$v_t = V_t/P^{ds}_t \tag{42}$$

Real consumption

$$c_t = \alpha_1.yd_t + \alpha_2.v_{t-1} \tag{43}$$

Nominal consumption

$$C_t = c_t.P^{ds}_t \tag{44}$$

Demand for bills

$$B^h_t = V_t.\Big(\lambda_0 + \lambda_1.(r_t) - \lambda_2.(YD_t/V_t)\Big) \tag{45}$$

Demand for equity

$$e^d = e^s \tag{46}$$

Demand for domestic currency

$$H^h_t = V_t - B^h_t - e^d.P^e \tag{47}$$

GOVERNMENT

Tax revenue

$$T_t = T^f_t + T^h_t \tag{48}$$

Supply of government bills

$$B_{S_t} = B_{S_{t-1}} + G_t + UB_t + r_{t-1}.B_{S_{t-1}} - T_t - r_{t-1}.B^{cb}_{t-1} \tag{49}$$

CENTRAL BANK:

Government bills held by the Central bank

$$B^{cb}_t = B_{S_t} - B^h_t \tag{50}$$

Demand for foreign currency, i.e., the foreign currency reserves generated by the the surplus on trade

$$Fx = Fx_{t-1} + \left(\frac{\Delta H^f_t}{XR}\right) \qquad \text{where } \left(XR = \frac{\Delta H^f_t}{\Delta Fx_t} = 1\right) \text{is implicit in the model} \tag{51}$$

Supply of currency by the Central bank

$$H_{S_t} = H_{S_{t-1}} + B^{cb}_t - B^{cb}_{t-1} + H^f_t - H^f_{t-1} \tag{52}$$

LABOUR MARKET:

Employment

$$N_t = y_t/A_t \tag{53}$$

Wage bill

$$WB_t = W_t.N_t \tag{54}$$

Unemployment

$$UN_t = Lf_t - N_t \tag{55}$$

Unemployment benefits

$$UB_t = \xi.W_t.UN_t \tag{56}$$

Employment rate

$$ER_t = \frac{N_t}{Lf_t} \tag{57}$$

Unemployment rate

$$UR_t = 1 - \frac{N_t}{Lf_t} \tag{58}$$

Labour force

$$Lf = act.Pop \tag{59}$$

where Pop is the total population

Labour participation rate

$$ln(act) = \Phi_0 + \Phi_1.ln\bigg(\frac{W_t}{P_t^{ds}}\bigg) + \Phi_2.ln(ER_{t-1}) \tag{60}$$

Nominal wage rate

$$W_t = W_{t-1} + \Omega_0.(w^*_{t-1} - w_{t-1}) \tag{61}$$

Real wage

$$w_t = \frac{W_t}{P_t^{ds}} \tag{62}$$

Targeted wage rate

$$lnw^* = \beta_0 + \beta_1.ln(A_t) + \beta_2.ln(\xi) + \beta_3.ln(ER_{t-1}) \tag{63}$$

BALANCE OF PAYMENTS AND TRADE

Import prices

$$ln(P_t^m) = \nu_{m_0} + \nu_{m_1}.ln(P_t^{y^*}) + (1-\nu_{m_1}).ln(P_t^y) + \nu_{m_1}.ln(XR) \tag{64}$$

Export prices

$$ln(P_t^x) = \nu_{x_0} + \nu_{x_1}.ln(P_t^{y^*}) + (1-\nu_{x_1}).ln(P_t^y) + \nu_{x_1}.ln(XR) \tag{65}$$

where XR is the nominal exchange rate, which is fixed to 1 in our model.

Real imports

$$ln(m_t) = \mu_0 - \mu_1.ln\bigg(\frac{P_{t-1}^m}{P_{t-1}^y}\bigg) + \mu_2.ln(y_t) \tag{66}$$

Real exports

$$ln(x_t) = \epsilon_0 - \epsilon_1.ln\bigg(\frac{P_{t-1}^x}{P_{t-1}^{y^*}}\bigg) + \epsilon_2.ln(y_t^*) \tag{67}$$

Nominal imports

$$M_t = m_t.P^m \tag{68}$$

Nominal exports

$$X_t = x_t.P^x \tag{69}$$

Current account balance

$$CAB_t = X_t - M_t \tag{70}$$

Financial account balance

$$FAB_t = -\Delta Fx.XR \tag{71}$$

ASSET MARKET EQUILIBRIUM

Total demand and supply of bills

$$\underbrace{B_{S_t}}_{\text{Bills issued}} = \underbrace{B_t^h + B_t^{cb}}_{\text{Bills demanded}} \tag{72}$$

Total demand and supply for domestic currency

$$\underbrace{H_{S_t}}_{\text{Currency issued}} = \underbrace{H_t^h + H_t^f}_{\text{Currency demanded}} \tag{73}$$

Total demand and supply for foreign currency

$$\underbrace{Fx_t^*}_{\text{Fx issued}} = \underbrace{Fx_t}_{\text{Fx demanded}} \tag{74}$$

Parameter and exogenous variables

$\theta = 0.2$	$\Omega_0 = 0.5$	$\beta_0 =$ -0.15	$\beta_1 =$1	β_2= 0.1	$\beta_3 = 0.75$	$\alpha_1 = 0.9$	$\alpha_2 = 0.1$
$\lambda_0 = 0.65$	$\lambda_1 = 5$	$\lambda_2 = 0.01$	$r = 0.025$	$\gamma = 0.15$	$\xi = 0.55$	$\mu = 1$	δ=0.1
$\nu_{m_1} = 0.7$	$\nu_{x_1} = 0.4$	$\mu_2 = 1.11$	ϵ_0= 0.917	$\epsilon_1 = 1.6$	ϵ_2= 0.62	$\Phi = 0.186$	$\Phi_0 =$ -0.2646
Φ_1= 0.05	$\Phi_2 = 0.23$	χ =0.10	$Pop = 117.4$	$A = 1.05$	$g = 14.72$	$XR = 1$	$P^{y^*} = 1$