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Income inequality and Germany's current account surplus

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Germany entered the euro with a current account deficit but over the entire past decade has run large and persistent current account surpluses. Besides joining the common currency, the increase of Germany's current account since the late 1990s has been accompanied by strong shifts in the personal and, in particular, the functional income distribution. In this paper, we argue that income inequality should always be analyzed with respect to both the personal and the functional distribution of income. We present a dynamic stochastic general equilibrium (DSGE) model in which a current account surplus arises as an endogenous result of a decrease in the share of household income in national income. On the one hand, this result complements existing literature where current account deficits result from rising personal income inequality. On the other hand, we find that current account imbalances will be more pronounced when accompanied by changes in the financial system. Accordingly, if we link Germany's accession to the European monetary union to lower exchange rate costs for German bank lending, the current account surplus becomes larger.

Keywords: income inequality, functional income distribution, household debt, financial system, current account

JEL-Code: D31, E17, F32

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Income inequality and Germany's current account surplus

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February 17, 2015

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Contents

1 Introduction

Current account imbalances were an important contributing factor to the financial and economic crises since 2007 at both the global level and within the European Monetary Union. Germany entered the euro with a current account deficit but over the entire past decade has run large and persistent current account surpluses. Besides joining the common currency, the increase of Germany's current account since the late 1990s has been accompanied by strong shifts in the personal and, in particular, the functional income distribution. In this paper, we present a dynamic stochastic general equilibrium (DSGE) model in which a current account surplus arises endogenously as a result of rising corporate income at the expense of household income, financial liberalization, and monetary integration.

An important weakness of many DSGE models is their reliance on the representative agent assumption which assumes away the issue of income inequality. Recently, some attempts were made to address this shortcoming and to incorporate household heterogeneity. Charpe and Kühn (2013) developed a two-country DSGE model in which a fraction of households is credit constraint or follows a rule-of-thumb in their consumption decisions. In this model, a decline in the bargaining power of workers induces non-conventional effects. First, lower domestic real wages lead to a negative domestic consumption effect - even though this effect is overcompensated by the positive impact on domestic output through both competitiveness and the domestic interest rate channel. Second, lower domestic real wages create a beggar-thy-neighbor effect when lower domestic imports overcompensate the positive impact on foreign output through reduced inflation generated by the lower price of imported goods. Finally, the overall effect of lower real wages is negative when monetary policy hits the zero lower bound and reduced wages and prices translate into higher real interest rates.

The model presented in this paper primarily builds on previous work by Kumhof and Ranciere (2010); Kumhof et al. (2015) and Kumhof et al. (2012). In this work, a very similar version of the model was used to explain the rise in household leverage and the decrease in national saving-investment balances in a number of countries combining rising income inequality and a developed financial system. The basic mechanism is that poor households ('workers') borrow from the domestic rich ('investors') and foreign financial markets to maintain their consumption despite a fall in income. This phenomenon was especially important in the Anglo Saxon countries, most notably the United States and the United Kingdom, in the run-up to the 2007 financial crisis. As the model is calibrated to the UK, we call this the *UK scenario*.[1]

[1] Kumhof et al. (2012) also analyze the effects of rising inequality in emerging economies with underdeveloped

Germany differs from other developed economies with developed financial systems in a number of important aspects. Firstly, shifts in income distribution are reflected not only in higher personal inequality, but also and importantly in the increasing share of corporate income in the national income at the expense of the household sector. In fact, the largest contribution to the rise in the current account since the late 1990s has come from the corporate sector (see Ruscher and Wolff, 2012; Behringer and van Treeck, 2013, Belabed et al., 2013). Higher corporate retained earnings adversely affect domestic demand to the extent that they are not fully offset by a reduction of saving by shareholder households. In the literature, this effect is known as the 'corporate veil' (Poterba, 1991; Sumner, 2004; Monogios and Pitelis, 2004; Atkinson, 2009).[2] In Germany, the conservative retention policies of small and medium-sized enterprises, which are often family-owned, also helps explain the growing importance of corporate retained earnings and at the same time the relative constancy of top household income shares. Secondly, households' demand for credit has been very weak in pre-crisis times, while inequality was on the rise. This can be explained by a pronounced precautionary savings motive in the context of labor market deregulation and social security reforms during the 2000s (see Carlin and Soskice, 2009). Thirdly, the banking system has played a very important role in intermediating the excess financial savings of the corporate and household sectors to the rest of the world. Financial credits, especially to the euro area, have been one of the most important driving forces of Germany's capital account over the past 15 years (Lindner, 2013). Besides the weak domestic credit demand, the increased financial integration resulting from the introduction of the euro also helps explain why the excess financial savings of rich households and the corporate sector have been invested abroad (within Europe) rather than lent domestically to poor and middle class households. This specific institutional environment is taken into account in the model simulations.

In order to cover both the *UK scenario* and the *Germany scenario*, we modify the Kumhof et al. (2012) model in the following ways: Firstly, because in the model there is no difference between personal and functional income distribution, we construct a synthetic shock taking into account information on top household income shares and on the share of wages (household disposable income) in national income. We calibrate the model to both UK and German data and simulate the effects of the synthetic income distribution shocks. Secondly, in order to capture the

financial systems. Here, the domestic poor do not have access to borrowing, and so the rich invest their additional savings in the international financial markets, thereby financing the current account deficits of the rich world. This mechanism helps explain the rising current account surplus of China and other emerging economies prior to the global financial crisis.

[2]The growing importance of corporate sector saving was highlighted by IMF (2006), Andre et al. (2007) and European Commission (2014).

country-specific differences in consumption behavior and credit demand, we refine the investors' utility function. The utility weight for investor consumption is made dependent on the composition of the synthetic shock, *i.e.*, investor consumption reacts less to an increase in corporate retained earnings than it reacts to an increase in current investor income. Moreover, as we do not find any evidence in the data for investment booms as a consequence of rising income inequality, we exogenize gross capital formation in the model and calibrate it to the countries' investment-to-GDP ratios. We also show that within the model unrealistically large variations in domestic and foreign capital investment would be required to obtain effects on current account balances that are similar to the effects of changes to income distribution. Thirdly, for Germany we run an additional scenario, where banking spreads[3] are shocked to capture the stark reduction of exchange rate risks after Germany joined the European monetary union. As a consequence, the current account surplus becomes much larger, amplifying the effects of the income distribution shocks after the Euro was introduced. This effect plays a similar role to financial liberalization in the UK (Kumhof et al., 2012).

The remainder of the paper is organized as follows. Section 2 discusses important stylized facts about inequality, the current account and credit in Germany and compares those facts to the situation in the UK. Section 3 briefly discusses problems underlying DSGE models with heterogeneous agents and then presents the main modifications of the model. Section 4 presents the model simulations and discusses policy implications. Section 5 concludes.

2 The data

2.1 Rise in income inequality

Germany is one of the countries with the strongest increase in overall income inequality since the mid-1980s (OECD, 2012). As shown in Figure 1 a, the Gini coefficient of both gross and net equivalized household income has increased to a similar degree in Germany as in the United Kingdom, with an acceleration in the rise of inequality during the 2000s. When it comes to the modeling of inequality, however, the Gini coefficient of household income is not the most appropriate measure: As is well known, the same Gini coefficient can be compatible with rather different distributions. Also, the Gini coefficient attributes only a small weight to top incomes, due to both its mathematical construction and the underestimation of top incomes in voluntary

[3]Banking spreads reflect the difference between credit and deposit rate or more generally between borrowing and lending costs.

households surveys, on which Figure 1 a is based (Behringer et al., 2014).

To keep the model manageable and following Kumhof et al. (2012), the distribution of income has to be mapped to income differences among a parsimonious number of agents. In this respect, a central feature of the Kumhof and Ranciere (2010) and Kumhof et al. (2012) models is the heterogeneity between top (5%) income class households ('investors') on the one hand and middle and bottom income class households ('workers') on the other hand. Because investors also decide about capital accumulation, they represent simultaneously rich households and firms. It therefore seems appropriate to use information from both the personal and the functional income distribution to calibrate the income shares of 'investors' and 'workers'.

Firstly, we consider the World Top Incomes Database (WTID). Figure 1 b shows the share of total pre-tax household income accruing to the top 5% of tax units in Germany and the United Kingdom, based on the WTID. Secondly, we consider the shares of wages and profits in GDP (Figure 1 c) and the share of corporate disposable income in private disposable income (Figure 1 d). In the United Kingdom, the wage share has been roughly stable over the past decades. Also, despite a higher volatility, corporate disposable income has remained roughly stable as a share of total private disposable income. The determining feature of rising inequality has thus been the spectacular rise in top household income shares. In Germany, by contrast, the rise of inequality within the household sector has been accompanied by a strong decrease of wages relative to capital income (Figure 1 c) and by a decrease of aggregate household disposable income relative to corporate disposbale income (Figure 1 d). The share of corporate disposable income in national disposable income has increased by 6-7 percentage points both during the 1980s and since the late 1990s until today. The redistribution of income towards the corporate sector was, however, interrupted for an entire decade following the German re-unification. As a consequence of this development, during the 2000s the corporate financial balance (Figure 2 a) becomes positive contributing to the German current account surplus (Behringer and van Treeck, 2013).

2.2 Inequality and components of GDP by expenditure

Germany's current account already increased strongly during the 1980s, and then again since the early 2000s. Germany is the only large surplus economy which has not been part of the global re-balancing of current accounts as a result of the recent crises.

Figures 2 a and c show the current account balance of Germany and its decomposition into the financial balances of the private household, corporate and government sectors. Figure 2 b

and d show the corresponding data for the UK. The largest contribution, in accounting terms, to the rise in the current account in Germany since the early 2000s has come from the corporate sector. As can be seen in Figure 3 c, the structural increase in the current account balance cannot be attributed to a larger net outflow of foreign direct investment, which as share of GDP is at essentially the same level as in the mid-1990s. This raises doubts about the notion that Germany's weak domestic demand is due to its unattractiveness as an investment location. This latter assertion is sometimes invoked on the basis of Figure 2 e, which shows a declining trend in the overall investment-to-GDP ratio in Germany over time.[4] Yet, as shown in Figure 2 e, this declining trend is not apparent in business investment in equipment and machinery which should be most strongly affected by business and investment conditions.[5] Germany is also one of those developed economies whose product and labour markets have been deregulated most during the pre-crisis decade (van Treeck and Sturn, 2012). It therefore appears odd to attribute the structural weakness of domestic demand in Germany to unattractive business conditions.[6]

Finally, Figure 2 f shows the consumption-to-GDP ratios for both Germany and the UK. While this ratio on a relatively low level seems to be very stable over time for Germany, it shows an upward slope in the UK, starting from a higher level. Theoretically, the effect of higher inequality on aggregate consumption is ambiguous (see Belabed et al., 2013; Behringer and van Treeck, 2013). If rich households save at higher rates than poor households, it may be expected that increasing (personal) inequality leads to an increase in the aggregate savings rate. Empirically, we do not observe this for the UK and other countries. Rather, prior to the crisis, the income losses of the poor were to a large extent compensated by lower saving and higher debt. The fact that this is not the case for Germany can be attributed to the different nature of income

[4]On the one hand, this downward trend in the investment-to-GDP ratio might be seen as strong relative to other developed economies (e.g. OECD, 2012, p.14). In real prices, this trend can be explained mostly by the development of public and residential investment (Lindner, 2014). On the other hand, the decline in the nominal investment-to-GDP ratio can be explained partly by the decline in the relative price of investment goods. See IMF (2006, p. 142).

[5]Looking at the non-financial corporate sector, European Commission (2014) reports that of the total increase of the sectoral financial balance of 5.7 percentage points of GDP in 2000-2007, 4.8 percentage points were due to higher corporate saving, and only 0.9 percentage points to lower investment spending. In 2007-2012, both investment (-2.4 percentage points) and saving (-2.1) have decreased. Given the increased and continuing uncertainty following the global and euro are financial crises and business cycle conditions, this recent rise in corporate net lending is, however, far less surprising than the increase over the previous peak-to-peak business cycle. In particular, note that the decrease in the investment-to-GDP ratio in 2007-2012 was to a large extent due to negative investment in inventories (-1.2 percentage points of GDP for the total economy, according to the AMECO database).

[6]The World Economic Forum's "Global Competitiveness Report 2013-2014," which analysed more than 100 indicators of competitiveness for 148 countries, ranked Germany fourth. According to the report, Germany especially stands out for its third best infrastructure quality, the sophistication of the business sector, ranking 4th, and its significant market size (5th place). Likewise, German companies are considered to be the third most innovative in the world.

shocks, as well as different institutions and the absence of an Anglo Saxon style debt culture. In Germany, shocks to the functional distribution of income have been dominating while credit demand remains at a relatively low level.

2.3 Credit demand and bank lending

During the decade following the re-unification of Germany, private consumption increased in line with total output, accompanied by a residential investment boom. Since the early 2000s, private household spending has remained on a low level (Figure 2 f) and households have even reduced their leverage (Figure 3 a), while the costs of the recent financial market crisis were mainly borne by the government sector (see the difference between Figures 3 a and 3 b).

Weak consumption spending and private household borrowing have likely been due to a combination of demand-side and supply-side factors. On the demand side, the implementation of reforms to make the labour market more flexible and unemployment and old-age benefits less generous has contributed to the rise in precautionary saving in the context of a production model historically based on firm-specific skills and long-term employment relations (Carlin and Soskice, 2009). On the supply side, the introduction of the euro has reduced the exchange rate risk and intermediation costs for cross-border financial investments within the European Monetary Union. This, together with the subdued credit demand of the private household, corporate and government sectors, has induced banks to increase their foreign net lending at the expense of domestic lending.

Figure 3 c shows that the German capital account has been primarily driven by the balance of other financial transactions, and not by foreign direct investments or investment in securities. This reinforces our view that domestic investment has not been crowded out by foreign investment owing to supposedly unattractive business conditions in Germany. Furthermore, Figure 3 d shows that the balance of other financial transactions has been dominated by bank lending especially to other European Union countries.

3 The model

3.1 Pros and Cons of DSGE Models with Heterogeneous Agents

Heterogeneity among households is a necessary condition to model the macroeconomic effects of income and wealth inequality. In this regard, DSGE models with heterogeneous agents can overcome some of the weaknesses of the representative agent framework. However, without

further changes to the modeling design, such models retain several characteristics which are exposed to justified criticism in the literature. Among the most important to be mentioned are rational expectations[7] and the limited role of effective demand[8].

In our view, the Kumhof et al. (2012) model lacks demand-side effects in two important instances. First, investors do not take into account their sales expectations when deciding on the amount of investment in the physical capital stock. Yet, a decrease in the share of income going to the bottom 95% of households, which are an important source of finance for the largest component of aggregate demand (consumption goods and residental investment), may be linked to over-capacities from the point of view of firms. Second, whenever top income class households decide to use their rising incomes for additional deposits, banks are able to lend the corresponding amount of credit to low income household. But, depending on country-specific institutions and norms, credit demand may be the limiting factor. Albeit in an indirect fashion, we consider such demand-side effects in the next section.

Because household heterogeneity is typically associated with a higher number of state variables, 'with only very few exceptions, dynamic heterogeneous-agent general equilibrium models do not have any analytical solution or allow for the derivation of analytical results' (Heer and Maussner, 2009, p. 338). Indeed, these models, including our model, become difficult to solve and the outcome is sensitive to the numerical solution method applied. This in turn prevents simultaneous changes to several critical characteristics in one model at the same time. In order to illustrate the general trade-off between higher complexity (and more realism) on the one hand and limited solvability on the other hand in DSGE models, we briefly refer to two examples from the literature:

Heer and Maussner (2009) introduce 'a simple heterogeneous-agent model with aggregate certainty' (in Chapter 7). Unlike a standard Ramsey problem, the value function here includes the individual state variables employment status and wealth, (ϵ, a), while for a feasible solution of the model also the distribution of the individual state variables has to be computed and the aggregate consistency conditions must hold. In other words, because households now differ in whether they are employed or not and hence in terms of their wealth, it is not enough to compute

[7]Rational expectations state that market participants are not subject to systematic mistakes in terms of their expectation formation. In contrast to so-called Agent-based Models (ABM), this rules out one source of endogenous fat tails in the distribution of (macro-)economic outcomes.

[8]If households cannot supply the intended amount of labor for reasons usually not captured in a standard DSGE model, the correspondingly lower demand (in our case for consumption goods and residential investment) leads to diminished production and increased unemployment. Hence and in contrast to so-called stock-flow consistent (SFC) models, demand-side effects tend to be underestimated in DSGE models. At least, in our model we emphasize the role of demand-side effects for investment and credit.

the individual consumption and wealth policy functions, $c(\epsilon, a)$ and $a'(\epsilon, a)$. Additionally, one has to look for a good numerical proxy of the household distribution function (assumed to be stationary), as the corresponding density function, $f(\epsilon, a)$, then allows to determine aggregate capital (and labor force). As a possible solution, the authors mention discretization of the distribution function, while concluding that 'it is rather the exception than the rule that (the suggested algorithm) converges' (Heer and Maussner, 2009, p. 346).

Algan et al. (2013) highlight the importance of accuracy tests for models with heterogeneous agents. The authors study several algorithms to solve the model by Krusell and Smith (1998), which in particular complements the model mentioned in the previous paragraph so that it includes aggregate productivity as an additional stochastic driving process (aggregate uncertainty). In general, they conclude: 'Ideally, one would document as well that the results are robust to using a different type of algorithm. ... And generating the same set of results with both a grid and a non-grid method would be a persuasive indication that the generated series are accurate' (Algan et al., 2013, p.35). Even though it could be argued that our model does not feature a continuum, but a finite number of agents, the criticism of a lack of robustification via an alternative solution method at the current stage also applies to our model.

3.2 Incorporating the corporate veil into the Kumhof et al. (2012) framework

We can use[9] the Kumhof et al. (2012) model essentially in its existing form, with some adjustments being made to capture the importance of the 'corporate veil' in the investors' utility function and of the above-mentioned demand-side effects. Investors maximize lifetime utility

$$E_0\left(\sum_{t=0}^{\infty}\left(\beta^i\right)^t\left(\xi_c^{\left(1-\frac{1}{\sigma^i}\right)}\left(\frac{\left(c_t^i\right)^{\left(1-\frac{1}{\sigma^i}\right)}}{1-\frac{1}{\sigma^i}}\right)+\log\left(d_t+\frac{\xi^f}{\xi^d}e_t f_t\right)\right)\right) \tag{1}$$

with respect to the vector $\left(c_t^i, d_t, f_t\right)$[10] subject to their budget constraint given by

$$e_t f_t q_t^* - e_t f_{t-1} + d_t q_t^d - d_{t-1} = r_t^k k_{t-1} + \Pi_t^{bank} - p_t^{cons_i} c_t^i - p_t^{inv}\left(k_t - (1-\delta)k_{t-1}\right), \tag{2}$$

[9] We solve the model in DYNARE++4.3.3 using a third order approximation. Policies are computed as annual log deviations from the steady state (DYN.SS vector generated by DYNARE++). With the exception of financial stock variables, all variables in our model are stationarized and expressed in log-units in the DYNARE++ code. In order to check model consistency, we reverse those transformations, in particular for the steady state solution, and conduct plausibility checks. Using the Kumhof et al. (2012) equations we can reproduce their results and conclude that the model is properly solved. Figures 6 and 8 are similar to the results by Kumhof et al. (2012), but results are not exactly the same as we modified the investors' first order conditions. In particular, we obtain a higher current account deficit by shocking workers' bargaining power.

[10] Both deposits and foreign bonds represent money-in-the-utility components often derived from a bequest motive.

where c^i is investors' consumption, d are investors' deposits, f is foreign bond position in foreign currency, e is the exchange rate and k the capital stock. p variables denote prices while the price of the previous period is here normalized to 1. r^k stands for the rental rate of capital and δ for the depreciation rate.

Investors own both banks and firms and do not receive any income from wages. q is the credit rate and q_t^d denotes the deposit interest rate so that bank profits are given by $\Pi_t^{bank} = d_t \left(q_t^d - q_t\right)$.

Physical capital accumulation is defined by $k_t = I_t + (1-\delta)\, k_{t-1}$, and the amount of period t's investment are exogenized by applying the following autoregressive stochastic processes for both domestic and foreign investments:

$$\begin{aligned} I_t &= (1-\rho)\,\tilde{I} + \rho I_{t-1} + \epsilon_t, \quad \text{with} \quad \epsilon_t \overset{i.i.d.}{} N(0,\sigma), \\ I_t^* &= (1-\rho)\,\tilde{I}^* + \rho I_{t-1}^* + \epsilon_t, \quad \text{with} \quad \epsilon_t \overset{i.i.d.}{} N(0,\sigma). \end{aligned} \tag{3}$$

In contrast to Kumhof et al. (2012) we do not presume in general a constant consumption utility weight, *i.e.* $\xi_c = 1$, but ξ_c is assumed to be a linear function of workers' wage,

$$\xi_c := \xi_c^1 + \xi_c^2 w_t. \tag{4}$$

Calibration of ξ_c^1 and ξ_c^2 according to the composition of the income shock (either linked more to the functional or more to the personal distribution of income) will then allow us to consider country-specific income shock characteristics. Straightforward Lagrangian optimization delivers first order conditions for domestic deposits, foreign bonds, and investor consumption:

$$\begin{aligned} \left(\beta^i\right)^{t+1} E_t\left(\frac{\lambda_{t+1}}{\lambda_t q_t^d}\right) + \frac{\xi^d}{\left(d_t + \frac{\xi^f}{\xi^d} e_t f_t\right)\lambda_t q_t^d} &= 1 \\ \left(\beta^i\right)^{t+1} E_t\left(\frac{\lambda_{t+1}}{\lambda_t}\frac{\frac{e_{t+1}}{e_t}}{q_t^f}\right) + \frac{\xi^f}{\left(d_t + \frac{\xi^f}{\xi^d} e_t f_t\right)\lambda_t q_t^f} &= 1 \\ c_t^i = \left(\frac{1}{\lambda_t^i p_t^{cons}}\right)^{\sigma^i} (\xi_t^c)^{\sigma^i - 1}, \qquad \sigma^i < 1. \end{aligned} \tag{5}$$

At this stage, note that investors do not maximize their utility function with respect to workers' wage, albeit in terms of the ξ_c function this could theoretically help them to optimize total utility. In principle, one leaves perfect foresight behind here and enters into bounded rationality. Investors face a veil they are not able to pierce fully. To be more precise, the reason why to make the consumption utility weight, ξ_c, dependent on workers' income is the composition of our synthetic income shock. Suppose the greater part of the income shock can be attributed to shifts in

the functional distribution of income, while top income shares do not increase proportionally. Such a situation typically describes a high amount of corporate retained earnings. If those earnings are not invested, corporate saving as well as the corporate financial balance as illustrated in Figure 2a will be positive without increasing consumption of corporate owners. In that case ξ_c should not react to the income shock, *i.e.*, investors' consumption demand does not react. ξ_c^2 will be relatively low and ξ_c will remain constant corresponding to a relatively low utility from consumption (Figure 4). The rationale behind this mechanism is the fact that it does make a difference for shareholders' consumption demand whether they obtain virtual capital gains as a result of positive corporate net saving or whether their current income really increases as a result of high bonuses or profit payouts (e.g. Atkinson, 2009). We take the combination of strong increases in corporate disposable income and relatively flat top income shares as an indication that top income class households will not fully pierce the corporate veil and their consumption preference in total should not change a lot.

In contrast, if the greater part of the income shock results from shifts in the personal distribution of income (top income shares), shareholders' consumption is assumed to react more strongly (with a relatively high ξ_c^2 and a relatively low ξ_c as a result of declining wages). In this case higher income will lead to stronger consumption preference as a smaller ξ_c stimulates consumption (Figure 4).

Simultaneously, it is important to explore the role of credit demand. In the model, this analysis is reduced to the question of whether investors prefer deposits (a higher utility weight ξ^d) or foreign bonds (a higher utility weight ξ^f). For the calibration, we will therefore refer to the observed correlation between changes in top income share and household debt. In Anglo-Saxon countries, where shifts in the personal distribution of income dominated, *i.e.*, where top income shares increased dramatically, household debt also went up (Section 2).[11] In that case, a growing credit demand in the logic of the model will be reflected in a higher utility weight of investors' deposits relative to foreign bonds. As investors are the only domestic agents who are involved in international trade, credit demand (the preference of home deposits) can be so strong that they start intermediating credits from abroad to the domestic workers. This corresponds to a situation, in which investors obtain more utility from additional deposits as they lose from the more negative foreign bond position.

[11] We prefer the relative income hypothesis (RIH) incorporating rational consumption emulation as an explanation for the observed difference between income and consumption inequality in Anglo-Saxon countries. In contrast to the RIH, consumption smoothing motives as an explanation typically consider income shocks to be transitory. However, in this paper we stick to the consumption smoothing mechanism just for simplicity and comparability reasons.

In Germany, where shifts in the functional distribution of income dominated, *i.e.*, where top income shares did not increase dramatically, household debt almost remained constant. Correspondingly, the lower domestic credit demand in the logic of the model will be reflected in a lower utility weight of investors' deposits relative to foreign bonds. This effect directly points towards a current account surplus.

All other parts of the model are the same as in Kumhof et al. (2012). For completeness we list the main characteristics here. Workers maximize lifetime utility

$$E_0\left(\sum_{t=0}^{\infty}(\beta^w)^t\left(\frac{(c_t^w)^{\left(1-\frac{1}{\sigma^w}\right)}}{1-\frac{1}{\sigma^w}}\right)\right) \tag{6}$$

with respect to the vector (c_t^w, l_t) subject to their budget constraint

$$l_t q_t = l_{t-1} + p_t^{cw} c_t^w - w_t. \tag{7}$$

l denotes the amount of credit supplied by banks. Production follows a Cobb-Douglas function

$$y_t = A\left(\chi k_{t-1}\right)^{\alpha}\left((1-\chi)\, h_t\right)^{1-\alpha}, \tag{8}$$

where χ stands for the fraction of investors and $(1-\chi)$ for the fraction of workers. Labor supply is set inelastically equal to $h_t = 1$. Following the rationale of the model, one derives the marginal product of labor as given by

$$\frac{\partial y_t}{\partial h_t} =: f_t^h = \frac{(1-\alpha)\, y_t}{(1-\chi)} \tag{9}$$

Labor markets are characterized by a very simple matching process. Specifically, the number of firms and workers is identical and both parties bargain over real wages without any form of centralized information process. Each and every period bargaining is restarted with an outside option of zero (if bargaining fails, no wage will be paid and no output will be produced). Workers' bargaining power is denoted by η. Under certain conditions the Nash bargaining solution will select an outcome that maximizes the product of the individual gains over the discordant wage. If the workers' Lagrange multiplier captures the number of consumption units corresponding to the wage, the target function supposed to be maximized will be the following

$$\underset{\{w_t\}}{MAX} \qquad \left(\lambda_t^w w_t\right)^{\eta_t}\left(f_t^h - w_t\right)^{1-\eta_t} =: G, \tag{10}$$

whereby $\left(f_t^h - w_t\right)$ denotes investors' surplus as the difference between the marginal product of labor and the realized wage. The first order condition delivers

$$\frac{\partial G}{\partial w} \overset{!}{=} 0 \Leftrightarrow \eta_t f_t^h \quad = w_t. \tag{11}$$

Consequently, the bargaining condition states that real wages directly depend on workers' bargaining power determining the share of the marginal product of labor that workers obtain, while the rental rate of capital results from this residually, *i.e.*

$$r_t^k = \frac{y_t - w_t\,(1-\chi)}{\chi k_{t-1}}. \tag{12}$$

Moreover, bargaining power η, which represents our variable of interest for the inequality shock, is assumed to follow an autogressive stochastic process given by

$$\eta_t = (1-\rho)\,\tilde{\eta} + \rho\eta_{t-1} + \epsilon_t \quad \text{with} \quad \epsilon_t^{\eta} \overset{i.i.d.}{} N\left(0, \sigma^{\eta}\right). \tag{13}$$

The aggregate credit bundle that borrowers demand follows a Dixit-Stiglitz form which can be written as follows:

$$l_t = \left(\int_0^1 l_t\,(z)^{\frac{1}{\theta+1}}\,dz\right)^{\theta+1}, \tag{14}$$

whereby θ stands for the elasticity of substitution. Using $\left(\frac{l_t(z)}{l_t}\right)^{\frac{1}{\theta+1}} = \frac{q_t(z)}{q_t}$ and the definition of bank profits, the spread between deposit and credit rate is then given by

$$\frac{1}{q_t} = \frac{1}{q_t^d}s, \tag{15}$$

while it is assumed that the spread also follows an autogressive stochastic process given by

$$s_t = (1-\rho)\,\tilde{s} + \rho s_{t-1} + \epsilon_t, \quad \text{with} \quad \epsilon_t \overset{i.i.d.}{} N\left(0, \sigma\right). \tag{16}$$

The spread represents our variable of interest for shocks to the financial system (UK reinforcing financial liberalization and Germany joining the monetary union).
Trade technologies for I_t, c_t^i, c_t^w, are also assumed to be of the Cobb-Douglas type, *i.e.*,

$$I_t = \left(I_t^h\right)^{\gamma_I}\left(I_t^f\right)^{1-\gamma_I}, \qquad c_t^i = \left(c_t^{ih}\right)^{\gamma_{c^i}}\left(c_t^{if}\right)^{1-\gamma_{c^i}}, \qquad c_t^w = \left(c_t^{wh}\right)^{\gamma_{c^w}}\left(c_t^{wf}\right)^{1-\gamma_{c^w}}, \tag{17}$$

while prices for each of the goods only depend on the size of the home bias for domestic production, γ, and on the exchange rate. For instance, prices for domestic investment goods are given by

$$p_t^{inv} = \gamma_I^{-\gamma_I}\left(1-\gamma_I\right)^{-(1-\gamma_I)} e_t^{1-\gamma_I}. \tag{18}$$

Foreign agents maximize lifetime utility

$$E_0\left(\sum_{t=0}^{\infty}(\beta^*)^t\left(\left(\frac{(c_t^*)^{\left(1-\frac{1}{\sigma^*}\right)}}{1-\frac{1}{\sigma^*}}\right)+\xi_f^*\log\left(\kappa_f^*+f_t^*\right)\right)\right) \tag{19}$$

with respect to the vector (c_t^*, f_t^*) subject to the budget constraint

$$f_t^* = f_{t-1}^* + r_t^{k^*} k_{t-1}^* + w_t^* - p_t^{cons^*} c_t^* - p_t^{inv^*} I_t^*, \tag{20}$$

where $*$ denotes the variables from the foreign perspective. The representative agent assumption is maintained for the foreign sector. Like in the domestic economy, production process and trade technology follow a Cobb-Douglas form. w represents the size of the domestic economy relative to the rest of the world. Hence, domestic and foreign GDP identities are given by

$$wy_t = w\chi\left(c_t^{ih} + I_t^h\right) + w\left(1-\chi\right)c_t^{wh} + \left(1-w\right)\left(c_t^{h^*} + I_t^{h^*}\right) \tag{21}$$

$$\left(1-w\right)y_t^* = \left(1-w\right)\left(c_t^{f^*} + I_t^{f^*}\right) + w\chi\left(c_t^{if} + I_t^f\right) + w\left(1-\chi\right)c_t^{wf}. \tag{22}$$

Credit amounts lent by domestic investors to domestic workers must be equal to the bank deposits (domestic bank balance identity)

$$\chi d_t = \left(1-\chi\right)l_t. \tag{23}$$

International credit amounts must find their offsetting item, while all credit transactions are intermediated by domestic investors (foreign bank balance identity)

$$w\chi f_t = -\left(1-w\right)f_t^*. \tag{24}$$

Finally, net exports (from domestic perspective) must be equal to the corresponding financial flows

$$\begin{aligned} w\chi\left(e_t f_t q_t^f - e_t f_{t-1}\right) &= \left(1-w\right)\left(c_t^{h^*} + I_t^{h^*}\right) - w\left(\chi\left(c_t^{if} + I_t^f\right) + \left(1-\chi\right)c_t^{wf}\right)e_t \\ \Leftrightarrow \chi e_t f_t q_t^f &= \chi e_t f_{t-1} + \frac{\left(1-w\right)}{w}\left(c_t^{h^*} + I_t^{h^*}\right) - e_t\left(\chi\left(c_t^{if} + I_t^f\right) + \left(1-\chi\right)c_t^{wf}\right). \end{aligned} \tag{25}$$

4 Simulations

4.1 Calibration

We analyse the effects of three shocks: Firstly, we reduce workers' bargaining power, η, so as to match the observed change in income distribution. For this purpose, we calculate an adjusted investors' income share by using information on the top household income share in total household income and the corporate income share in total private income. The adjusted investors' income share, $Y_{adj.}^5$ is calculated in the following way:

$$Y_{adj.}^5 = \left(Y_{WTID}^5 Y^{HH} + Y^F\right) / \left(Y^{HH} + Y^F\right) \tag{26}$$

where Y^5_{WTID} is the top 5% income share obtained from the WTID, Y^{HH} is the net disposable income of the private household sector obtained from the national accounts (AMECO), and Y^F is the net disposable income of the corporate sector. Depending on the starting point, we obtain an increase of the adjusted top 5% income share of 6.1 (1998-2007) to 8.8 (1995-2007) percentage points for Germany. In Kumhof et al. (2012), the simulated bargaining shock of -11.4% for the U.K. yields an increase in the top 5% income share of about 9 percentage points after 20 years. Hence, in order to make simulations comparable by applying the same simulation period for both the UK and Germany[12], we use the same inequality shock as Kumhof et al. (2012) for the UK scenario and a bargaining shock of -8.8% over 20 years for the German scenario.

Secondly, we shock the banking spread, s, in order to consider important changes to the financial system. In order to map the ongoing process of financial liberalization in the UK scenario, we presume that the banking spread declines by 25 base points over 10 years. As credit rates display inertia in the model, the rationale behind a negative spread shock is that deposit rates and credit supply increase. By contrast, in the Germany scenario we increase the banking spread (50 base points over 10 years) corresponding to lower exchange rate costs of German bank lending. As a consequence, deposit rates and domestic credit supply decrease, while domestic credit demand is weak.[13]

Thirdly, we also run scenarios in which we generate current account positions for Germany (UK) stemming from shocks to capital accumulation that are similar in size as those obtained from the inequality shocks. The corresponding shocks to foreign investment (domestic investment) add up to 1% (6%) over ten years relative to baseline. We will conclude from this analysis that empirically investment dynamics are not the main driver of the German persistent current account surplus and of the British deficit.

While most of the parameters refer to standard values taken from the literature (respectively they are identical to those already used by Kumhof et al. (2012)), in five cases - besides ξ_c already dealt with in detail above - parameters are set to obtain observable ratios from national accounts data. First, investment $\tilde{I}, \tilde{I}^*$ is calibrated to obtain constant investment-to-GDP ratios of 17.5% (UK) and 19.5% (GER), which works very well and is close to the sample average for 1991 - 2007. Second, the home bias for investment goods aims at 1991 investment goods

[12]We are roughly aiming at a simulation period 1991 - 2007. In general, a strong and highly persistent increase of inequality (defined by both the functional and the personal distribution of income) could already be observed in many countries since the 80s. Of course, there are country-specific characteristics, like the German re-unification, overlapping the basic inequality dynamics. The increase in the top 5% WTID income share for the U.S. was about 11.7 percentage points in 1983-2008, which is the period used in Kumhof and Ranciere (2010).

[13]This is one example of how to translate a demand-side effect into a supply-side effect so that after all the effect can be incorporated into the DSGE model.

imports-to-GDP ratios of 7% (UK) and 12% (GER). Despite all efforts, our steady state solution underestimates the level of these ratios, while we correctly obtain a significantly larger ratio for Germany as compared to the UK. Third, the home bias for workers' and investors' consumption goods aims at a 1991 consumption goods imports-to-GDP ratio of 6% for both countries. Again, we underestimate these ratios, while the country-to-country relation is realistic so that in both cases the resulting value is almost identical. Fourth, parameters $\xi_f, \xi_{f^*}, \kappa_{f^*}$ are set to obtain a net-foreign-asset-to-GDP ratio of -8% for the United Kingdom, which corresponds to the 1991 observation. For Germany we aim at a ratio of 7%. Despite all efforts, our steady state position overestimates this value. Fifth, calibration for ξ_d aims at a 1991 debt-to-income ratio of 110% (90%) for the UK (Germany). While our steady state solution overestimates this level for the UK, it underestimates it for Germany.

The relative country size w is set to 4.5% (6.5%) of world GDP for the UK (Germany) based on World Bank data. Following Kumhof et al. (2012) the population size of investors is equal to 5%. In Table 1 we list all parameters and data sources involved in the calibration of the model.

4.2 Increased inequality without changes to the financial system

4.2.1 Germany inequality scenario

Figure 5 presents the simulation output for Germany showing the effects of a decline in workers' bargaining power over 20 years, where the larger part of the inequality shock derives from the functional distribution of income (a relatively low ξ_c^2). The decline in the bargaining power directly leads to a real wage drop of about 7% relative to baseline at the end of the shock period, while the rental rate of capital residually increases by more than 15%. As a result of higher income, investors' consumption increases by more than 40% relative to the baseline calibration at the end of the depicted impulse response function. The ongoing increase in investors' consumption, after the bargaining power shock has run out, is due to the fact that workers' leverage has risen in the meantime so that workers' debt service secures additional investors' income for some extra periods until all variables return to the steady state level.

In this scenario, neither changes to domestic nor to foreign investment take place. Workers' consumption declines because of the real wage drop but not proportionally as workers use credit to partly compensate for the income losses. But note that the increase in workers' leverage (up to 110% at the end of the depicted simulation period) is lower than in the British case (above 150% at the end of the period). This can be traced back to the higher ξ_f-ξ_d ratio reflecting relatively low credit demand in Germany. Given the missing domestic credit demand, investors start buying

foreign bonds so that the current account turns into a surplus and the net-foreign-asset position rises. At the same time (in the model rather implicitly), there is enough foreign demand for domestic goods so that the additional domestic credit and goods supply matches foreign demand. At the peak of the simulation period, the top 5% income share (representing both top household income and corporate retained earnings) has risen up to more than six percentage points. This is much more than the observed increase of the top 5% income share (Figure 1), but in line with our synthetic income shock including corporate retained earnings.

4.2.2 UK inequality scenario

Figure 6 depicts the simulation output for the United Kingdom for a decline in workers' bargaining power over 20 years, where the larger part of the inequality shock derives from the personal distribution of income (a relatively high ξ_c^2). The results are similar to those already found by Kumhof et al. (2012). Higher credit demand (a lower ξ_f-ξ_d ratio) leads to a higher workers' leverage. Investors even start intermediating loans from abroad to domestic workers so that the current account turns into a deficit and the net-foreign-asset position declines. At the same time, there is enough domestic demand for foreign goods as credit is largely used to compensate the income losses so that consumption goods imports remain stable and foreign goods supply matches domestic demand. At the peak of the simulation period, the top 5% income share, in this scenario representing mostly the income of rich households (rather than corporate income), has risen up to more than seven percent, which is in line with UK data from the World Top Incomes Database.

4.3 Increased inequality accompanied by changes to the financial system

4.3.1 Germany joining the monetary union

Figure 7 depicts additional simulation output for Germany. Here, in addition to the income distribution shock from the previous scenario (Figure 5) domestic bank spreads are shocked positively (+50 base points over ten years). Following Kalemli-Ozcan et al. (2010), 'the euro's impact on financial integration is primarily driven by eliminating the currency risk.' Accordingly, we use the banking spread shock to take into account Germany's joining the European Monetary Union roughly ten years before the financial crisis. Indeed, German bank lending margins with creditors in other euro are member states increased as credit rates did not decrease proportionally, while it was no longer necessary to consider the exchange rate risk costs in the margin calculation. In the model, the transmission mechanism of an increasing banking spread is as follows:

Deposit rates decrease, while credit rates remain almost constant. As a consequence, domestic deposits and hence domestic credit supply (given the low domestic credit demand) become less appealing. Instead, the volume of foreign bond transactions (lending abroad) increase so that the domestic household leverage becomes less pronounced, while the resulting current account surplus becomes more pronounced.

4.3.2 Financial liberalization in the UK

Figure 8 presents the simulation output for the United Kingdom. Here, in addition to the scenario illustrated in Figure 6 domestic bank spreads are shocked negatively (-25 base points over ten years). Following Kumhof et al. (2012), 'this is a simple representation of UK financial liberalization ...'. To be more precise, we connect financial liberalization (as a supply-side argument) with the dramatic increase in British household leverage. In the model, the transmission mechanism of a decreased banking spread is as follows: The deposit rate increases slightly, while the credit rate remains almost constant (compare the difference between the corresponding plots in Figures 6 and 8). As a consequence, domestic deposits and hence credit supply (given the high domestic credit demand) become more appealing. Thus, not only domestic but also foreign credit supply intermediated by the domestic investors and hence the increase in household leverage become more pronounced. So does the current account deficit.

Finally, it is worth mentioning that among the considered shocks the model is most sensitive to changes in the financial system (structural banking spread shocks). However, in this paper we mainly focus on macroeconomic effects of rising income inequality. What we find is that, given the observed changes in income distribution, structural changes like the start of the European Monetary Union and financial liberalization produce amplifying effects. It certainly goes beyond the scope of this paper to analyse those structural events in detail.

4.4 Robustification analysis: Investment dynamics as an alternative explanation of current account imbalances?

In all previous scenarios we abstracted from changes in physical capital formation. By contrast, some economists argue that real investment dynamics are the main driver of current account imbalances, see Section 4.5 and in particular Footnote 12. In order to robustify our results, we run scenarios in which we generate current account positions from investment shocks for Germany and the UK that are similar to that obtained from the inequality shocks. We then consider whether the size of those shocks that is necessary to produce these results is realistic.

Figure 9 presents simulation output for Germany resulting from a one percent increase in foreign (rest of the world) investment over ten years. At the peak of the depicted impulse response the effect on the current account is very similar to the evolution in Figure 5. So far, it may sound plausible that investment dynamics relative to changes in income distribution may have a comparably large influence towards current account imbalances worldwide. But, if this was so, we should also be able to explain a similar part of the British deficit in pre-crisis time.[14] Before running such a scenario it is worth mentioning that by definition over 90% of the rest-of-the-world perspective are the same for Germany and the UK. That means we have to apply a positive foreign investment shock up to almost the same amount also for the UK scenario.

Figure 10 presents simulation output for the UK, in which a similar current account deficit evolves as in Figure 6, but this time as a consequence of investment shocks. In order to obtain such a result, it is necessary to positively shock domestic investment by six percent cumulated over ten years relative to baseline. This corresponds to a one percent increase in the British investment-to-GDP ratio. But as illustrated in Figure 2, this tendency matches in no way the empirically observed downward trend in the data. Moreover, from a sales expectations perspective, it does not seem likely that companies extend productive capacities when at the same time most of the consumers are subject to persistent real income losses. We conclude from this analysis that real investment dynamics are not a main driver of persistent current imbalances worldwide.

4.5 Policy Implications

Some observers have argued that absent political interventions in international capital flows, the German current account surplus will shrink automatically and Germany will experience a domestic demand boom in the decade to come (Sinn, 2013). The explanation for this view is that German savings will no longer be invested in crisis-burdened current account deficit countries but rather in the domestic economy.[15] However, five years after the beginning of the eurozone crisis such a response with a significant reduction of Germany's current account surplus cannot be observed. A more healthy development would be for the corporate sector to increase its demand for productive investment and to move back into a net borrowing position again (after

[14] Note the main features of the British case - rising income inequality, rising household debt and widening current account deficits - also apply for other Anglo-Saxon countries in pre-crisis time - most prominent to the US, see Behringer and van Treeck (2013) for a panel analysis.

[15] "After years of extensive and excessive capital exports to the southern countries, investors from the north now have realized their mistake and look more towards investment in the home harbor. This is the reason for the investment and property boom that Germany has experienced since the summer of 2009 and that has accorded it an above-average growth rate since then." (Sinn, 2013, pp.15-16).

more than a decade of corporate financial surpluses). The question, however, is where sufficient private demand is to come from in the future that would justify permanently higher corporate investment. It would be short-sighted to rely on a domestic demand boom driven primarily by credit-financed consumption of lower and middle income households, similar to the developments that led to the household debt crises in the United States or United Kingdom. Hence, we argue that there is no alternative to addressing the issue of income inequality out front, since ultimately investment, which enhances productive capacity, needs to be backed by adequate consumer spending that has to be financed through adequate purchasing power of the middle and bottom income class households.

5 Conclusion

This paper explores reasons and transmission channels for the persistent German and British current account imbalances. In order to distinguish between functional and personal income distribution effects, we incorporate the so-called *corporate veil* into investors' utility function proposed by Kumhof et al. (2012) while keeping their household separation into workers and investors. This approach certainly leads us to the limits of modeling heterogeneity in a DSGE framework.

On the one hand, we can confirm the results from previous work which found a link between rising personal income inequality and current account deficits, *ceteris paribus.* On the other hand, we find that changes in functional income distribution in favor of the corporate sector can contribute to a current account surplus position, *ceteris paribus.* In this sense, our results support the hypothesis of rising income inequality being one source of generating financial fragility and global macroeconomic instabilities.

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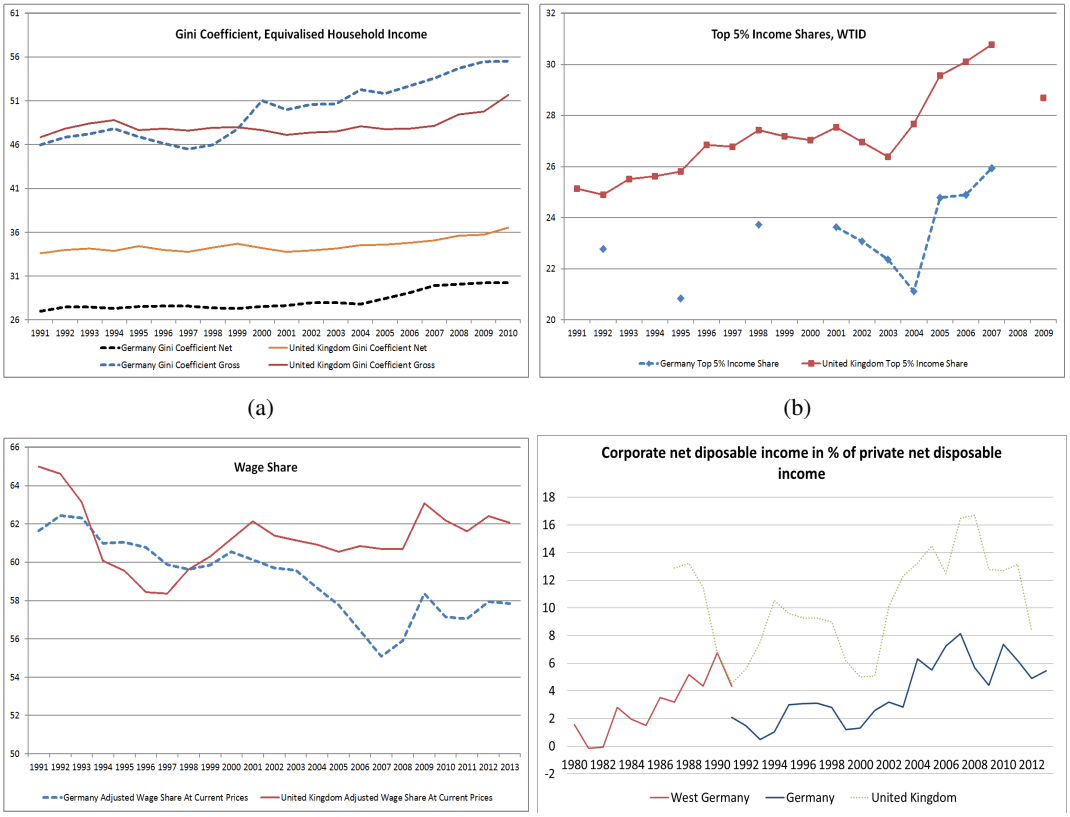
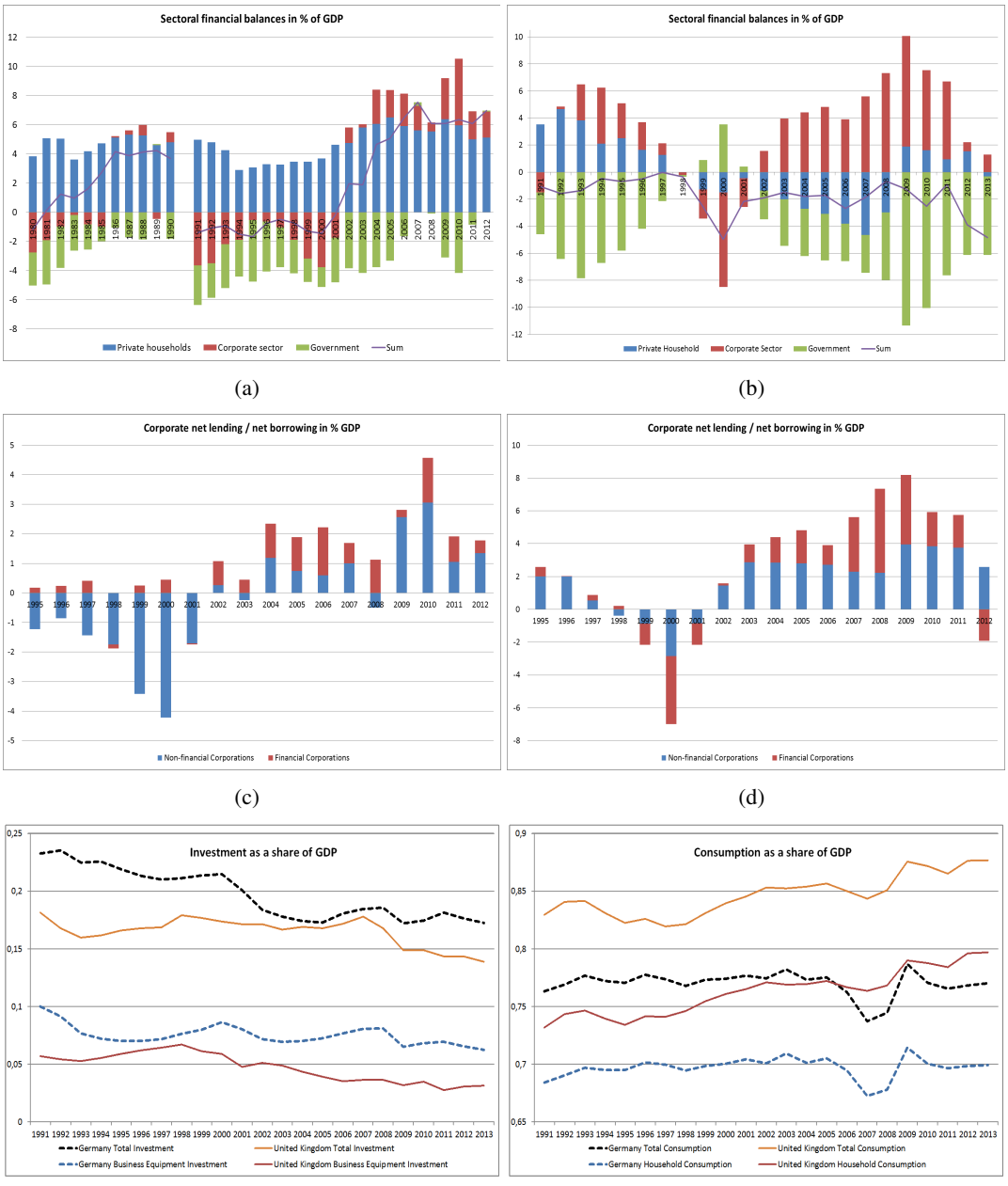


(a) (b)

(c) (d)

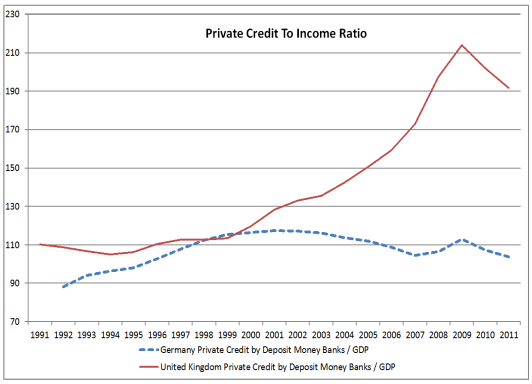
Sources: OECD (Gini), WTID (Top income share), AMECO (Corporate net disposable income).
Note: Top income shares include capital gains.

Figure 1: Measures of income inequality

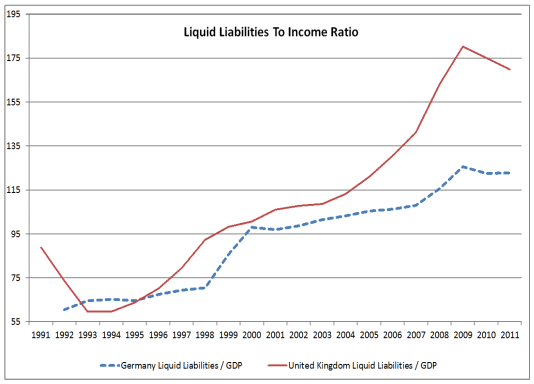


Sources: AMECO, Eurostat (Non-financial Corporations).
Note: Subfigure (a) and (c) GER, (b) and (d) UK.

Figure 2: Sectoral financial balances and components of GDP by expenditure



(a)



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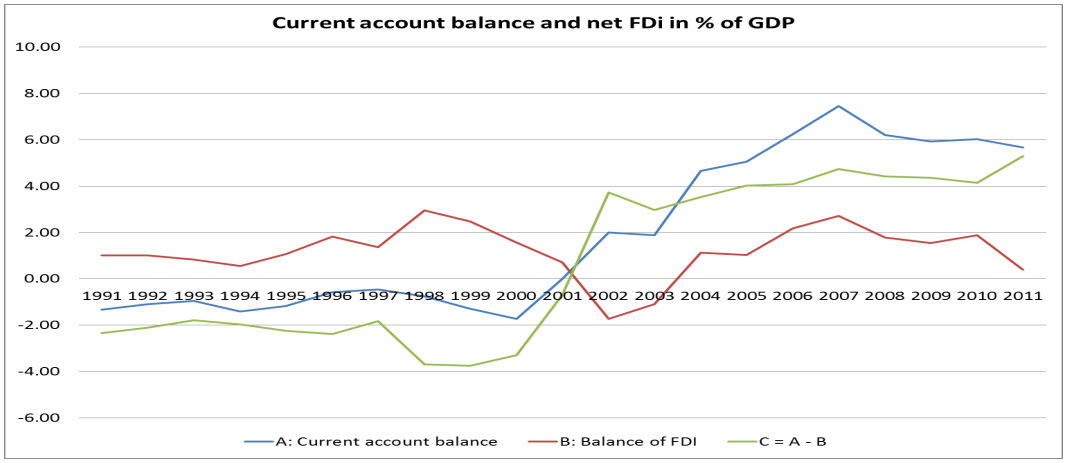
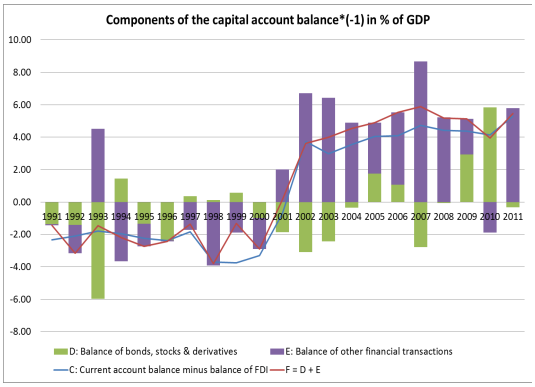
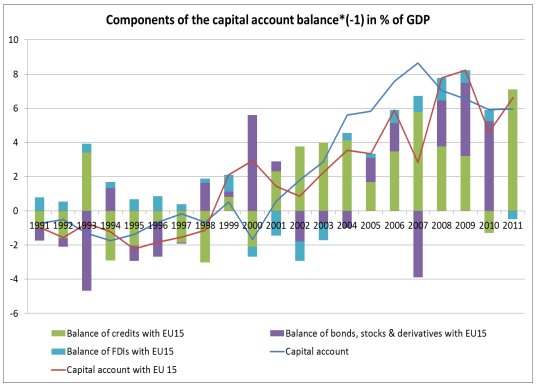


(c)



(d)



(e)

Sources: World Bank (Financial Development and Structure Data Set), Bundesbank, Destatis. Subfigure (c) to (e) decompose the capital account balance of Germany.

Figure 3: Indebtedness and capital account balance

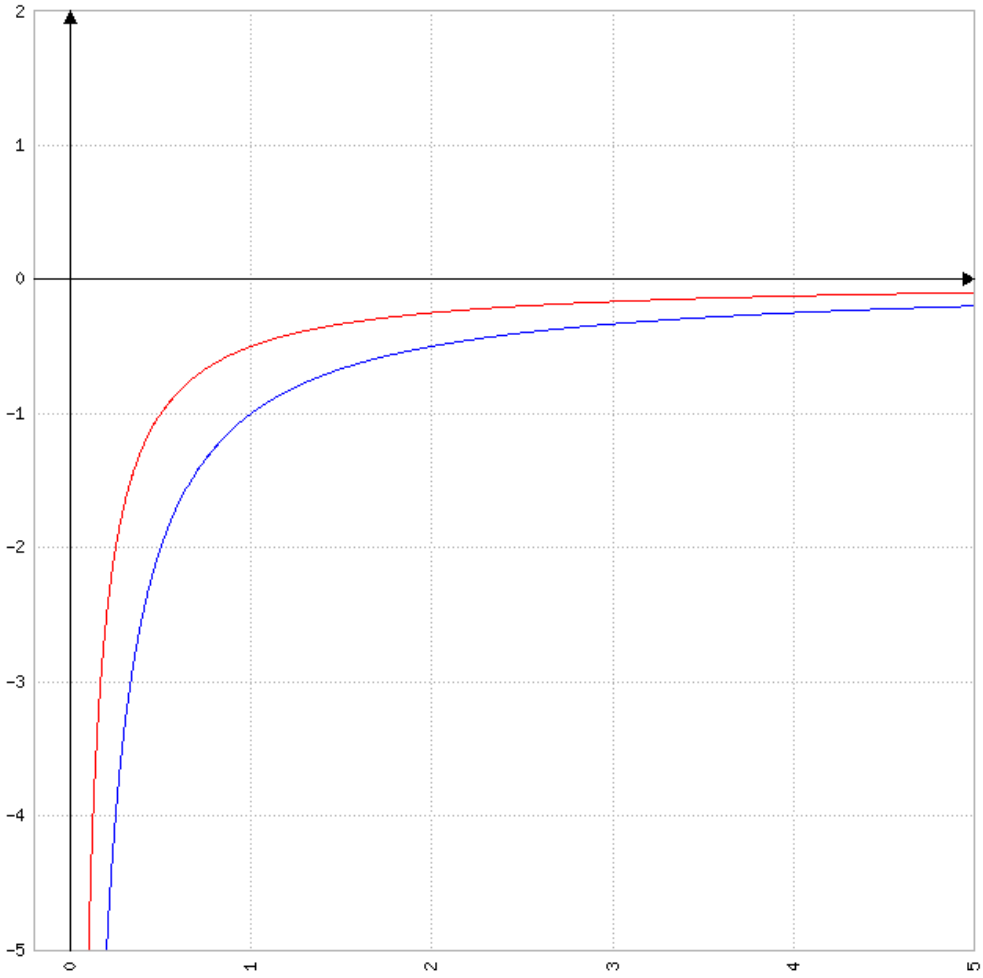


Figure 4: The figure plots utility (y-axis) over consumption (x-axis) with baseline ξ_c (blue line) and a smaller ξ_c (red line). The consumption part of the period utility and its margin are described by: $U_t = \frac{(\xi_c c_t)^{1-\frac{1}{\sigma_i}}}{1-\frac{1}{\sigma_i}}$ and $U'_t = \xi_c^{1-\frac{1}{\sigma_i}} c_t^{-\frac{1}{\sigma_i}}$. With $\sigma_i = 0.5$, we obtain: $U_t = -(\xi_c c_t)^{-1}$, $U'_t = \xi_c^{-1} c_t^{-2}$. Period utility is increasing in consumption (see blue line). The utility level is always negative but for a greater level of consumption it becomes less negative. Here, it is not important that the level is negative as we just need an ordinal scaling so that utility is separable in consumption. Finally, with a smaller ξ_c (red line), we obtain an increasing effect on utility.

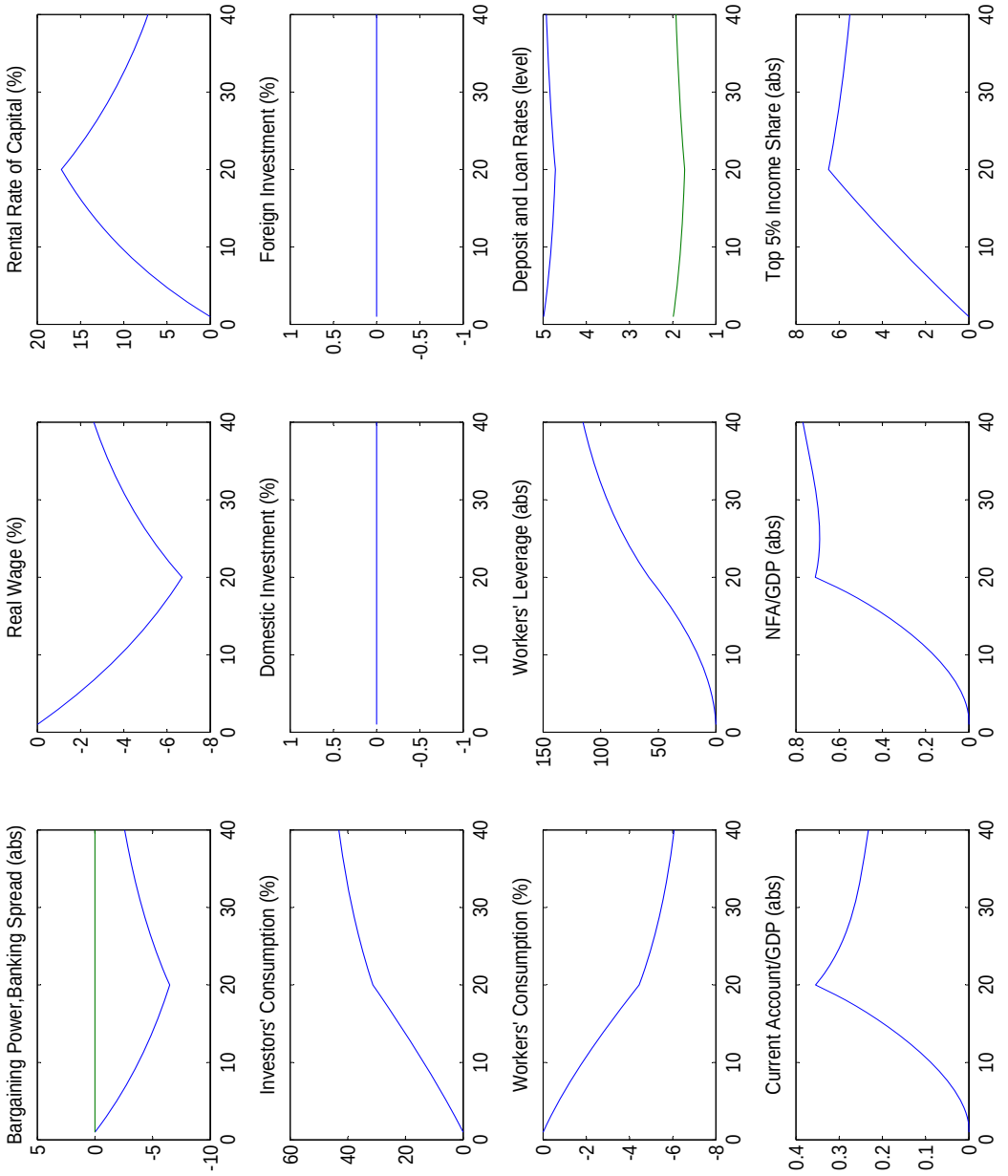


Figure 5: Germany scenario I: Inequality dominated by shifts in the functional income distribution.

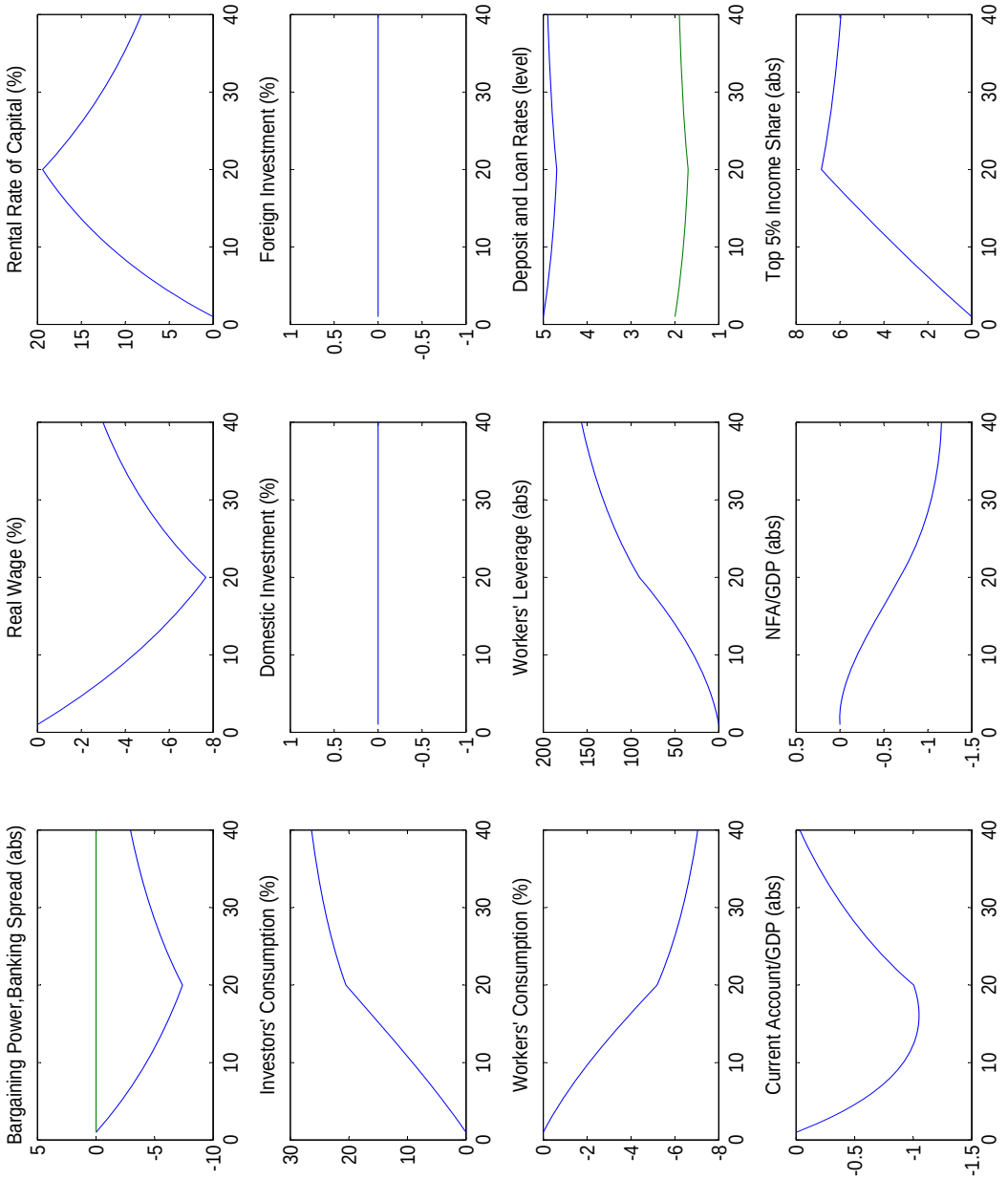


Figure 6: UK scenario I: Inequality dominated by shifts in the personal income distribution.

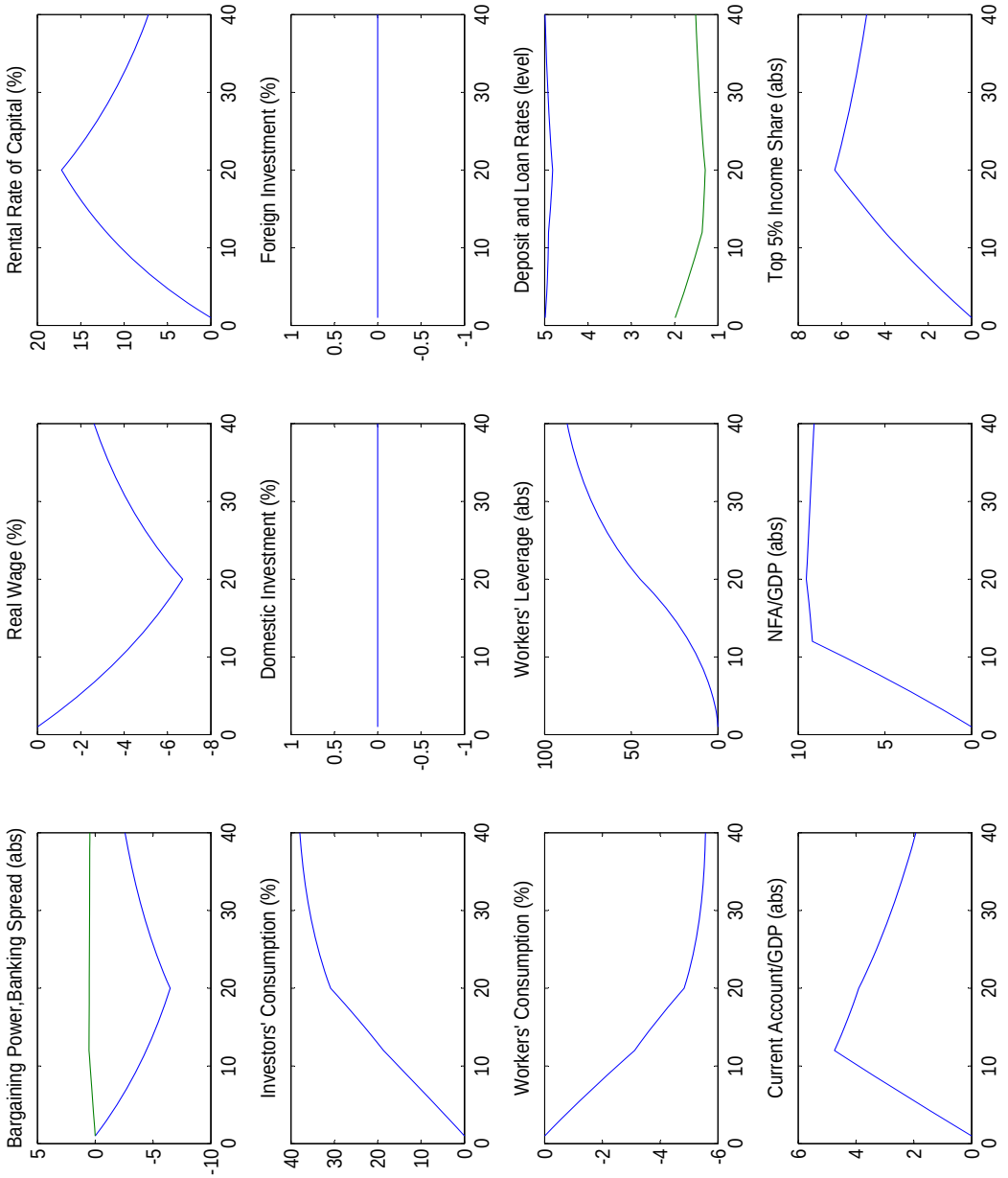


Figure 7: Germany scenario II: Inequality dominated by shifts in the functional income distribution accompanied by an increasing banking spread (Germany joining the monetary union).

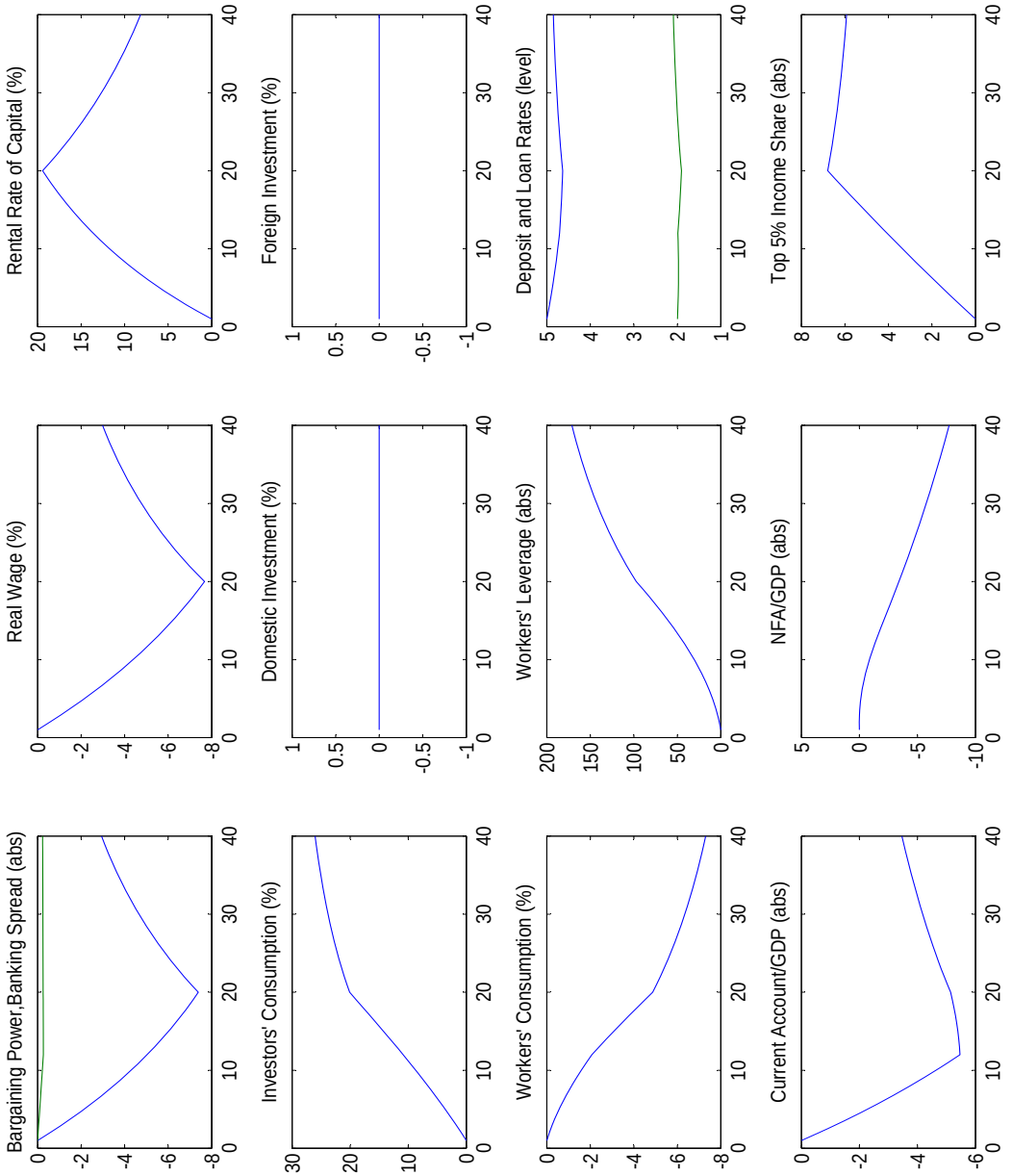


Figure 8: UK scenario II: Inequality dominated by shifts in the personal income distribution accompanied by a decreasing banking spread (UK liberalizing financial markets).

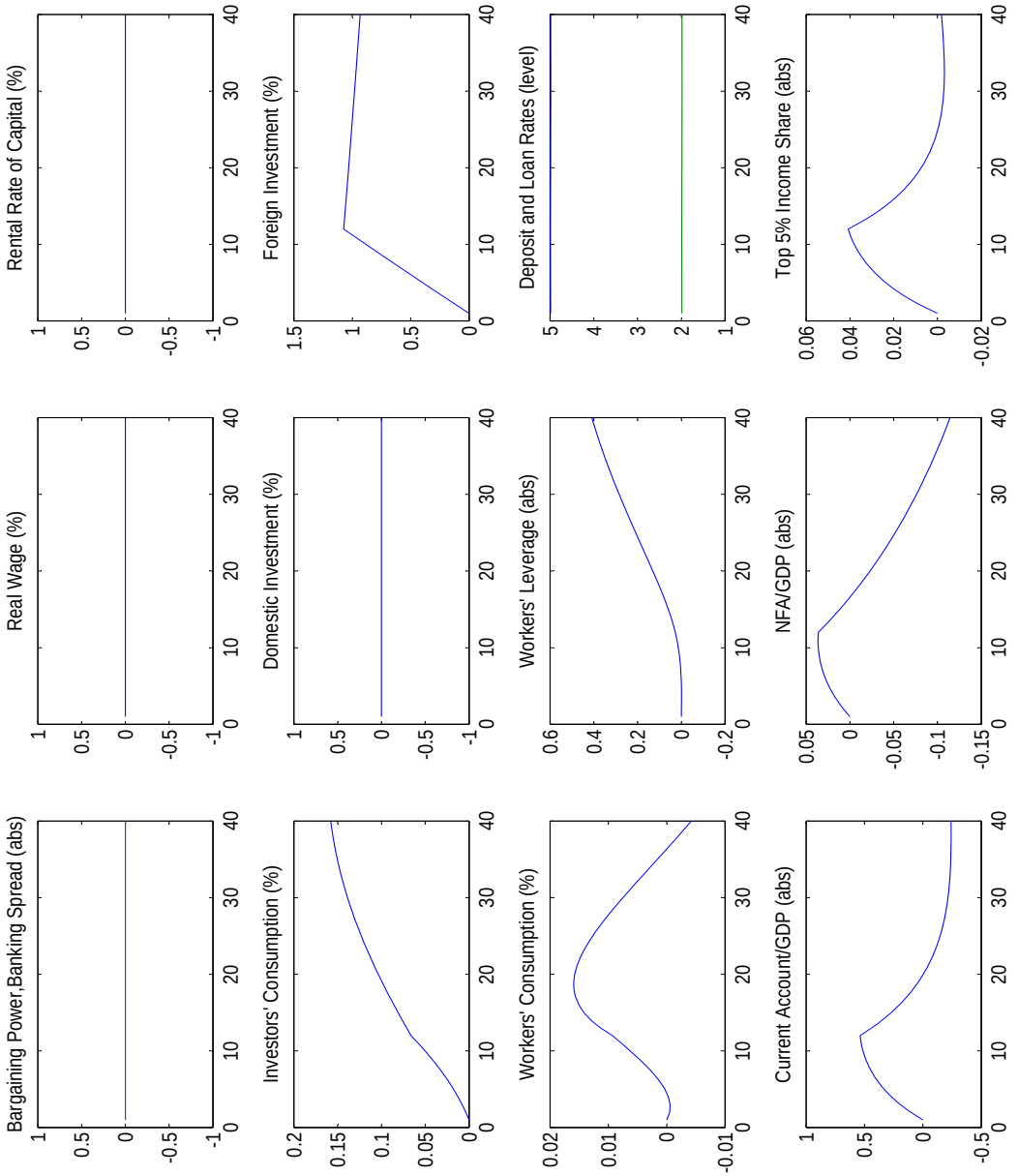


Figure 9: Germany robustification scenario: A current account surplus similar to Germany scenario I arises after a positive shock of foreign investment. Note that over 90 % of the rest-of-the-world dynamics must be the same for both robustification scenarios.

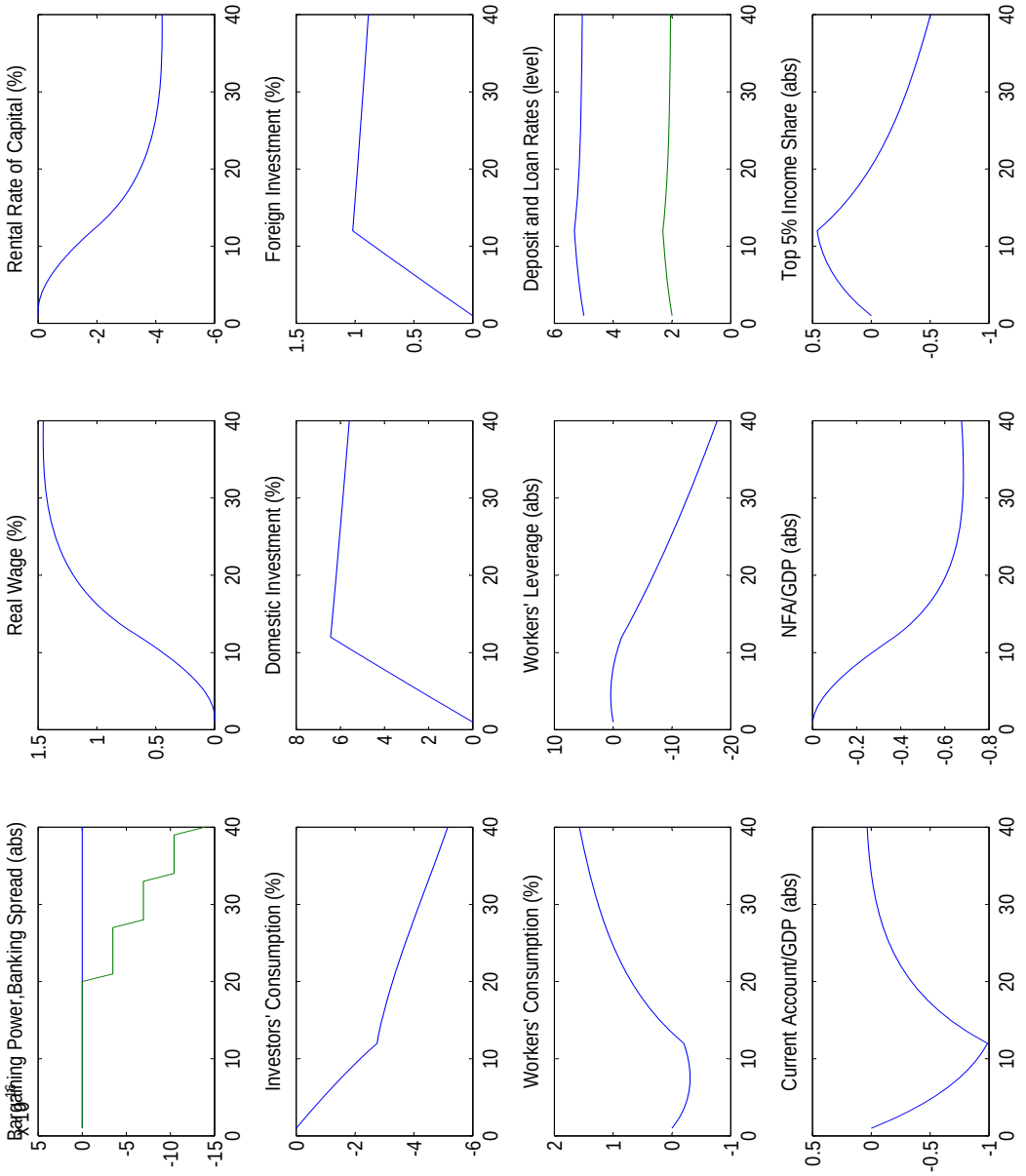


Figure 10: UK robustification scenario: A current account deficit similar to UK scenario I arises after a positive shock of domestic investment. Note that over 90 % of the rest-of-the-world dynamics must be the same for both robustification scenarios.

Parameter	Definition	UK value	GER value	Source	Description
β^i, β^*	Time Preference Home Investor and Foreign Agent	0.9	0.9	Kumhof(2012)	Standard value from the literature. Investors are assumed to be less time risk averse than workers.
β^w	Time Preference (Discount Rate) Home Worker	0.9525	0.9525	Kumhof(2012)	Standard value from the literature.
$\sigma_i, \sigma_w, \sigma_*$	Intertemporal Elasticity of Substitution All Agents	0.5	0.5	Kumhof(2012)	Standard value from the literature.
ξ_f	Utility Weight of Home Investors' Foreign Bonds	0.1304	0.1454	AMECO	Calibration aims to obtain an initial (1991) net foreign asset to GDP ratio for UK -8%, GER 7%
ξ_f^*	Utility Weight of Foreign Agents' Bond Position	0.0939	0.0939	Kumhof(2012)	
ξ_d	Utility Weight of Home Investors' Deposits	0.1854	0.1650	AMECO	Calibration aims to obtain the 1991 debt-to-income ratios for UK 110%, GER 90%.
ξ_c^1, ξ_c^2	Utility Weight of Home Investors Consumption	0.42, 0.30	0.65, 0.05	AMECO, WTID	Calibration takes into account the decomposition of the income shock.
κ_{f^*}	Utility Addon of Foreign Capital Stock	1.04	1.02	Kumhof(2012)	See modality for ξ_f, ξ_{f^*}.
$\bar{\eta}, \bar{s}$	Steady State Bargaining Power and Banking Spread	1, 0.029	1, 0.029	Kumhof(2012)	Standard values from the literature.
$\rho_\eta, \rho_s, \rho_I, \rho_{I^*}$	Persistence of Shocks	0.9995	0.9995	Kumhof(2012)	Shocks are supposed to be highly persistent.
$\exp\left(\bar{I}\right), \exp\left(\bar{I^*}\right)$	Steady State Domestic and Foreign Investment	2.64, 0.19	3.94, 0.19	AMECO	Calibration aims to obtain average investment-to-GDP ratios: UK 17.5%, GER 19.5%.
χ	Population Share of Home Investors	0.05	0.05	WTID	Investors are supposed to represent top5% income shares.
ω	Home Country Size	0.045	0.065	WDI	World GDP weights.
δ, δ^*	Home and Foreign Depreciation Rate	0.1	0.1	Kumhof(2012)	Standard value from the literature.
A, A^*	Home and Foreign Productivity	1.08, 0.82	1.08, 0.82	Kumhof(2012)	Values are used as a scale factor to normalize the economies' output.
α	Home output elasticity of capital	0.2568	0.2582	AMECO	Standard value from the literature.
α^*	Foreign output elasticity	0.3003	0.3003	Kumhof(2012)	Standard value from the literature.
γ_c^*, γ_i^*	Home Bias for Foreign Agents' Goods	0.9966	0.9966	Kumhof(2012)	Given the relative size, values are set close to 1.
γ_c^i, γ_c^w	Home Bias for Home Agents Consumption Goods	0.9453	0.9893	AMECO	Calibration aims to obtain initial consumption goods imports-to-GDP ratios: 6% (both UK and GER)
γ_i	Home Bias for Home Investment Goods	0.8853	0.8953	AMECO	Calibration aims to obtain initial investment goods imports-to-GDP ratios: 7% (UK), 12% (GER)

Table 1: Parameterization of the model. AMECO stands for the Annual Macro-Economic Database from the European Commission, WTID for the World Top Income Database from the Paris School of Economics and WDI for the World Development Indicators from the World Bank. All other values are taken from Kumhof et al. (2012). Initial values aim at 1991 observations to avoid the structural break with German reunification.

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