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Challenges for Europe in the world, 2030

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Challenges for Europe in the world in 2030

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EUROPEAN WELL-BEING SCENARIOS BASED ON AN ECONOMETRIC MODEL

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Abstract. This paper describes the methodology and results of a long-term simulation exercise focusing on selected well-being (WB) measures for five European areas. Health, education, living standards, social inclusion and employment measures are considered, along with poverty and income inequality indicators. The projections are obtained using an econometric model developed as a specific module of the AUGUR's CAM version, relating WB indicators to a set of demographic, macroeconomic and public finance drivers. The simulations consider four alternative European scenarios (E1-E4) implemented in the CAM according to the AUGUR project's goals, and two WB module-specific scenarios, in which i) the effects of the ongoing fiscal consolidation processes is highlighted by strengthening the role of the public finance variables in WB drivers' equations (fiscal dominance – FD); ii) a different composition of Welfare expenditure is considered in order to evaluate the possibility of mitigating the WB effects of the European austerity measures.

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1. Introduction

The main goal of this contribution is to provide a methodology for long-term simulations of Well-being (WB) drivers and measures under alternative demographic, macroeconomic and institutional hypotheses. The proposed methodology has been developed within the FP7 *AUGUR – Challenges for Europe 2030* project, in which different economic, social, environmental and governance issues are analyzed under the common perspective of the CAM projections[2].

The basic assumption of the approach is that future developments in WB and living conditions in Europe depend on the historical, economic and social evolution of the single countries and on the ongoing and future changes in European welfare and social protection systems, whose services and monetary provisions, together with the economic evolution, are among the main determinants of well-being.

The present economic crisis and the difficulties and hesitations experienced so far in its management both at the country and at the European levels rule out the viability of a single perspective analysis of the ongoing and future changes. For this reason, the possible future WB trajectories are investigated by assuming a scenario approach. More specifically, ongoing trends in European WB and welfare systems are described by internally consistent hypotheses on some key demographic, macroeconomic and public finance factors. These scenarios provide the necessary information on the possible direction of the future changes in social conditions and on their consistency with the declared goals of the European construction since the Lisbon Treaty.

Consistently with the project's general approach, four variant scenarios are specified for Europe. The first (E1), which is defined within the global "reduced government" scenario, assumes that the European countries will continue to "struggle on" without relevant modifications in the general policy conduct and particularly in monetary and fiscal arrangements. The second European scenario (E2), whose global collocation is again the "reduced government", considers the EMU and thus the EU break-ups. The third and fourth scenarios are defined within the global "regionalization" scenario and assume – respectively - a multi-speed solution for Europe (E3), i.e. a "managed" break up

[2] F. Cripps and N. Khurasee, 2008, Cam Model of the world economy. www.augurproject.eu

leading to specific monetary areas, and the convergence towards a Federal Europe (E4), characterized by a relevant increase of the federal budget consistent with the idea of a "transfer union".

Historical developments and conjectured future institutional and economic trends thus form the informative basis of the WB simulations. The basic idea behind the methodological approach adopted in this analysis is that, once a set of potentially relevant WB drivers are identified and formally related, on the one hand, to demographic and macroeconomic variables and, on the other, to WB measures, long-term CAM forecasts can be used to obtain long-run projections of WB outcomes under the alternative scenarios.

Once the relations linking WB drivers to CAM's variables and WB measures are specified and estimated, an econometric WB module is implemented and simulated conditional on the CAM macroeconomic projections and the WB module-specific hypotheses.

The analysis considers five European areas, the eastern (EUE), the northern (EUN), the southern (EUS), the western (EUW) and the United Kingdom (UK). Four major WB dimensions are taken into account: *i*) Health; *ii*) Education; *iii*) Living standards, social inclusion and employment; *iv*) Poverty and income inequality. Each WB dimension is defined by three specific WB measures. Considering the first WB dimension, the three measures considered are life expectancy at birth (LEB), expected healthy life at birth (HLB) and illness-free life at birth (NHLB). The education dimension of WB is defined by the drop-out rate (DOR), the expected years of schooling (EYS) and the tertiary education enrollment rate (TEER). The material deprivation rate (DEPR), the economic dependency rate (ECDR) and the employment rate (ER) detail the living standards, social inclusion and employment dimension of WB. The poverty rate (POVR), the Gini index (GINI), and the elderly relative median income (ERMI) are considered as the measures of the fourth dimension of WB, i.e. poverty and income inequality.

These measures are projected to the 2030 simulation horizon together with their selected drivers. The latter are basically the main components of social protection (SOCPR) and Welfare (W) provisions, and in particular expenditures for disability (DIS), education (EDU), family (FAM), health (HEAL), housing (HOU), labor market protection (LMP) in the form of active labor market policies (ALMPs), pensions (PENS), social inclusion (SI) and unemployment protection (UN), i.e. passive labor market policies (PLMPs) .

Aside from the four external hypotheses of the European future evolution (E1-E4), the projections consider also two internal alternative hypotheses. The first assumes that, because of the ongoing fiscal consolidation processes, Welfare expenditure components are constrained to evolve consistently with the fiscal requirements, irrespective of WB demand (i.e. demographic and social needs). The technical implementation of the "fiscal dominance" hypothesis requires the modification of the Welfare expenditure components equations by imposing exactly balanced long-run dynamics among welfare expenditures and general government public expenditure (i.e. a set of cointegrating vectors)[3]. The second internal alternative scenario which is relevant within the "struggling on" (E1) scenario, considers a modified combination of public expenditure for social protection provisions. In practice, public savings potentially available from the implementation of the projected reforms in national pension and health systems are assumed to be spent in the other welfare expenditure components, without modifying their relative weights in total non-pension/health welfare expenditure.

The proposed approach should complement recent studies addressing the relation between macroeconomic policies and individual WB measures. These analyses have been mainly conducted from a microeconomic point of view, using tax-benefit modeling and micro-simulation methods (Callan *et al.*, 2011; Leventi *et al.*, 2010; Sutherland, 2007). The complementarities arise from the different perspective assumed here, i.e. the macroeconomic point of view, and the widest objective of the analysis, which is the one of relating a large set of WB measures to macroeconomic, demographic and public finance developments, using a unifying model and a set of alternative hypotheses for a set of European areas including all European countries.

The paper is structured as follows. The second section presents the CAM projections under the alternative scenarios, focusing on a set of variables that are relevant for the future evolution of WB drivers and outcomes,. The third section describes the methodological approach, detailing the methodology that has been adopted to design the main links between the macroeconomic

[3] The implementation of the fiscal dominance scenario is particularly relevant in the present European macroeconomic and political situation, in which a relevant fraction of European citizens are experiencing the effects of fiscal austerity measures. The resulting analysis can be seen as complementary to a number of recent studies addressing the effects of fiscal consolidation measures on selected WB outcomes (Callan *et al.*, 2011; Jenkins *et al.*, 2011; Figari *et al.*, 2010; Atkinson, 2009; Figari *et al.*, 2011; Sutherland *et al.*, 2008; Ozdemir *et al.*, 2009; Ozdemir *et al.*, 2010; Ozdemir and Ward, 2011) .

environment (i.e. the CAM's projections for European areas) and the WB dimensions, taking into account the dynamics of the main drivers of the selected well-being measures and aggregate dimensions. The fourth section contains some details of the econometric implementation of the model, considering the specification process, the goodness of fit and the analysis of the multipliers in a dynamic perspective. The fifth section presents and discusses the results of the projections and is organized such that the policy challenges Europe will face in the upcoming years is highlighted. In particular, under the reduced government scenarios, the simulations show that relevant WB and social challenges will emerge, basically because of the evident contradiction of integrated economic institutions and nationally-based fiscal and social protection systems. The sixth section concludes. Detail analyses and results are reported in specific appendices.

2. CAM projections, WB drivers and outcomes

This section is dedicated to a brief description of the CAM scenario simulations for a set of variables that are potentially relevant for the future evolution of WB drivers and outcomes. The analysis is focused on selected demographic, macroeconomic and financial CAM variables and on their comparison, in historical perspective, with the observed trends in Welfare expenditure and composite WB measures. This perspective is functional to a preliminary evaluation of the possible relations among the heterogeneous drivers of WB outcomes, to be formally designed and estimated at the modeling stage. Before discussing CAM projections, it is useful to summarize the hypotheses characterizing the four alternative scenarios.

2.1 A brief summary of the four scenarios[4]

Under the "struggling on" and the "EU break up" scenarios E1 and E2, the global context is characterized by a reduced role for government intervention both in terms of political support and of financial relevance. The European share of global trade is assumed to be under persistent decline. The public finance consolidation process will lead to a progressive contraction in government budgets and in a reduced role for public intervention in the areas characterized by market failures and

[4] Cfr. Cripps and Naret (2012).

in the provision of public goods. Present levels of welfare expenditure and of social protection won't be sustainable under these circumstances.

Within this world scenario the hypotheses of a "struggling on" for Europe (E1) is characterized by the implementation of dramatic fiscal consolidation measures in Southern countries (EUS) and in the UK. Absent relevant modifications in the regulatory set-up, i.e. in the EMU and the single market rules, these areas are expected to face a persistent economic stagnation, also propagating to the other European areas.

Within the global reduced government scenario, the "EU break up" (E2) hypothesis assumes the fragmentation of the EMU and, as a necessary result, of the European single market. In this context, the US and China are expected to implement protective economic measures to reduce contagion and protect their trade shares. A continuing global financial market influence on the valuation of sovereign debt and its service cost is expected to lead, in the absence of fundamental changes in the management of the fiscal and monetary policy conduct, to increasingly aggressive public finance consolidation processes, characterized by a strongly pro-cyclical fiscal conduct, i.e. by muscular austerity measures and by increased tax pressure on the revenues side. These policies will eventually lead to strong recessions and to the impossibility of enforcing the necessary long-term sustainability of public debt, especially in highly indebted/slow growing southern European countries. Strong currency devaluations in EUS and EUE countries and revaluations in EUW and EUN will eventually spread the recession also in these core European areas.

Under the regionalization world scenario, the future economic developments will be characterized by a process of strengthened economic, political and financial relations on a regional basis. Two European specifications of this world scenario are considered. The first perspective (E3) assumes that Europe will face a process of internal regionalization, characterized by a partial and administrated breakdown of the EMU, in which region-based currency valuations and a "multi-speed" European economy will emerge. As a result of the internal polarization, each European sub-area will establish strong economic relations with neighbor countries and will specialize its production and its institutional set-up accordingly. The implications for economic growth and public finance of the latter scenario will be diversified across European areas. Depending on specific assumptions on energy markets, on financial market valuations of national debt bonds and on the valuations of the new Euro currencies, the divergence process between the northern/western European areas and the

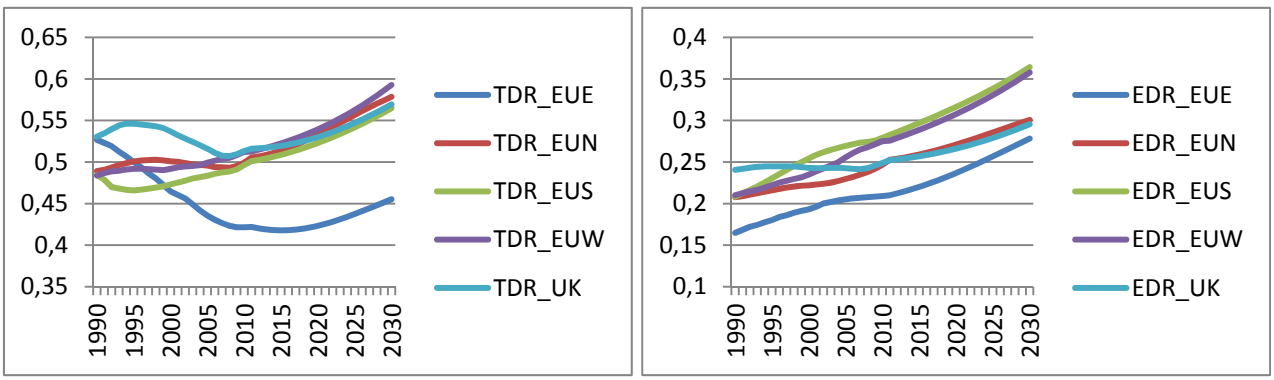
southern/eastern counterparts will be more or less strong. The second perspective (E4) assumes that fundamental changes in the conduct of monetary and fiscal policies, made possible by a renewed and intensified institutional integration process leading to a federal Europe with increased budget up to 5%, will enforce economic stability and growth in a context of economic and structural convergence of the different European areas.

Each of these variant scenarios has important and specific implications for Social Europe and WB, given the clearly different implications for the conduct of fiscal policy and thus for the sustainability of the national social protection systems and of the welfare-state in general. However, irrespective of the scenario being considered, a reshaping of the European institutions and of their functions is required.

2.2 CAM projections

Before analyzing the forecasted evolution of the macroeconomic and financial components, a quick look at the evolution of the key demographic indicators in the CAM is provided. Figure 1 contains the historical and projected dynamics of the total dependency rate (TDR), defined as the ratio between the fraction of population not in the working age (population 0-14 + 65 and over) and working age population (population 15-64), and of the elderly dependency rate, given by the population 65 and over to population 15-64 ratio, and of the economic dependency rate (ECDR), defined as the ratio between the number of unemployed and out of the labor force to employment.

Figure 1 - Historical and projected evolution of the total end the elderly dependency rates



Source: elaborations on CAM projections

The graphs clearly show a continuing increase in the TDR and in the EDR in the simulation period, for all the European areas. The dominant factor behind this dynamics is ageing, which is particularly strong in EUS and EUW. In these areas, with respect to the 2011 values, the EDR is expected to increase of about 8 percentage points at the simulation horizon (from 28.6% to 36.4% and from 27.6% to 35.6%). The increase is basically the same considering the TDR. This evolution reflects the demographic imbalances related to the "baby boom" of the sixties and seventies and of the subsequent contraction in the fertility rate, and is expected to have serious implications for the evolution and financial sustainability of European Welfare systems (Sutherland, 2007; OECD, 2001; 2009). In fact, a high fraction of social protection expenditure is associated to pension provisions and health services, both strongly related to the demographic structure.

In order to ensure the long-term financial sustainability of Welfare systems, a number of European countries entered in a process of strong reform which is still ongoing. The actual viability of these needs however to be tested against the issue of their social sustainability in different economic environments, provided that an important role in the reforms is played by a general reduction of the social benefits and by the induced changes in agents' behaviors (Gruber and Wise, 2004; Frick and Headey, 2009; Bosworth and Burtless, 2010). An appreciation of the relevance of this problem in the different scenarios can be obtained from the analysis of the employment rates (ER) and of the related economic dependency rate (ECDR), whose historical and projected evolution is reported in Figure 2.

The graphs show clearly that differences between E3 and E4 are not appreciable, both for ER and ECDR. The worst scenario, in terms of employment performances, is the E2, especially for EUN, EUW and, to a lesser extent, for the UK. This is reflected in the differential behavior of the ECDR, showing that the driving force of this measure of dependency is employment, given that the population dynamics is comparatively stable across scenarios. The best scenarios for employment performances are the E3 and E4 for all the areas, where expected increases in the ER and decreases in the ECDR are particularly evident for EUE, EUS and EUW.

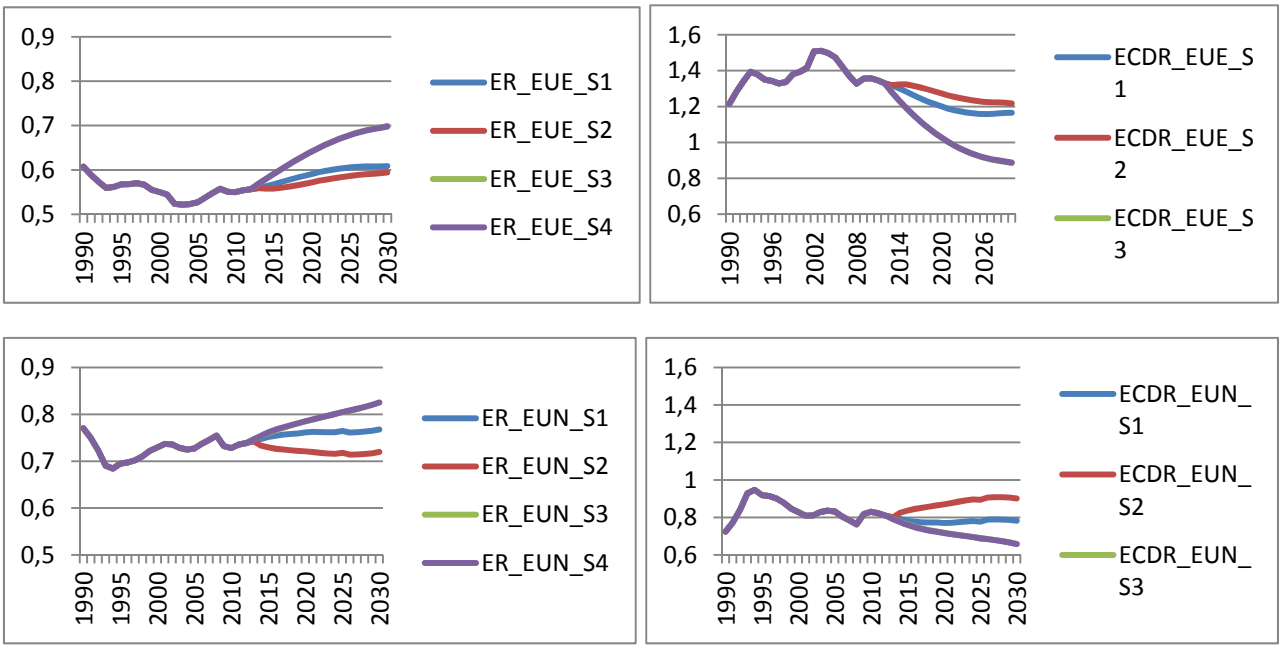
The ECDR shows a negative trend for all areas in all scenarios but the EUN after 2015, signaling that the underlying labor market trends (as defined by the evolution of the participation and employment rates) tend to dominate the cyclical components. However, considering year 2015 and E2, very different values are recorded in the different European areas. The evolution of the ECDR shows that

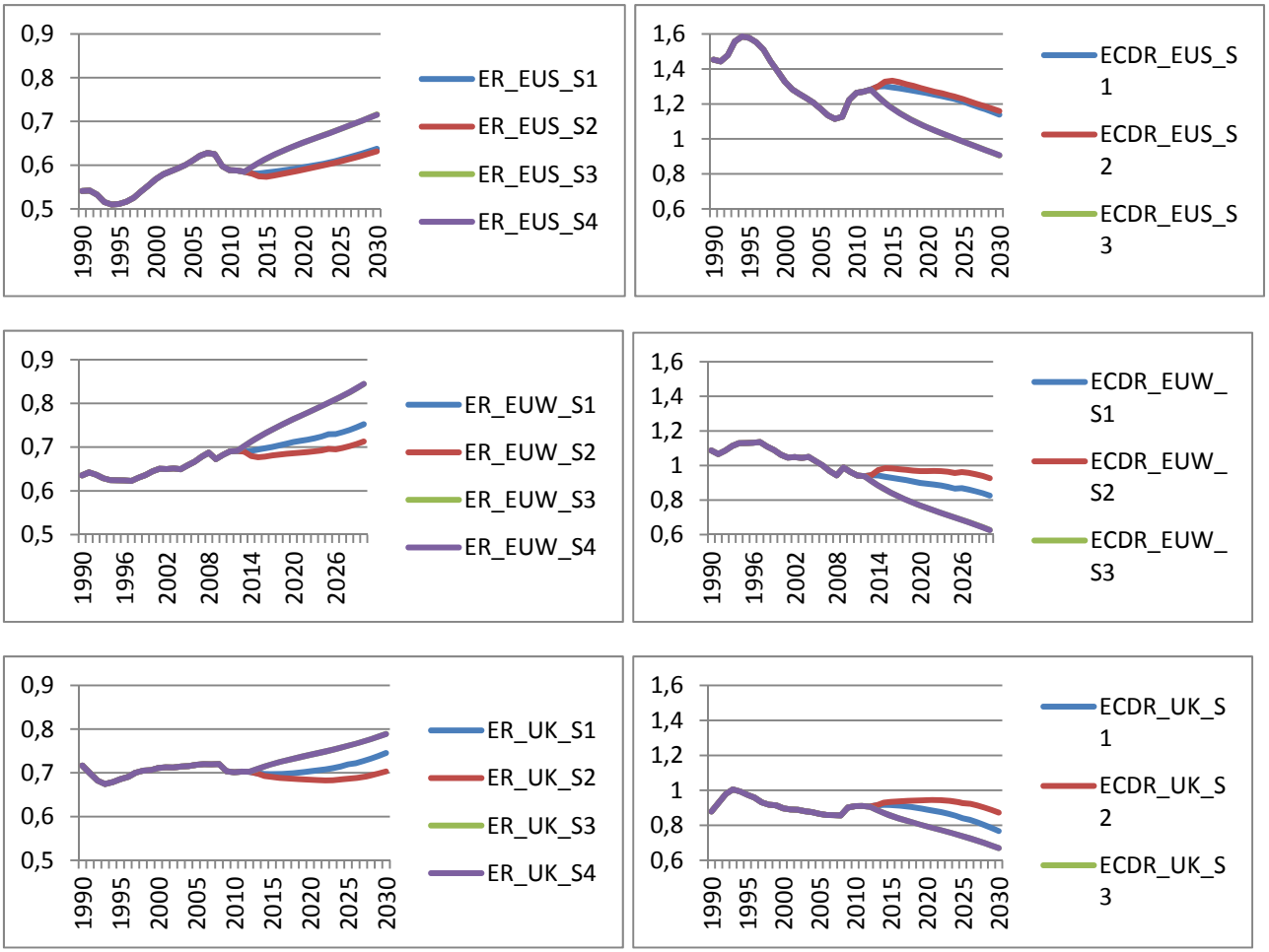
for each person employed, there will be 1.32 persons out of the workforce in the EUE and the EUS, 1 person in the EUW, 0.95 in the UK and 0.85 in the EUN.

Considering the projected ECDR values for year 2030 in the best and worst scenarios (E4-E2), the following differences emerge: more than 30% for EUE, 25% for EUN and EUS, 30% for EUW and 22% for the UK. These differences provide a clear intuition of the implications of the different demographic and labor market scenarios for the financial sustainability of the European social protection systems, but also call into question the social sustainability of the ongoing reforms, provided that, in the worst scenarios, the weakest European economies are expected to face high dependency ratios (demographic and economic) in a context of fiscal austerity and economic recession or stagnation.

This context is described in Figure 3 where the historical and projected evolution of per capita GDP and of per capita government expenditure (GEXP) in the CAM under the four alternative scenarios in the five European areas are summarized.

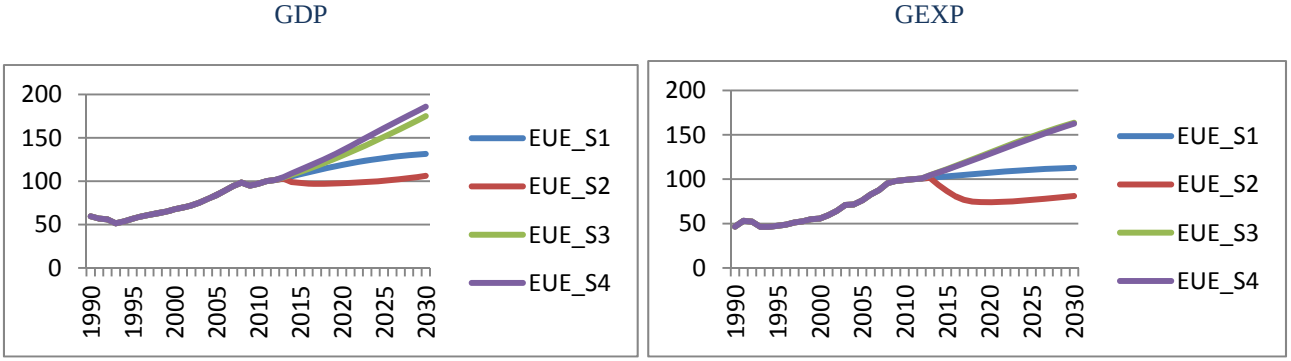
Figure 2 - Historical and projected evolution of the ER and the ECDR

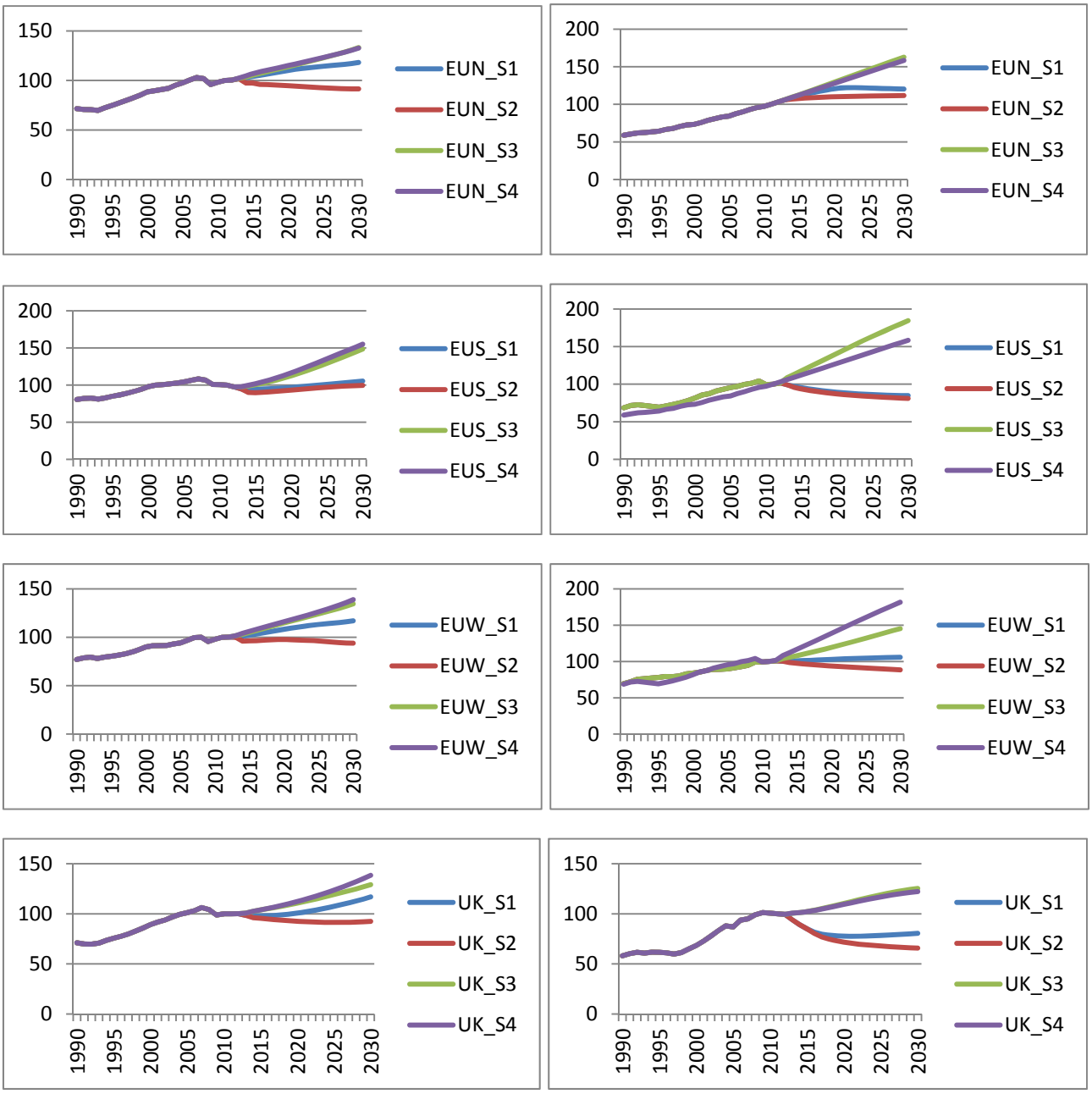




Source: elaborations on CAM projections

Figure 3 - Historical and projected p.c. GDP and GEXP in the alternative scenarios. 2011=100





Source: elaborations on CAM projections

Real per capita GDP declines substantially under E2 in all European areas immediately after the break up, and is expected to decline almost steadily for the entire simulation period in EUN (-8% in 2030 as compared to 2011) and, marginally, in EUW (-3%) and in the UK (-4%). Symptoms of weak recovery are present after 2017 in EUS and EUE, that are expected to go back to 2011 levels in 2030,

because of the devaluation of the national currencies. A strong initial contraction in GDP is expected in EUS and the UK under E1, because of the operation of the austerity measures.

The best results are obtained under E4, in particular in EUS (because of the relaxed austerity measures and the move towards a transfer union) and, to a minor extent, in the UK (because of the hypothesis of not taking part to the increasing European integration towards a federal state). Under the "multi speed" scenario E3, GDP performances are comparable to those expected under S4.

The projections for real per capita GDP are basically mirrored by those for real per capita government expenditure. Under E2, real GEXP at the 2030 horizon will be nearly 38% less than the 2011 value in the UK and 20% in EUS and EUE. A substantial contraction of near 15% is also expected in EUW. The same real contraction is expected for EUS and, up to 2015, for the UK, under E1. The austerity measures are less aggressive in the other areas.

2.3 CAM variables and aggregate Welfare expenditure

The selected CAM projections that have been briefly discussed provide a stylized description of the expected demographic, economic and financial evolution under the different scenarios. On the one hand, the dynamics of the demographic and economic dependency rates, as well as the labor market changes, are likely to influence the future "demand" for social protection provisions. On the other hand, the implementation of austerity measures in indebted countries are expected to have relevant effects on the "supply" of public services and Welfare expenditure in general. Table 1 provides a preliminary appreciation of the sample correlation between the dynamics of Welfare expenditure and "demand" and "supply" factors. Because of the evident trending behavior in the series, the correlations are obtained considering the log-deviation of each variable from its deterministic trend. Welfare expenditure (WEXP), GDP and GEXP are per capita measures. In order to capture the Granger-causality of interest, WEXP is entered with one lead (or the candidate covariates with one lag).

At the aggregate level, de-trended sample data denote a positive dynamic correlation between WEXP and GEXP in all the European areas, with a very high size of the correlation coefficient being found for EUE and EUS (0.96 and 0.85, respectively). Weaker correlations are obtained for EUW and the UK (0.23 and 0,10, respectively). A positive dynamic correlation is found also between WEXP and

lagged GDP, even if weaker on average than that between WEXP and lagged GEXP. The highest value is obtained for EUE (0.91), the smallest for EUN, EUS and EUW (0.14).

Table 1 – Welfare expenditure, demographic, macroeconomic and financial variables. Sample correlations (1990-2011) of log-deviations from trends

	Welfare expenditure				
	EUE	EUN	EUS	EUW	UK
TDR	0.41	0.01	0.73	-0.28	0.17
EDR	-0.57	0.16	0.42	-0.28	-0.19
ER	0.43	0.35	0.63	0.15	0.36
GDP	0.91	0.14	0.14	0.14	0.20
GEXP	0.96	0.42	0.85	0.23	0.10

Source: elaborations on Eurostat and CAM data. Dynamic sample correlations between CAM variables and leaded WEXP.

The evidence provided by the sample correlations of Welfare expenditure with the demographic indicators is rather mixed. The dynamic correlation between WEXP and TDR is positive for EUE, EUS and the UK (0.41, 0.73 and 0.17, respectively), virtually zero for EUN and weakly negative for EUW. With the exception of EUS and EUN (0.42 and 0.16, respectively), the dynamic correlation between WEXP and EDR is always negative, and quite strong for EUE (-0.57).

The sample dynamic correlation between WEXP and ER is always positive and, with the exception of EUW (0.15) quite relevant in size. The maximum value is found for EUS (0.63).

Even if it is not possible to derive structural information from dynamic sample correlations, the data show that Welfare expenditure movements are mostly associated to the dynamics of government expenditure and, to a minor degree, to changes in GDP.

The role played by “demand” factors is instead not evident in this simple preliminary analysis. The sizeable positive correlation of WEXP with the dynamics of the employment rate is likely to capture the co-variation with the macroeconomic cyclical component (given the strong positive correlation between ER and GDP), thus it cannot be related to “demand” factors. Unsurprisingly, no clear indications can be derived from the dynamic correlations with the demographic indicators, likely

because the aggregate welfare expenditure is the result of a set of heterogeneous provisions, whose beneficiaries have very different demographic characteristics.

2.4 Welfare expenditure and composite WB indicators

A further necessary step in this preliminary descriptive analysis is the focus on the relation between welfare expenditure and WB dimension indicators (health, education, living standards, social inclusion and employment and poverty and income inequality). Given the WB measures considered in the analysis, a composite indicator for each WB dimension is calculated considering a simple average of the transformed WB measures in the sample 1990-2011. The transformations are necessary in order to remove the scale effects of the specific measures and to correctly consider their sign in the determination of WB. In practice, each WB measure has the same weight in the definition of the WB dimensions after considering a re-scaling to the beginning of period values and an inverted sign for measures negatively affecting WB. In line with the descriptive analysis for the relation among CAM variables and welfare expenditure, dynamic sample correlations are obtained considering the deviation from the deterministic trend of each variable, and for the same reason, Welfare expenditure is entered with one period lag.

Table 1 – Welfare expenditure, and WB indicators. Dynamic sample correlations (1990-2011) of log-deviations from trends

	Welfare expenditure				
WB dimension	EUE	EUN	EUS	EUW	UK
Health	0.86	0.15	-0.03	-0.33	0.27
Education	0.84	0.53	0.74	0.05	0.02
Living std, social incl, empl.	0.61	0.12	0.45	-0.18	0.05
Poverty and income inequality	0.38	-0.12	0.92	-0.02	0.21

Source: elaborations on Eurostat data. Dynamic sample correlations between lagged WEXP and WB measures.

With the exception of EUW, nearly all the WB dimension indicators appear positively correlated with lagged Welfare expenditure. In particular, educational outcomes are always positively correlated, with sizeable correlation coefficients for EUE, EUS and EUN (0.84, 0.74 and 0.53,

respectively). The predictive power of lagged WEXP is also strong for EUE and EUS considering the living standard, social inclusion and employment index (0.61 and 0.45, respectively) and the poverty and income equality index (0.38 and 0.92, respectively). The dynamic correlations are instead virtually zero for the educational outcomes in EUW and the UK (0.05 and 0.02, respectively), for health outcomes in EUS (-0.03) and for poverty and income equality in EUW (-0.02). Large negative dynamic correlations are found in the EUW sample for security, health and – to a lesser extent – living standards.

From the perspective of the European areas, clear indications of positive dynamic correlation between deviations from long-run trend of WEXP and WB dimension are obtained for EUE, EUS and, to minor degrees, EUN and the UK. No evidence is found for the western European cluster.

Even in this case, the generality of the measures employed in this preliminary check rule-out the possibility of getting clear-cut results. However, even if it is not possible to give a structural meaning to dynamic sample correlations, there are symptoms that changes in welfare provisions can be associated to subsequent variations in a number of WB dimensions in different areas.

Moreover, the evidence of a relative stability of the country differentials in WB indicators in the last 20 years, considering the moderate convergence in economic and labor market participation indicators, such as per-capita GDP and employment rates, could indicate that well-being outcomes are not only related to economic performances, whose typical institutions have experienced a deep integration process, but also to the level and the quality of social protection expenditure, which is still decided and managed at the national levels. In fact, despite the apparent improvements in WB outcomes in all European areas and the European Commission commitment towards greater integration and coordination - as testified by the extension of the area of application of the Open Method of Coordination[5] - a clear path towards convergence in WB is still lacking, with signals of divergence beginning in 2007.

These results suggest the viability of a more structured empirical analysis, in which WB drivers are, in a first step, related to demographic, macroeconomic and public finance factors and, in a second step, to WB measures. On the one hand, such an analysis requires a deeper and more specific

[5] The OMC now considers common standards for the national pension system, health care, participation and active labor market policies, gender equality policies, education, training and life-long training.

investigation of the relations among CAM variables and Welfare expenditures, considering the different social protection provisions and their potentially multiple relations with economic variables, financial constraints and specific sections of the population. On the other hand, it requires an investigation of the relations between detailed WB measures and specific drivers. This analysis is described in the following sections.

3. General approach

The approach proposed in this analysis should complement recent studies addressing the relation between macroeconomic policies and individual WB measures. These analyses have been mainly conducted from a microeconomic point of view, using a tax-benefit modeling and a micro-simulation approach (Callan *et al.*, 2011; Leventi *et al.*, 2010; Sutherland, 2007). The complementarities are evident in the different perspective assumed here, i.e. the macroeconomic point of view, and the widest objective of the analysis, which is the one of relating a large set of WB measures to macroeconomic, demographic and public finance developments using a unifying model and a set of alternative hypotheses for a set of European areas including all European countries.

At a maximum level of generality, WB drivers can be classified in two main categories. Monetary (resource-based) drivers are, among others, GDP, public expenditure, public revenues, capital returns, wages and labor incomes in general, public sector transfers, social protection and welfare in all their components. Non monetary drivers are in general the variables defining the demographic and the labor market outcomes, as well as other non monetary factors potentially relevant for well-being (such as the performances of health and education systems, urbanization rates and the environment).

Such a high-level classification is needed in order to identify, within the first component (the monetary one), its potential relations with the macroeconomic environment in the different scenarios and, in a further stage, the potential relations among the macroeconomic environment, the monetary and non-monetary WB variables. Specific attention is devoted to the identification of the effects on monetary drivers of the demographic transition (ageing) faced by the European countries and the developed economies in general (OECD, 2001; 2009). Concerning the poverty and income inequality dimension, the elements taken into account in the analysis are those measuring the general income

inequality and the distributional imbalances among generations, as measured by the Gini coefficient and the elderly relative median income, respectively[6].

3.1 Linking well-being scenarios to macroeconomic projections: WB drivers and measures

In order to ensure the consistency of the European WB scenarios with the macroeconomic context, each scenario is specified on the basis of a set of relations linking well-being measures and drivers with the relevant macroeconomic variables in the CAM model. Formally, these additional relations define a separate model block of the CAM model, i.e. a mathematical structure specifically designed to provide *i)* the relations among selected macroeconomic variables in the CAM model and the selected WB drivers and *ii)* the relations among well-being drivers and well-being measures. Such a block is placed in a post-recursive position with respect to the CAM model, such that variables in the CAM model can be treated as exogenous - or strictly forcing - with respect to the recursive WB block. In other terms, CAM model's projections provide the framework within which WB scenarios are developed, ensuring their external and internal consistency.

Operationally, the relations defining the recursive block are obtained by econometric estimation (i.e., by using stochastic relations) when sufficiently long time-series for WB drivers/measures are available for the different countries in the five European areas, and by deterministic relations – defined on a base-year evidence – when such information is not available or when relations are valid by definition. The candidate WB drivers are identified within the set of the CAM macroeconomic variables, ore selected from external official sources.

The variables in the CAM model relevant as WB drivers can be grouped into four classes: *i)* macroeconomic variables; *ii)* financial variables; *iii)* demographic and labor market variables; *iv)* energy and environmental indicators. Considering the first group, the main macroeconomic aggregates are considered, such as GDP, consumption, investment, saving, the capital stock, public expenditure and revenues, net exports, private income, private saving, public debt, prices, inflation, exchange rates and terms of trade. Considering banking and financial sector variables, only a limited

[6] As specified above, demographic and labor market indicators can be considered as a further cross-cutting issue.

set is taken into account, such as interest and bond rates. Given their relevance for WB drivers and measures, all the demographic and labor market variables in the CAM model are considered (population, child population, elderly population, net migrations, working-age population, urban population, employment). Considering the fourth group, variables in the CAM model that can be related to WB are energy demand, energy production from carbon-based fuels, non-carbon based energy production, CO2 emissions. A description of the WB drivers and measures to be related to the model variables is provided in the next section.

It is worth stressing that, since the CAM does not consider wages and labor compensation as specific measures, it is not possible to derive the evolution of the functional distribution directly from the CAM's output, even if such a measure is potentially important for the evolution of the personal distribution as well as for the dynamics of living standards, social inclusion and poverty. In order to circumvent this drawback, a theoretical relation considering the role of capital deepening and the average return on capital is used to relate the functional to the personal distribution. For example, the personal income distribution is not invariant to the functional distribution, that – in the absence of direct measures of the wage mass - can be proxied by the evolution of the capital to labor ratio and by the GDP to capital ratio. Capital deepening, having effects in the skill composition of the labor force and employment, can have effects on income inequality, living conditions and the risk of poverty (Aghion *et al*. 1999; Pereira and Martins, 2004; Budria and Pereira, 2005; Heinrich and Hildebrand, 2005).

Concerning WB drivers that are not in the CAM, the relevance of specific social protection instruments (drivers) for WB dimensions suggests to consider, in the first place, a detailed representation of public expenditure and in particular the complete structure of Welfare expenditure. The following sub-categories of welfare and social protection expenditures are considered in the recursive block of the CAM model:

i) Public expenditure for disability, per capita, as a % of GDP and as a % of total government expenditure (DIS)

ii) Public expenditure for education, per capita, as a % of GDP and as a % of total government expenditure (EDU)

iii) Public expenditure for family protection, per capita, as a % of GDP and as a % of total government expenditure (FAM)

iv) National Health System health expenditure, per capita, as a % of GDP and as a % of total government expenditure (HEAL)

v) Public expenditure for housing, per capita, as a % of GDP and as a % of total government expenditure (HOUS)

vi) Public expenditure for labor market protection in the form of active labour market policies (ALMPs), per capita, as a % of GDP and as a % of total government expenditure (LMP)

vii) Public expenditure for long-term care, per capita, as a % of GDP and as a % of total government expenditure (LTH)

viii) Public pension system expenditure, per capita, as a % of GDP and as a % of total government expenditure (PENS)

ix) Social inclusion expenditure, per capita, as a % of GDP and as a % of total government expenditure (SI)

x) Unemployment benefits expenditure (i.e. PLMPs), per capita, as a % of GDP and as a % of total government expenditure (UN)

xi) Social protection expenditure, per capita, as a % of GDP and as a % of total government expenditure (SOCPR) defined by the components i), iii), iv), v), viii) and ix) above

xii) Welfare expenditure, per capita, as a % of GDP and as a % of total government expenditure (W), defined by all the Welfare expenditure components i) to x).

A schematic description of how WB measures are, in a first approximation, related to WB drivers and drivers to macroeconomic variables is provided for each WB dimension separately, specifying the WB measures and the specific (potential) drivers to be related to the macroeconomic variables in the CAM. The description should clarify that, with respect to the AUGUR analysis of the WB scenarios at the world level, the main distinctive point of the European specification is its greater

detail, while the broad methodological approach, aside from its formal specification, is basically unchanged.

3.1 Health WB dimension

It is useful to recall that the three WB measures considered for the health dimension of WB are: *i)* Life expectancy at birth (LEB); *ii)* Expected healthy life at birth, i.e. disease-free life (HLB); *iii)* Non-healthy life (NHLB). Note that HLB and NHLB are complementary, i.e. the measure under *iii)* can be obtained from the difference between the first and the second health WB measures.

The health dimension is expected to evolve in relation with a number of drivers, in turn depending on a set of macro-variables considered in the recursive block of the CAM model. The list below sketches the main drivers that are considered in the analyses, specifying the main corresponding macro-variables to which they are expected to be related, formally modeled and simulated in the recursive block of the CAM model.

i) Per-capita GDP, determined in the CAM model;
ii) National Health System expenditure (per-capita and as % of GDP), determined in the recursive WB module, related to NHS past values and total government expenditure;
iii) Long-term health care expenditures (as a % of GDP and of total expenditure), determined in the recursive WB module, related to its past values, NHS expenditure and total government expenditure;
iv) Income inequality and relative poverty indicators, determined in the recursive WB module, related to their past values and to functional distribution proxies;
v) Elderly relative median income, determined in the recursive WB module, related to its past values, past and present income.

3.2 Education WB dimension

The three WB measures considered for the health dimension are: *i)* Expected years of schooling (EYS); *ii)* Drop-out rates (DOR); *iii)* Tertiary education enrolment rates (TEER). Even in the case of the education dimension, its measures are related to a number of drivers, that in turn depend on a set of macro-variables considered in the recursive block of the CAM model.

i) Per-capita GDP, determined in CAM model;

ii) Public expenditure for education (per-capita and as % of GDP), determined in the recursive WB module, related to its past values and total government expenditure;

iii) Employment rate, determined in the CAM model;

iv) Urbanization rate, determined in the CAM model;

v) Income inequality and relative poverty indicators, determined in the recursive block of the CAM model, related to their past values, functional distribution measures;

vi) Bank loans to deposit rate, determined in the CAM model.

3.3 Living standards, social inclusion and employment WB dimension

The three WB measures considered are: *i)* the Deprivation rate (DEPR); *ii)* the Economic dependency ratio (ECDR); *iii)* the Employment rate (ER). The evolution over time of these measures is again related to a number of drivers, that in turn depend on a set of macro-variables considered in the recursive block of the CAM model:

i) Employment rate, determined in the CAM model;

ii) Welfare expenditure (per capita, as a % of GDP and as a % of population covered by welfare programs), determined in the recursive WB module, related to its past values and total government expenditure;

iii) Re-distribution operated by the government (as a % of GDP), determined in the recursive WB module, defined by the government expenditure to revenues ratio;

iv) Average substitution rate for retired employees, determined in the recursive WB module, related to its past values, past and present incomes, the elderly relative median income, institutional controls for pension systems specificities;

v) Income, determined in the CAM.

3.4 Poverty and income inequality

The three WB measures considered in the analysis of the poverty and income inequality dimension are: *i)* the Poverty rate (POVR); *ii)* the Gini inequality index (GINI); *iii)* the Elderly relative median income. Their evolution over time is related to the following candidate drivers:

i) Per-capita GDP, determined in the CAM model;

ii) Re-distribution operated by the government (as a % of GDP), determined in the recursive WB module, defined by the government expenditure to revenues ratio;

iii) Capital deepening, determined in the recursive WB module, defined by the capital to labor ratio and by the GDP to capital ratio;

iv) Economic dependency rate, determined in the recursive WB module on the basis of the employment rate and the demographic indicators in the CAM.

Some cautions on estimated WB relations are worth mentioning. Due to aggregation problems, the evidence on relations among macroeconomic data and drivers, and among WB drivers and measures in particular, can result at best weak. Perhaps most importantly, these relations are generally neither time-invariant, nor independent of potential policy interventions. The evolution over time of WB measures is strictly related to public intervention in general and welfare coverage in particular, i.e. to the specific economic and social policy choices that can take place in the projection period. In other terms, identified relations that are valid in sample are not necessarily valid also out of sample. Moreover, WB measures do not evolve linearly with their drivers and generally with the main indicators of economic development, displaying relevant decreasing return to scale to economic development indicators.

These cautions should clarify that WB projections should be considered as a tool for providing a substantially qualitative assessment of the future trends in WB conditional on selected scenarios and specific hypotheses.

The proposed approach has the main goal of ensuring the internal consistency of the different projections without limiting the width of the analysis, that can be tuned by explicit hypotheses on the future evolution of the relations among the WB and the macroeconomic levels and on the potential policy changes that can be required in order to meet the evolving budget constraint and/or social needs in the different scenarios. These policy changes can affect well-being through the formal relations of the recursive block, or by changing these relations themselves[7].

[7] In order to take into account the abovementioned potential sources of structural variation, the identified relations among the WB and the macroeconomic levels are specified such that they can be modified and calibrated on the basis of specific hypotheses for the projection intervals. Moreover, some policy instruments are identified among the set of variables of the

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4. The econometric approach and its evaluation

This section contains a brief description of the specification and estimation process for the equations describing the stochastic structure of the WB module. Overall, the model is composed by a system of 205 simultaneous equations in 261 variables. All the 56 exogenous variables are provided by the CAM. Among the 205 equations, 65 are deterministic (i.e. valid by definition) and 140 stochastic. The stochastic equations are defined by 24 five-variables systems (corresponding to the five EU country groups) and one 20-variables system for the population breakdown (four breakdowns for each country group). Among the 24 five-variables systems, 10 are specified for the single components of Welfare expenditure[8], and the remaining 14 for the WB measures considered in the analysis. Each system is estimated using the Zellner' SURE estimator.

Given the heterogeneous nature of the information upon which the analysis relies, and the lack of a structural theory linking the demographic, macroeconomic and qualitative variables to be considered, the model equations are specified with the goal of obtaining *i)* good adaptability to the historical information and statistical reliability of the estimates; *ii)* the highest sensitivity of WB outcomes to the alternative scenarios implemented in the CAM model; *iii)* parsimonious representations.

The resulting model structure is based on a system of block-simultaneous equations describing the relations among CAM variables and WB drivers and those among WB drivers and WB outcomes. Consistently with the goal of obtaining empirically-consistent specifications (point *i*) the general starting formulation for each equation in the simultaneous structure is the system ARDL formulation, specified in ECM form in the cases in which long-run stability is evident or theoretically established. Formally, for each equation (country group) of the simultaneous blocks, the general starting specification is the ARDL(*p*,*q*):

$$x_t = a + bt + \sum_{i=1}^{p} c_i x_{t-i} + \sum_{i=0}^{q} \mathbf{d}_j \mathbf{y}_{t-j} + u_t \quad [1]$$

CAM model and other introduced in the recursive block used for well-being projections, in order to better detail their policy relevance.

[8] The stochastic equations for the specific Welfare expenditures considered in the analysis are not 12,as specified in section three, because aggregate Welfare expenditure (WEXP) and Social Protection expenditure are obtained by summation of the single expenditure components.

where x_t is the dependent variable (a WB driver or measure), *a* and *t* are coefficients for the time trend, and $\mathbf{y}_{t-j}$ is a vector of contemporaneous and lagged regressors (CAM variables and/or WB drivers), selected according to theoretical reasoning and statistical checks.

In the presence of long-run stability ($x_t = x_{t-1}$) equation [1] can be re-parameterized to obtain a static long-run equation, i.e. the long-run attractor of the variables' dynamics:

$$x_t = \hat{\gamma}_1 + \hat{\gamma}_2 + \hat{\gamma}_3 y_t + z_t$$
$$\gamma_1 = \frac{a}{\left(1 - \sum_{i=1}^{p} c_i\right)}, \quad \gamma_2 = \frac{b}{\left(1 - \sum_{i=1}^{p} c_i\right)}, \quad \gamma_3 = \frac{\sum_{i=0}^{p} d_i}{\left(1 - \sum_{i=1}^{p} c_i\right)}. \qquad [2]$$

The first relation in [2] is the co-integrating vector (the long-run equation or attractor) implicit to the ARDL(*p*,*q*) specification in [1]. It basically provides the equilibrium long-run relation between the dependent and the independent variable(s), that holds in the absence of shocks (at the steady-state).

As an example, if the dependent variables in the system ARDL are the specific components of Welfare expenditure and the independent variable is government expenditure, the existence of the long-run relations establishes a constant ratio between Welfare expenditure and government expenditure and, given the stability of the single Welfare expenditure components, it also ensures a stable composition of Welfare expenditure at the steady state.

The resulting error-correcting dynamics is described by the ECM reparameterization:

$$\Delta x_t = \delta + \sum_{i=1}^{p-1} \beta_i \Delta x_{t-i} + \sum_{i=0}^{q} \boldsymbol{\chi}_j \Delta \mathbf{y}_{t-j} + \alpha \hat{z}_{t-1} + \varepsilon_t$$

where δ is a constant term capturing the area-specific trend for the level of the dependent variable, β_i is the lag-specific auto regressive coefficient for the differenced dependent variables, $\boldsymbol{\chi}_j$ is the lag-specific coefficient capturing the contemporaneous and dynamic correlations between the dependent variable and the independent variables and α is the EC term, or loading coefficient, capturing the speed of adjustment to long-run equilibrium. In fact, $\hat{z}_{t-1}$, that is the residual of the long-run static equation, denotes the stationary disequilibrium.

The loading coefficients (EC coefficients) in each welfare expenditure item equation are area-specific, such that speeds of convergence toward long-run equilibria are estimated and heterogeneous across country groups. Since for some areas (mostly east Europe) in few equations long-run stability does not hold in sample, the EC terms are not significant or do not have the expected negative signs.

In these cases, the loading coefficients are held fixed at a moderate (negative) value consistent with an half-life disequilibrium of nearly 6.5 periods (i.e. assuming a value close to -0.1).

Note that the explicit consideration of the disequilibrium-correcting behavior of the Welfare expenditure EC equations allows the evaluation of potential hypotheses on the timing of the fiscal consolidation processes by fixing the values of the country-specific EC terms.

The objective of maximizing the sensitivity of WB drivers and results to CAM's projections (point *ii*) has been reached confronting the static and dynamic multipliers of alternative formulations obtained by combining different forcing variables in the admissible set (i.e. the variables for which there is an economic interpretation of the resulting relations) and different dynamic structures, i.e. adopting a conditioned data-driven approach to the specification. From preliminary checks it has been possible to verify that: *i)* the sensitivity of WB outcomes depends more on the relations among drivers (e.g. social protection expenditure variables and demographic indicators) and outcomes than on the relations among CAM variables (assumed to be strictly forcing) and WB module-specific drivers; *ii)* a low sensitivity of some WB drivers to the alternative scenarios can be found with specifications of reduced-form equations (the ARDL specifications) in which both WB "demand" (e.g. demographic indicators) and WB "supply" (mostly, GDP, employment, public expenditure and government budget balance) variables are included. The estimated relations among social protection public expenditure are historically related to demand factors (e.g. the positive relation between pension expenditure and ageing) as well as to public finance evolutions: since the former are weakly related to the alternative scenarios, the stronger the relation with demographic variables/indicators, the weaker the sensitivity of the projections to the scenarios.

These considerations suggested to verify, along with the baseline specification, an alternative approach in the selection of the forcing variables, and to favor a parsimonious approach in the specification of the dynamic structure of the equations. In particular, considering the relation among CAM variables and WB drivers, improvements in sensitivity can be achieved by modifying the equations specification process in the direction of a more "structural" approach, in which WB "supply" and "demand" factors are considered separately in order to better highlight the "causal" links that – on prior theoretical grounds – will be the most important in driving WB outcomes during the fiscal consolidation process. Two sets of WB drivers systems of equations have thus been specified, the first obtained by including both WB "demand" variables (e.g. demographic indicators) and WB "supply" variables (e.g. public finance rations and indicators), i.e. the "baseline"

specification, the second assuming a more "supply"-oriented perspective in the independent variables selection, i.e. by focusing on the role of public expenditure and the conduct of fiscal policy. In the alternative specification,

Specifically, two separate systems of equations for social protection and welfare expenditure items have been specified. In the first, WB "supply" factors (mostly public finance variables) are considered along with WB "demand" variables (mostly demographic) and macroeconomic variable in the equations defining the evolution of social protection and Welfare expenditure. Basically, in the alternative specification of drivers equations WB "demand" factors (mostly demographic variables) are excluded, in order to focus on the role of public finance and macroeconomic factors in the determination of the welfare expenditure projections. This choice corresponds to the hypothesis of "fiscal dominance" in the definition of public expenditure for social protection services and transfers.[9].

It is worth highlighting that these two sets of system equations actually define two alternative hypotheses for WB drivers, the first denoted "baseline" specification (BS), the second denoted "fiscal dominance" (FD) specification. The different projections obtained with the two systems can be interpreted as indicating the effects on social protection provisions and on WB measures of the fiscal dominance hypothesis (rationing of WB demand).

Concerning the relation among WB drivers and WB measures, improvements in sensitivity are obtained both via a careful specification of the independent variables set and optimizing the dynamic specification of the equations. The latter objective, which corresponds to the need of obtaining parsimoniously encompassing specifications (i.e. point *iii* above), has been reached using a general-to specific reduction method (Hendry, 1995). Starting from a general formulation of the dynamic structure of the ARDL WB drivers and measures equations, the final dynamic specification is obtained by sequentially dropping the coefficients with t-stat p-values below 0.2, conditional on the

[9] Welfare expenditure equations specifications in which only demand factors are considered are also present in the WB module and the dependent variables aliased. It has been verified that this additional block produces simulations that are more in line with those of the baseline specification, signaling that the available historical information for Europe tends to weight more the joint role of demographic and macroeconomic factors than the joint role of fiscal and macroeconomic factors.

need of maximizing the size of the estimated coefficients and given an exclusion criterion based on the consistency between the sign of the estimated coefficients (thus of the causality nexus) with prior theoretical conjectures. As a result, nearly all estimated coefficients are significant at the standard 95% value. Different directions of search have been tested in order to avoid path-dependence in the reduction process[10].

As it will be shown, WB projections (for both drivers and measures) prove sensitive to the alternative scenarios and their dynamics is reasonable on a priori theoretical grounds.

4.1 Sensitivity analysis: BS vs FD (Baseline scenario vs Fiscal dominance)

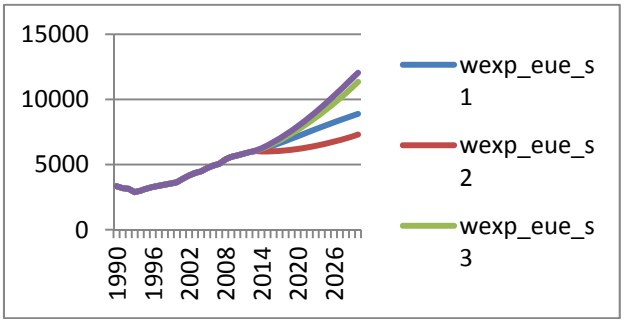
The possibility of linking WB outcomes to two alternative systems for the driver equations allows to compare the potential effects on WB stemming from the fiscal dominance scenario (i.e. WB demand rationing) with respect to a baseline assumption in which WB demand factors are considered along with economic and WB supply factors. From this comparison, the potential effects on WB associated to the European austerity measures affecting the determination of Welfare expenditure and WB outcomes can be evaluated. Figure 4 shows the sensitivity of total Welfare expenditure to the alternative hypothesis of fiscal dominance (FD) by comparing the results with those obtained in the baseline specification (BS) in the four alternative European scenarios (E1-E4).

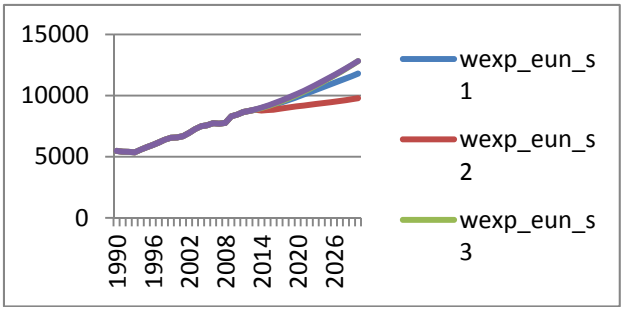
The resulting analysis can be seen as complementary to a number of recent studies addressing the effects of fiscal consolidation measures on selected WB measures. Callan *et al*., (2011) consider the effects of austerity measures in six countries; Jenkins *et al*. (2011) propose analyses on the effects of recessions on households' income distribution; Figari *et al*. (2010) analyze the effects of the recession and of the related unemployment on the risk of poverty; Atkinson (2009) and Figari *et al*. (2011) consider the effects of the recession as a stress-test for the Welfare state; Sutherland *et al*. (2008) evaluate the effects of tax increases on incomes and poverty.

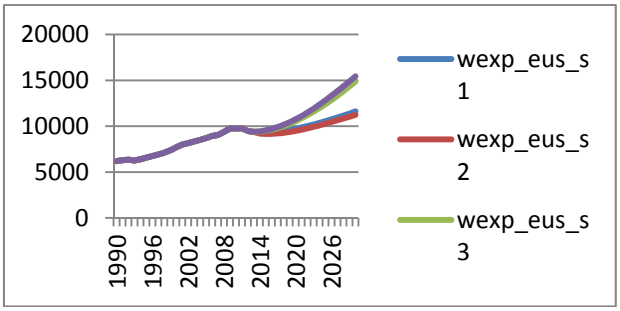
[10] The resulting reductions do not always satisfy the indications of the Bayesian information criteria.

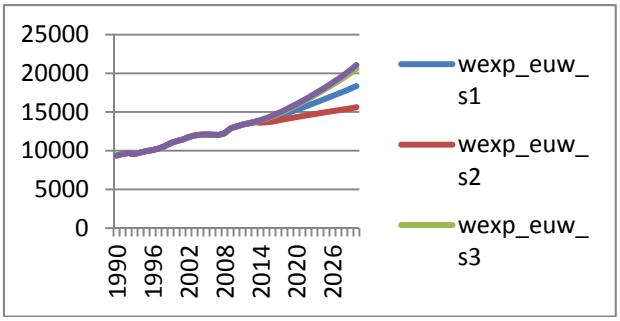
Figure 4 – Aggregate Welfare expenditure under the BS and FD, in E1-E4.

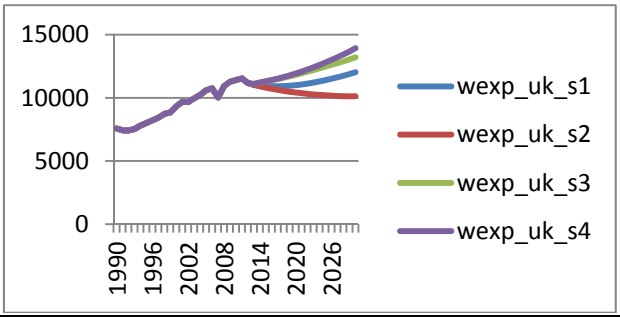
A – Baseline scenario



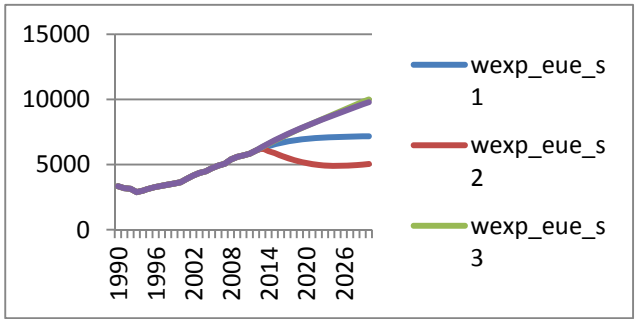


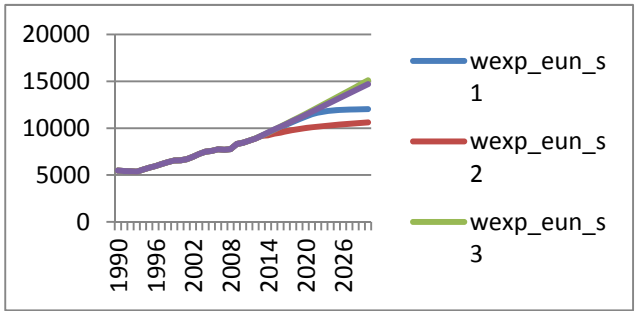


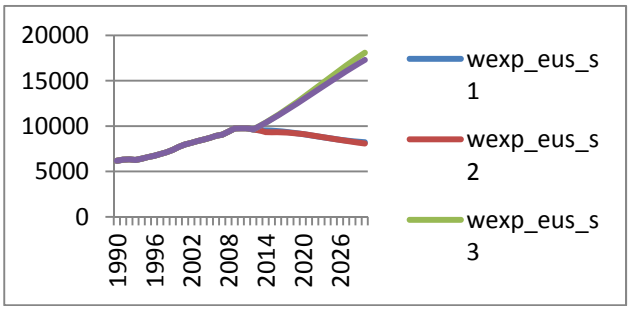


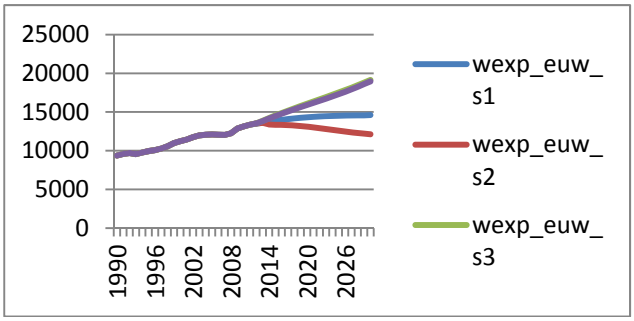


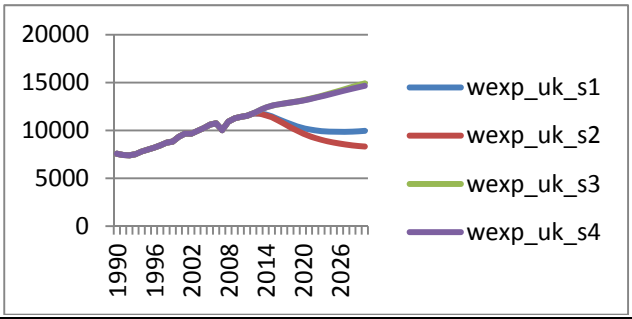
B – Fiscal dominance











Source: WB module projections

Ozdemir *et al*. (2009) analyze the effects of the recession on social exclusion Ozdemir *et al*. (2010) anticipate the potential effects of the recession on the risk of poverty; Ozdemir and Ward (2011) analyze the social effects of the current crisis from the point of view of the employment dynamics with a specific focus on the risk of poverty.

The graphs clearly show the high sensitivity of Welfare expenditure to the alternative specifications of the WB drivers equations. Under the FD hypothesis, a long-run contraction of WEXP is expected in E1 and E2 in all the areas except EUN. Considering E3 and E4, the FD hypothesis implies lower long-run levels of WEXP for EUE and EUW only, while higher levels of expenditure are expected in the other country groups. Such an unexpected result, signaling that the WB "demand" factors highlighted in the BS would be consistent with lower levels of WB expenditure, is due to the particularly strong dynamics of public expenditure in E3 and E4, even if it is basically aligned with the medium term evolution of GDP. Given the relatively stable demographic dynamics across scenarios, the fact that the sensitivity of WEXP dynamics to the public expenditure evolution is higher than the sensitivity to GDP growth explains the apparently paradoxical result of higher welfare expenditure under FD.

The differences in expenditure obtained with the two alternative hypotheses in the four scenarios are summarized in Table 2, reporting the percentage differences in Welfare expenditure obtained under FD with respect to the BS. The table clearly shows that, considering the E1 scenario, the FD hypothesis is expected to lead to a strong contraction of WEXP in all European areas but EUN: -30% in 2030 for EUS, -20% in EUW and EUE, - 17% in the UK. No relevant differences are instead obtained for EUN. The expected contractions in WEXP at the simulation horizon are even stronger under E2 for EUE (-31%) and EUW (-22%) and basically unchanged for the EUS and the UK. Under E2, the FD scenario implies a higher level of WEXP for EUN (+8%). Considering E3 and E4, the FD hypothesis is expected to lead to lower levels of WEXP for EUE (-12% and -19% in E3 and E4, respectively) and EUW (-7% and -10% in E3 and E4, respectively) only. In the other European areas, the FD hypothesis in the "multi speed" and "federal Europe" imply higher levels of Welfare expenditure, in particular for EUS (+22% in E3 and + 12% in E4).

Provided that the demographic structure is rather stable across scenarios, these outcomes reflect the differential dynamics of per capita GDP and government expenditure in E1-E4. In fact, whilst under the FD hypothesis the long-run attractor (i.e. the co-integrating vector) of the different welfare and social protection expenditure components is per capita government expenditure, in the BS the long-run equilibrium of the expenditure components is specified with respect to both demographic indicators and per capita GDP.

Table 2 – Projected Welfare expenditure variations under FD w.r.t. the BS

		2012	2013	2014	2015	2020	2025	2030
	EUE	2.1	3.5	4.1	3.9	-2.9	-11.8	-19.4
	EUN	1.6	3.8	5.8	7.6	13.4	10.1	1.9
E1	EUS	1.9	1.9	2.0	1.8	-6.4	-18.5	-29.1
	EUW	-0.1	-0.6	-0.8	-1.2	-6.2	-13.3	-20.5
	UK	5.6	6.8	6.3	4.6	-6.8	-13.5	-17.2
	EUE	2.1	3.5	0.6	-2.1	-17.5	-26.2	-31.0
	EUN	1.6	3.8	5.3	6.5	9.7	9.9	8.6
E2	EUS	1.9	1.9	1.5	1.9	-3.7	-16.4	-28.0
	EUW	-0.1	-0.6	-1.6	-2.4	-8.6	-15.9	-22.3
	UK	5.6	6.8	6.4	5.3	-7.0	-14.3	-17.8
	EUE	2.1	4.8	6.4	7.1	3.6	-3.4	-11.9
	EUN	1.6	4.0	6.1	7.9	14.2	17.3	17.9
E3	EUS	1.9	6.6	10.4	14.0	24.4	26.3	21.6
	EUW	-0.1	1.2	2.2	2.8	1.1	-2.9	-7.0
	UK	5.6	9.1	10.4	11.1	11.3	12.1	13.0
	EUE	2.1	4.7	6.1	6.4	0.1	-9.5	-18.8
	EUN	1.6	3.9	5.9	7.4	12.4	14.7	14.6
E4	EUS	1.9	6.2	9.8	12.9	19.8	18.1	12.0
	EUW	-0.1	0.8	1.6	1.9	-1.0	-5.3	-10.1
	UK	5.6	9.1	10.5	11.1	10.2	8.4	5.3

Source: WB module projections

The differential dynamics of per capita government expenditure and GDP also explains the fact that welfare expenditure under FD is expected to be higher than under the BS in the short run even for E1

and E2. The positive differences are in fact the result of the slower contraction of government expenditure with respect to GDP in the first periods of the simulation. The reasons of these differences will be clearer after having analyzed the multipliers and the equilibrium properties of the systems in the BS and FD scenario.

4.2 Sensitivity analysis: Welfare expenditure components and government expenditure shocks

In the previous section, the analysis of the sensitivity of WB drivers has been focused on the dynamics of aggregate welfare expenditure considering the four alternative external scenarios E1-E4 and the hypothesis of FD against the BS. Here a further aspect of the model sensitivity is investigated, i.e. the sensitivity of the specific Welfare expenditure components to a persistent variation in government expenditure occurring in 2013. The analysis relies in this case on the evaluation of the dynamic multipliers and is built upon the hypothesis of a one percent increase in public expenditure in all the European areas occurring under E1 and assuming the FD specification for the WB driver equations.

The results of the simulation exercise are summarized in Table A1 in the Appendix, reporting the dynamic multipliers of public expenditure for the specific Welfare components and for social protection and Welfare aggregate expenditures. The long time span considered in the simulation (2013-2030) allows to consider both impact and interim multipliers and to approximate the long-run multipliers. Moreover, results allow an evaluation of the differential impact of shocks to government expenditures on the specific welfare expenditure components in the European areas.

Considering the impact multipliers, low values are obtained for education expenditures (nearly 0.15) and labor market protection expenditures (nearly 0.17) in all the European areas, and for pension expenditures in the UK (close to 0). High values of the impact multipliers are instead obtained for social inclusion expenditures (more than 1) and health expenditures (nearly 0.8). The contemporaneous elasticity of the other components is basically in line with the average contemporaneous elasticity of total Welfare expenditure (between 0.3 and 0.4).

Medium-term multipliers are heterogeneous across country groups and Welfare expenditure components. The highest values at the 2 and 7 years ahead forecast horizon are obtained for EUN and EUW, especially for disability and labor market protection expenditures. The lowest interim

multipliers are instead found for EUE and EUS, in particular for disability, health and unemployment protection expenditures.

Long-term multipliers can be approximated by the values obtained at the 17 years forecast horizon. Nearly all the multipliers are close to the target value of 1, which is implied by the presence of the co-integrating vector relating each long-run Welfare expenditure component to government expenditure. Few exceptions are worth mentioning, i.e. the case of housing expenditure, whose multiplier is on average slightly above 0.8, and that of long-term care expenditure, whose multiplier in on average close to 0.64.

These results indicate that, in the short to medium-term, the Welfare expenditure response to a government expenditure shock is heterogeneous across country groups and welfare components. However, with minor exceptions, the long-run welfare expenditure response is basically in line with the long-run target of government expenditure. Such a result, which is implicit to the econometric implementation of the FD hypothesis, ensures WB projections that are fully consistent with the CAM scenarios.

4.3 Specific multipliers under FD and the BS for WB drivers and WB measure equations

In this section information about short and long-run multipliers for key variables in the systems of equations for WB drivers and WB measures is provided. From the estimated loading coefficients of the ECM representations, information about the implied half-life disequilibrium[11] is also calculated and reported in the tables for WB drivers. Both the BS and FD specifications are considered for the systems of the WB drivers equations. Results are summarized in Table A2a and A2b in the Appendix (for the BS and FD specifications, respectively), whilst those for WB outcomes are summarized in Table A3 in the Appendix, in which the size of the auto-regressive (AR) component is also reported.

Space limitations rule out a detailed description of the short and long-run multipliers for the estimated systems of WB drivers and outcomes. However, some general results are worth

[11] Half life disequilibrium is a measure of disequilibrium persistence, given by the number of periods required to recover half of the distance from the long-run equilibrium position once a shock moves the system away from it. It is calculated from the estimated loading coefficients, or error correction terms, in the ECM representation.

mentioning. First, considering the WB drivers equations, a higher short-term sensitivity to GDP is found in the BS specification with respect to the FD specification. The average sensitivity to per capita GDP is in fact 0.48 in the BS specification and 0.30 in the FD specification.

Second, the average half-life disequilibrium is higher in the FD specification (nearly four years) than in the BS specification (nearly five years), signaling that under fiscal dominance the adjustments to long-run equilibrium positions are slower. These differences explain the differential dynamics of welfare expenditure components in the two alternative hypotheses, and in particular the fact that, in the first years of the projection window, welfare expenditure is higher under FD than under BS even in E1 and E2: the contraction in output associated to the austerity measures implies quicker contractions in expenditure in the BS than in the FD scenario. In other terms, the fiscal dominance hypothesis needs more time to produce its effects.

4.4 Predictive uncertainty: evidence from a stochastic simulation

A further question in the assessment of the statistical reliability of the econometric strategy described above is the analysis of the forecast uncertainty, i.e. the assessment of the predictive error, conventionally defined by the 95% confidence bounds of the projections obtainable by the stochastic simulation of the model. It is worth mentioning that, since the predictive errors of the CAM projections are unknown, results are conditional to the assumption that CAM variables are fixed over repeated samples i.e. they are assumed to be strictly non stochastic. As a result, the predictive uncertainty is entirely produced by the estimation errors of the systems of equations of the WB module and does not change across external scenarios E1-E4. Figures A1 and A2 in appendix compare the statistical significance of the projections obtained for the baseline E1 scenario under both FD and the BS for aggregate welfare expenditure (Figure A1) and for the Gini index of inequality (Figure A2) in the five European country groups[12].

The graphs show a relatively moderate predictive error, such that the forecasted changes in welfare expenditure and inequality can be considered significant according to a standard statistical criterion.

[12] Results on the statistical reliability of the projections do not change much considering other WB drivers or measures and can be obtained upon request from the author.

With the exception of the Gini index in EUE, the sensitivity to the alternative FD and BS hypotheses are also significant, as the mean values associated to a given hypothesis tend to cross the 95% bounds of the alternative hypothesis in all country groups and in a relatively moderate time interval from the base year of the simulation (2012). The forecast errors are comparatively larger under FD hypothesis, signaling a better performance of the BS driver' system specification. This confirms the results of the preliminary descriptive analysis on dynamic sample correlations and basically reflects the higher adaptability to sample data of the BS specification.

Cautions made about the reliability of out of sample forecasts in the presence of possible structural changes due to the implementation of austerity measures in the EU remain valid here: given the present crisis and the ongoing changes in European policy conduct, information on forecast errors in the BS and FD specifications is not a valid indicator on the reliability of one model (hypothesis) with respect to the other, as it is obtained on the basis of historical relations that might not hold in the future.

Overall, sensitivity checks (to scenarios, FD-BS specifications and exogenous shocks to CAM variables), multiplier and persistence profiles analyses and the evaluation of the predictive errors of the model under the alternative FD and BS specifications have shown that the WB module is able to produce statistically reliable results that are sensitive to changes in external and internal scenarios in a economically meaningful way. The directions and the size of the expected changes in Welfare expenditure and WB measures across country groups and scenarios are in fact credible on a priori empirical and theoretical grounds. The long-term projections and simulations obtainable with the WB module, irrespective of their statistical reliability, allow interesting insights into a field of investigation that, to our knowledge, had not yet received a formal assessment under a macroeconomic perspective, and in particular one finalized to the production of long-term WB projections and to the analysis of its sensitivity to policy changes.

The next section summarizes and discusses the results of the projections and simulation exercises.

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5. Selected results

This section is dedicated to the summary of the results of the WB projections in the different scenarios, considering both the BS and the FD specifications of the welfare expenditure systems of equations.

Before providing the details of the WB projections, a brief summary of the projected evolution of each component of welfare expenditure is provided. In a second step, the projected WB evolution in the alternative scenarios is evaluated and discussed for selected WB measures and, for each WB dimension (security, health, education, living standards, equality) by referring to a WB dimension index and to an overall WB index. In a final step, sensitivity of results to an alternative composition of welfare expenditure is evaluated, considering the E1 scenario under FD hypothesis.

5.1 The projected evolution of Welfare expenditure components

Tables A4a-A4d in the Appendix summarize the evolution of real per capita Welfare expenditure in each external scenario (E1-E4) under the BS and FD specifications. In order to improve the readability of results, per capita values are normalized to the base-year of the projections (2011=100).

Considering E1, a dramatic contraction in most welfare expenditure components is expected under FD in EUS and the UK. The contraction expected for 2030 is particularly strong in the family (FAM), health (HEAL), labor market (LMP) and unemployment protection (UN) components, for which real per capita provisions are reduced by nearly 25% on average with respect the 2011 values. These results are fully consistent with the expected reductions in general government expenditure provided by the CAM projections.

The differences between results under the BS and FD hypotheses provide an appreciation of the potential effects of the implementation of strict austerity measures and, for this reason, they are particularly informative within the “struggling on” scenario.

In line with the results highlighted for the aggregate welfare expenditure, the effects of the FD hypothesis for single components of per capita Welfare expenditure are particularly relevant. Considering the 2030 horizon, the differences in expenditure are higher for the country groups in which the fiscal burden is stronger and the expected growth dynamics weaker, i.e. EUS, and the UK.

With the exception of few expenditure components, in particular education (EDU) and housing (HOUS), for these country groups the FD hypothesis implies a reduction in real per capita expenditure within the range of 25 and 50 percentage points. Even if comparatively lower, the FD hypothesis implies a substantial reduction of the expenditure dynamics even in EUW and EUE. Fiscal consolidation does not lead to substantial differences with respect to the BS specification in the EUN group, for which a relative increase in expenditure can be observed in some components, such as education (EDU), housing (HOUS) and labor market protection (LMP).

Considering E2, expenditure tends to be lower than in the baseline "struggling on" scenario E1 in nearly all country groups and for all the welfare expenditure components but labor market and unemployment protection (LMP and UN). The relative contraction is on average higher under the BS specification than under FD, because of the worsened macroeconomic dynamics and the weaker fiscal constraints characterizing the E2 scenario with respect to the E1. The relatively higher labor market protection and employment expenditures under the BS specification are due to the projected labor market performances, that under E2 are expected to be below those under E1.

Considering the "multi speed" scenario E3, the welfare expenditure dynamics is significantly stronger than in the baseline "struggling on" scenario E1 for the entire forecasting interval, in all the country groups and for all the components, except unemployment protection (on average lower by nearly 20% in 2030), because of the improved employment performances. The average 2030 increase in WEXP with respect to the baseline scenario is 13%, with the highest differences being expected for the education, health and long-term care expenditure components (between 25% and 30%), the lowest for the disability (DIS) and social inclusion (SI) components (below 10%).

The "towards federal Europe" scenario E4 reinforces the relatively higher dynamics of welfare expenditure obtained for E3. In this case the average 2030 increase in expenditure with respect to the baseline "struggling on" scenario E1 is 16%, with the highest differences again registered in the education, health and long-term care expenditure components (between 30 and 40%) and an expected reduction in unemployment protection expenditure of nearly 25%.

Such a heterogeneous dynamics in real per capita welfare provisions is expected to have some effects on future WB. The next section summarizes the results for WB outcomes from the perspective of selected WB measures and each WB dimensions.

5.2 The projected evolution of selected WB measures

In this stage of the analysis, the projections of specific WB measures are considered. Differently from the preceding analyses, WB measures are not normalized at the base year of the simulations, and thus their actual values are reported. This choice makes the readability of results a bit more tedious, but allows an immediate comparison of the projections with the information available from the official statistical sources used in the estimation stage. Tables A5a-A5d in the Appendix summarize the results of the projections in the E1-E4 scenarios for nine selected WB measures: the life expectancy at birth (LEB) and the healthy life at birth (HLB) for the health dimension (the non healthy life at birth NHLB is deterministically determined from these measures and thus not considered in the tables); the drop-out rate (DOR), the expected years of schooling (EYS) and the tertiary education rate (TEER) for the education dimension; the deprivation rate (DEPR) for the living conditions, social inclusion and employment dimension (the employment rate ER and the economic dependency rate ECDR are deterministically defined by the CAM projections, already described in section 2); the poverty rate (POVR), the Gini index (GINI) and the elderly relative median income (ERMI) for the equality dimension.

Overall, WB measures respond to the changing scenarios in the expected direction and the size of the changes is reasonable on a priori grounds and on the basis of the historical changes. The amount of information summarized in tables A5a-A5d rules out a detailed description of the projections for WB measures. Taking the perspective of the single WB dimension, it is however possible to highlight some key WB measure results that would merit a specific focus.

First, health measures appear the less sensitive to the changing scenarios and hypotheses, denoting an upward trend in all scenarios, even if substantial differences in long-run outcomes are obtained. Considering the worst and the best scenarios (E2-FD and E4-BS), the projections for the 2030 horizon show an average difference in life expectancy (LEB) of about 3 years, with LEB being less favorable in the worst scenario (nearly 3.5 in EUS and EUW) and an average difference in expected healthy life (HLB) of about 6 years, again in the expected direction of a reduced dynamics in the worst scenario (6.8 in EUE).

Second, education measures denote a reasonable sensitivity to the changing scenarios, especially for the tertiary education enrollment rate (TEER). Considering the worst and the best scenario for this dimension (E2-FD and E4-FD), the projected 2030 differences in DOR are on average close to 3.5 percentage points (6.4% in EUS and 5% in the UK), with DOR increasing in the worst scenario.

Those for the expected years of schooling (EYS), reduced in the worst scenario, are on average about 2 years (2.5 in EUE) and those in the tertiary education enrollment rates (TEER), reduced in the worst scenario, close to 12% (24% in EUE and 20% in EUN).

Third, the measures capturing standards of living, social inclusion and employment denote high sensitivity to the changing scenarios. The differences between the E2-FD and the E4-FD scenarios at horizon 2030 are on average close to 5% for the material deprivation rate DEPR (higher in the worst scenario) and heterogeneous across country groups (about 12% in EUE and 1.5% in EUN), as are those for the economic dependency rate, whose dynamics has been already described in section 2.

Fourth, WB measures describing the poverty and income inequality dimension are also quite sensitive to the changing scenarios. The difference between the E2-FD and the E4-FD in the risk of poverty rate (POVR) at the 2030 horizon is on average close to 8%, higher in the worst scenario, but 14% in EUE and 3% in EUN. Analogous considerations hold true for the Gini index (GINI), denoting a sizeable variability across scenarios. The differences between the E2-FD and the E4-FD scenarios are on average close to 4 points of the index (higher in the worst scenario), and heterogeneous across countries (6.5% in EUS, 6% in the UK and only 0.3% in EUN). Considering the same extreme scenarios (E2-FD and E4-FD), the difference in the elderly relative median income at the 2030 horizon is expected to be on average 11%, lower in the best scenario, with sizeable differences across countries (27% in the UK and close to only 1% in EUE).

Even if the reliability of long-run projections for aggregate WB measures can be highly debatable on a purely quantitative ground, the general interpretability and reasonability of results suggests to consider the information they provide to be relevant in the anticipation of the future qualitative trends in WB, as well as in the evaluation of the potential social effects of the ongoing changes in the macroeconomic environment and in the European policy conduct.

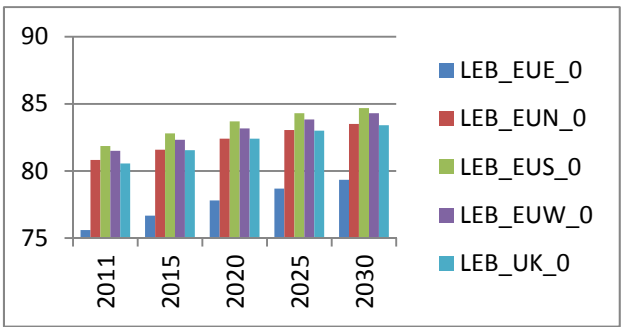
In order to improve the readability of WB results, Figure 5 compares selected WB outcomes under the “struggling on” E1 scenario considering the FD specification (i.e. the baseline scenario under fiscal dominance) with those emerging in the “federal Europe” E4 scenario under the BS specification. The attention is focused on the most representative WB measures for each dimension, i.e. the life expectancy at birth (HLB), the tertiary education enrolment rate (TEER), the material deprivation rate (DEPR) and the risk of poverty rate (POVR).

The graphs show that, under the "struggling on" scenario with fiscal dominance (E1-FD), generalized improvements in WB are obtained only in LEB. Considering the TEER measure of educational WB, increases are expected to take place only in EUN and, marginally, in EUE. The predicted TEER evolution is stable in EUW and decreasing in EUS and in the UK. A similar dynamics is expected for the DEPR measure, for which a clear reduction is evident only for EUE and EUN. An increase in material deprivation is expected for the UK. With the exception of EUN, the risk of poverty is expected to remain basically stable in the simulation interval, with evidence of a slight increase in the last years of the projection period. The favorable WB outcomes expected for EUE and EUN have different explanations. Whilst the expected improvements in EUE WB basically reflect the persistence of the convergence process to central European standards experienced since the European enlargement, improvements of WB in EUN are the result of the fact that the macroeconomic slowdown and the fiscal consolidation processes affect only marginally the countries in the northern European cluster.

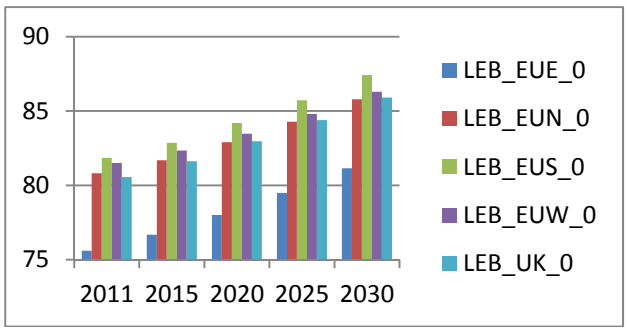
These dynamics, even if not signaling an overall contraction in European WB in the next twenty years (some evidence in this direction is present for the UK), actually define an important break when considered from the historical perspective, since they basically define an important slowdown (if not a stop or inversion) of the positive outcomes characterizing the past evolution of WB measures in European countries. The relevance of such a slowdown in WB evolution can be better appreciated by assuming a comparative perspective.

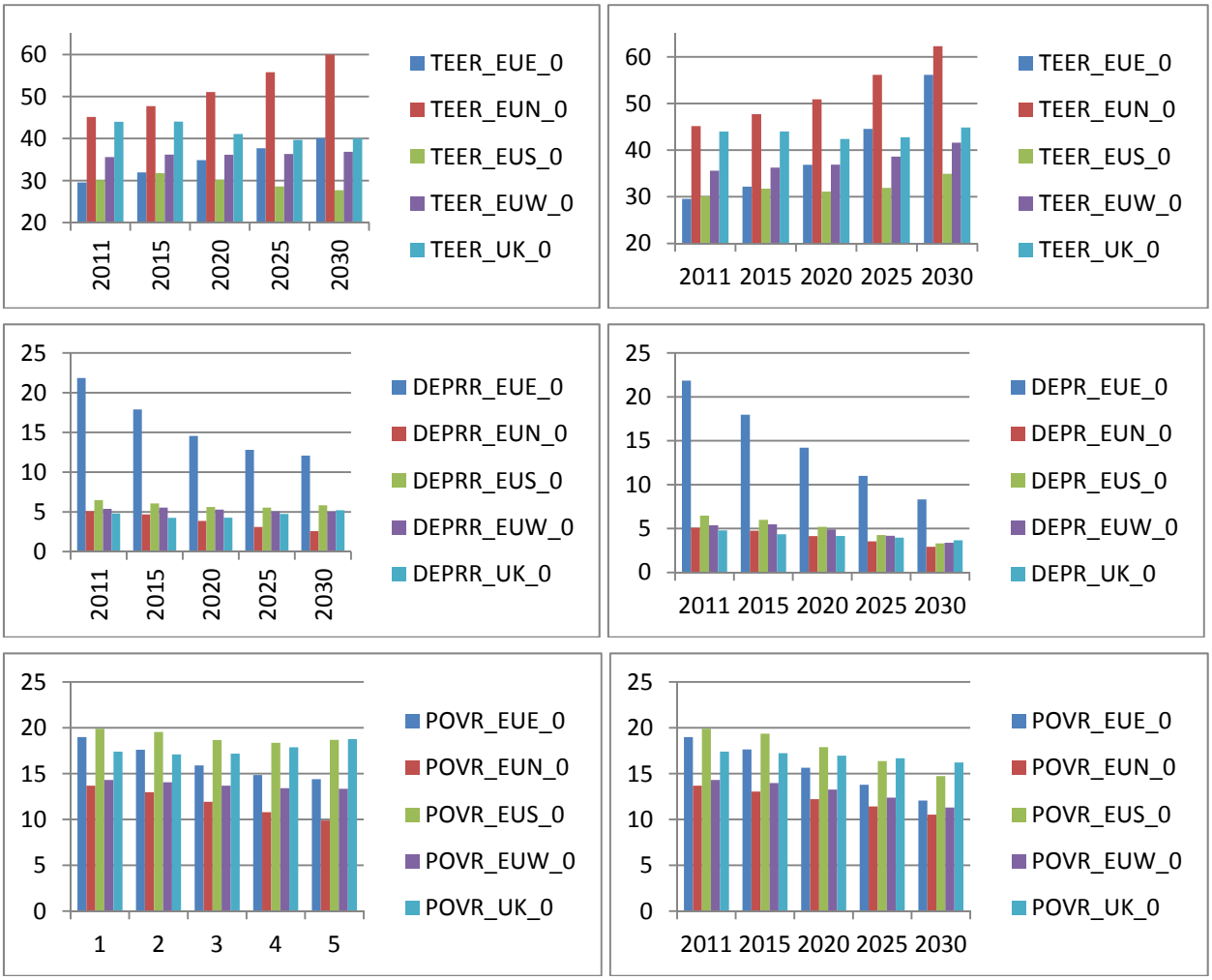
Figure 5 – Selected WB results in E1-FD and E4-BS

E1-FD



E4-BS





Source: WB module projections

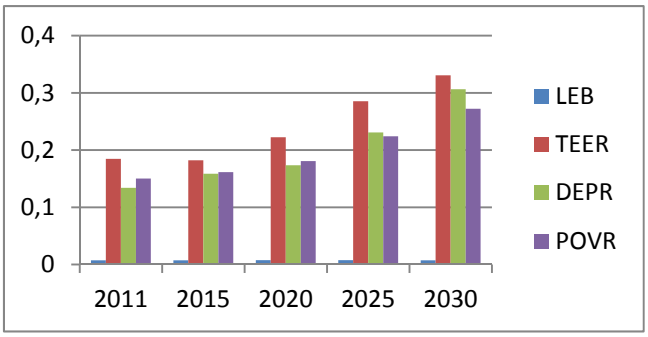
Under the "federal Europe scenario" in the baseline specification of welfare equations (E4-BS), according to which a generalized convergence to the pre-crisis macroeconomic dynamics is expected to take place, a positive evolution of the entire set of the selected WB measures is expected to take place in the simulation window, especially after 2020. Such a positive evolution is however below the dynamics experienced in the pre-crisis period.

An interesting issue emerging from the results of the selected WB measures is provided by the clear evidence of WB divergence across countries groups under the E1-FD scenario. Moreover, considering the favorable E4-BS scenario, there are not clear symptoms of convergence in WB measures. The convergence issue is synthetically summarized in Figure 6, where a measure of cross-

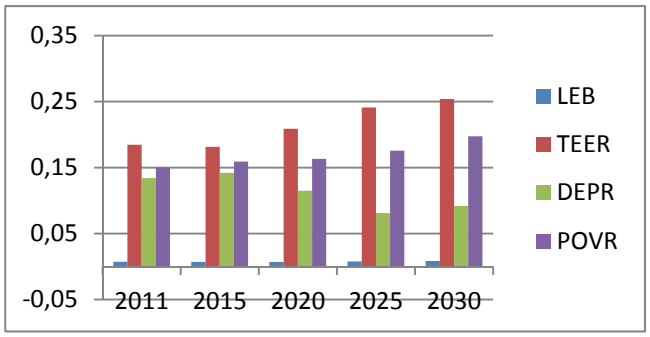
country groups WB dispersion (i.e. the coefficient of variation) is reported for each selected WB measure at different simulation horizons[13].

Figure 6 – WB convergence: cross-country groups variability for selected WB measures

E1-FD



E4-BS



Source: Elaborations on WB module projections

The graphs clearly indicate that, except for LEB, strong divergence in WB outcomes is expected to characterize the future European evolution in the "struggling on-fiscal consolidation" scenario E1-FD. This result is particularly relevant as it highlights the potential "collateral" social damages, thus the desirability and social sustainability, of the present economic policy decisions.

Interestingly, with the exception of the material deprivation rate DEPR, a moderate divergence is expected also under the more favorable "federal Europe scenario", in particular for the TEER. This result highlights that, in line with the historical evidence on European WB, absent specific and coordinated interventions in national welfare systems, the increased financial resources devoted to social Europe under the E4-BS scenario are expected to be fruitless in moderating the heterogeneity in WB outcomes across Europe by stimulating a clear process of social convergence.

5.2 The projected evolution of WB dimension indicators and of aggregate WB

After having described some selected results for specific WB measures, projected WB indexes for each WB dimension can be considered. Consistently with the strategy adopted in the analysis in

[13] The eastern European group is excluded from the analysis, in order to focus the attention on a more homogeneous set of countries.

section 2.4, a composite indicator for each WB dimension is calculated. The indicators are obtained as averages of the specific WB measures, after that the scale effects of the specific measures are removed and the correct signs in the definition of WB are restored[14]. Based on these indexes, an aggregate WB indicator is also obtained as the average of the different indexes. Tables 3a-3d summarize the results for each WB dimension and for the aggregate WB index in the different scenarios E1-E4.

Table 3a – Projected WB dimensions under the BS and FD in scenario E1. 2011 = 100

		BS				FD			
WB DIM		2015	2020	2025	2030	2015	2020	2025	2030
Health	EUE	102	103	105	107	102	103	105	106
	EUN	102	103	104	106	102	103	103	104
	EUS	101	102	104	105	101	102	103	103
	EUW	101	103	104	106	101	102	103	104
	UK	101	103	104	106	101	102	103	103
Education	EUE	117	132	145	157	117	132	143	152
	EUN	107	115	124	133	107	116	128	138
	EUS	111	107	105	107	112	112	111	105
	EUW	103	104	107	112	103	104	106	108
	UK	99	98	96	96	100	99	97	96
Liv std, soc in & empl	EUE	116	128	137	145	117	131	139	142
	EUN	105	112	120	128	106	119	130	138
	EUS	104	109	114	121	104	110	111	109
	EUW	98	103	110	118	98	102	105	106
	UK	106	104	104	106	108	108	102	95
Pov&Ineq	EUE	101	102	103	105	101	103	102	101
	EUN	101	103	104	105	102	105	109	111
	EUS	99	97	98	100	99	96	93	90
	EUW	101	101	102	104	101	100	99	97
	UK	97	92	90	90	98	93	87	83
WBT	EUE	109	116	123	128	109	117	122	125
	EUN	104	108	113	118	104	111	118	123
	EUS	104	104	105	108	104	105	104	102
	EUW	101	103	106	110	101	102	103	104
	UK	101	99	99	99	102	101	97	94

Source: WB module projections

The aggregate index of WB (WBT) shows a general sensitivity of WB to the different scenarios and to the alternative BS and FD specifications. Unsurprisingly, WB is expected to be at its lowest levels

[14] In practice, measures that negatively affect WB, i.e. deprivation rates, poverty rates etc. are changed in sign.

under E2 and at its maximum under E4. The projections confirm the FD hypothesis to be decisive for WB results, especially under the worst scenarios E1 and E2.

In the E1 scenario and under FD hypothesis, in 2030 WBT is expected to be below its initial value in the UK, persistently declining after 2020 in EUS, and basically unchanged in EUW. Clear increases are expected for EUE and EUN. The contraction is evident in the UK (-6%) and, after 2020, moderate in EUS (-3%). A 4% increase is expected for EUW, while a nearly 25% increase in WB characterizes the projection for EUE and EUN. These differences reflect the projected evolution of welfare expenditure and per capita GDP. The expected contraction in WBT associated to the fiscal austerity hypothesis in E1 is of 6% in EUS and in EUW, 5% in the UK and 3% in EUE. The FD hypothesis leads to a 5% increase in WBT in EUN.

Considering the single WB dimensions, in E1 a moderate increase in health is expected in all country groups irrespective of the BS-FD specification.

The WB index for the education dimension is expected to be lower than its initial value in the UK (-4% under both the BS and the FD hypotheses).

A substantial increase in living standards, social inclusion and employment is expected in all country groups but the UK in the FD specification, where a 5% contraction is projected at the simulation horizon. The positive dynamics of this WB dimension is almost entirely driven by the projected evolution of the employment rate, dominating also the dynamics of the economic dependency rate, given the relatively stable demographic structure across scenarios.

The poverty and inequality WB measure in 2030 are below their 2010 values in the UK (-17% under FD and -10% under BS), in EUS (-10% under FD and -0.4% under BS) and in EUW (under FD only, -3%). The aggregate index is expected to remain basically unchanged for EUE, while a 5-10% increase is expected for EUN.

The observed reduction or stagnation in aggregate WB is thus mostly driven by the expected worsening of the educational and the poverty and income inequality conditions, taking place mostly in the UK and in EUS, respectively. It is worth highlighting that, even if negative developments in poverty and inequality are expected also under the BS, the FD hypothesis turns out particularly relevant for results. The projected differences under FD at the simulation horizon are of -10 percentage points for EUS, -7 percentage points for EUW and the UK and -4 points for EUE.

Considering the "EU break up" scenario E2, a general contraction in WB is expected under the FD specification for EUW and the UK. On average, the aggregate index contraction with respect to the "struggling on" scenario E1 is of 6% under the BS specification and 8% under FD. With respect to the initial values, the expected 2030 contraction in WBT under the FD specification (FD) is 15% in the UK, and 7% in EUW, 4% in EUE. A moderate increase in WBT with respect to initial values is expected for EUN, while a relatively stable dynamics characterizes the WBT evolution in EUS. The worsening of WB outcomes under E2-FD is particularly strong for EUW, basically because of the high sensitivity to the competitive devaluations and the protectionist measures implied by the breakdown of the EMU and the single market rules.

Table 3b – Projected WB dimensions under the BS and FD in scenario E2. 2011=100

		BS				FD			
WB DIM		2015	2020	2025	2030	2015	2020	2025	2030
Health	EUE	102	103	104	106	102	103	103	104
	EUN	102	103	104	105	101	102	102	103
	EUS	101	102	103	104	101	102	102	102
	EUW	101	103	104	105	101	102	103	103
	UK	101	103	104	105	101	102	102	102
Education	EUE	113	119	120	121	113	118	118	117
	EUN	104	106	106	106	104	106	108	109
	EUS	105	106	106	105	105	109	113	110
	EUW	101	102	102	100	101	102	101	98
	UK	100	102	99	92	100	103	101	94
Liv std, soc in & empl	EUE	116	120	125	131	117	119	113	106
	EUN	105	105	109	113	106	111	118	124
	EUS	104	106	112	117	104	108	111	107
	EUW	98	97	100	103	97	95	90	82
	UK	106	100	93	86	108	105	90	71
Pov&Ineq	EUE	101	99	99	101	101	96	90	85
	EUN	102	101	101	101	102	103	105	106
	EUS	99	96	95	97	99	96	92	87
	EUW	101	100	99	99	101	98	94	90
	UK	97	90	85	83	99	91	82	74
WBT	EUE	108	110	112	115	108	109	106	103
	EUN	103	104	105	106	103	106	108	110
	EUS	102	103	104	106	102	104	104	101
	EUW	100	100	101	102	100	99	97	93
	UK	101	99	95	91	102	100	94	85

Source: WB module projections

With respect to the baseline E1 scenario, differences are particularly sizeable for the living standards, social inclusion and employment dimension, for which the E2 scenario under FD implies, with respect to the E1-FD scenario, a further index contraction of 36% for EUE, 24% for EUW and the UK, and of 14% for EUN. No relevant differences are instead expected for EUS.

A strong contraction relative to the E1-FD scenario is also expected in the education index for EUE and EUN (-35% and -29%, respectively).

Considering the "multi speed" E3 scenario, a general increase in aggregate WB is expected in all country groups but in the UK for the poverty and inequality dimension under the BS specification. The expected 2030 WBT improvement (under the BS specification) with respect to the 2010 values is of 39% for EUE, 24% for EUS, 21% for EUN, 16% for EUW and 5% for the UK. The adoption of the FD specification leads to higher increases in EUN (28%) and in EUS (38%).

Compared to the baseline E1 scenario, the S3-BS hypothesis implies a 2030 increase of WBT of 8% for EUE, 3% for EUN, 6% for EUS and 5% for EUW and the UK.

Table 3c – Projected WB dimensions under the BS and FD in scenario E3. 2011=100

		BS				FD			
WB DIM		2015	2020	2025	2030	2015	2020	2025	2030
Health	EUE	102	104	106	108	102	104	106	107
	EUN	102	103	105	107	102	103	104	105
	EUS	101	103	104	106	101	103	104	105
	EUW	101	103	104	106	101	103	104	105
	UK	101	103	104	106	101	102	104	105
Education	EUE	117	133	153	180	117	134	154	178
	EUN	107	115	126	138	107	117	131	147
	EUS	112	115	127	150	114	126	150	183
	EUW	103	106	112	120	103	107	114	122
	UK	100	102	104	107	101	105	109	114
Liv std, soc in & empl	EUE	117	132	145	156	118	136	149	159
	EUN	105	114	124	134	107	120	134	146
	EUS	107	116	127	138	107	123	140	153
	EUW	99	107	117	128	100	109	119	128
	UK	108	111	113	116	110	119	124	130
Pov&Ineq	EUE	101	104	107	111	102	106	110	111
	EUN	101	103	105	107	102	105	110	114
	EUS	99	98	100	103	101	104	108	113
	EUW	101	103	106	109	102	104	106	108
	UK	97	94	92	92	100	98	99	100
WBT	EUE	109	118	128	139	110	120	130	139
	EUN	104	109	115	121	104	111	120	128

EUS	105	108	115	124	106	114	126	138
EUW	101	105	110	116	101	106	110	116
UK	102	102	103	105	103	106	109	112

Source: WB module projections

These differences in aggregate WB outcomes are the result of the high sensitivity of some WB dimensions to the changing scenarios. In particular, considering the E3-BS junction, the deviations from the baseline scenario in the BS specification are mostly driven by the expected improvements in the living standards, social inclusion and employment dimension, as well as in education, that are expected to take place in each country-group except the EUN. Considering the E3-FD scenario, relevant improvements are also expected in the poverty and equality dimension, again with the exception of EUN. Only moderate improvements (below 5%) are expected in the health WB dimensions. The relevance of the FD hypothesis for the poverty and inequality WB dimension index is the result of its high sensitivity to welfare expenditure, given its moderately negative sensitivity to GDP growth[15].

Table 3d – Projected WB dimensions under the BS and FD in scenario E4. 2011=100

		BS				FD			
WB DIM		2015	2020	2025	2030	2015	2020	2025	2030
	EUE	102	104	106	109	102	104	106	108
	EUN	102	103	105	107	102	103	104	105
Health	EUS	101	103	105	107	101	103	104	105
	EUW	101	103	104	106	101	103	104	105
	UK	101	103	105	106	101	102	104	105
	EUE	117	137	162	198	117	137	161	190
	EUN	107	116	128	142	107	117	132	150
Education	EUS	112	117	134	162	114	127	153	189
	EUW	103	107	114	124	103	107	115	125
	UK	100	103	106	112	101	106	110	117
	EUE	117	133	147	159	118	137	150	159
Liv std,	EUN	105	115	124	134	107	121	134	145
soc in &	EUS	107	117	129	140	107	124	140	152
empl	EUW	99	108	118	130	100	109	118	128
	UK	108	111	115	120	110	119	125	131
Pov&Ineq	EUE	101	104	108	112	102	106	109	110

[15] Increases in per capita GDP, *coeteris paribus*, lead to moderate increases of the Gini index, thus to the reduction of the equality WB index.

	EUN	101	103	105	107	102	105	110	114
	EUS	99	98	100	104	101	103	108	111
	EUW	101	104	107	110	102	104	106	108
	UK	97	94	93	93	99	98	98	99
	EUE	109	120	131	145	110	121	132	142
	EUN	104	109	116	122	104	111	120	129
WBT	EUS	105	109	117	128	106	114	126	139
	EUW	101	105	111	118	101	106	111	116
	UK	102	103	104	108	103	106	109	113

Source: WB module projections

Considering the "federal Europe" E4 scenario, the general increase in aggregate WB at the 2030 horizon under E3 is confirmed. Only for the UK the WB outcomes at the 2030 simulation horizon are poor with respect the initial values (8% under the BS and 13% under FD). The increase in WBT with respect to initial values is at its maximum for EUE (45% under the BS and 42% under FD) and for EUS under both FD (39%) and BS (28%). On average, the FD hypothesis maximizes aggregate WB, given the higher welfare expenditure dynamics characterizing the FD hypothesis within the E4 scenario, especially in EUS and EUN. The insensitiveness of WBT to the E4 scenario for the UK (results are basically aligned to those obtained in E3) reflects the fact that the "federal Europe" scenario does not include the UK in the federal process.

Compared to the baseline "struggling on" E1 scenario, the hypothesis of convergence to a federal Europe implies an increase in the aggregate WB index for all country groups, basically of the same size obtained under E3. The increase is only moderate for EUN and the UK under the BS and for EUN under FD. The E4 scenario implies an appreciable increase also in the education WB index for both the BS and FD specifications and for all country groups except for the UK. The expected increase in the educational dimension of WB under S4-FD with respect to S1-FD is 38% for EUE.

5.4 Policy simulation: changing the composition of Welfare expenditure

The baseline E1 scenario assumes that the European countries will continue to "struggle on" without relevant modifications in the present policy conduct and changes in monetary and fiscal agreements. The implementation of austerity programs in southern countries and in the UK are expected to lead these areas in a persistent economic stagnation, also propagating to the other European country groups. The analysis of the sensitivity of welfare expenditure and WB outcomes to scenarios and the

projections discussed so far show that the baseline "struggling on" scenario has relevant implications for WB in nearly all country-groups, especially under the fiscal dominance (FD) hypothesis.

In this section a policy simulation exercise is proposed. By assuming the perspective of the baseline "struggling on" scenario under fiscal dominance (i.e. E1-FD), a move towards a different composition of welfare expenditure is hypothesized.

The projections presented above assume that no relevant changes in welfare composition will occur in the regulatory set-up in the simulation period. This hypothesis, given the ongoing changes and austerity measures being implemented in most European countries, is quite strong, since it basically imposes a generalized contraction in all welfare components. The recent experience in a number of European countries shows that this is not always the case, since fiscal austerity measures have been directed mostly to the biggest fragments of public expenditure, such as pension and health expenditure. With respect to the former, it should be highlighted that a number of European countries have already reformed the public pension systems, both making the eligibility conditions more severe, and reducing the future replacement rates in pension provisions. These facts are not taken into account in the projections presented so far.

In order to test the sensitivity of results to a change in the composition in Welfare expenditure, a long-term (structural) reduction of 10% in pension expenditure and of 5% in health expenditure are assumed, and public savings are directed to the other Welfare expenditure components according to their relative share in total Welfare expenditure. The changes in the composition are introduced quite gradually, beginning in 2013 and fully completed in 2017. In the long-term, this hypothesis implies an increase in expenditure for the other components of 13.7% for EUE, 7.2% for EUN, 13.1% for EUS, 10.2% for EUW and 10.8% for the UK.

Table 4 summarizes the simulation results for the WB measures considered in the analysis, focusing on the percentage deviations from baseline, i.e. from the scenario E1-FD. Results show a limited sensitivity to the changing composition of Welfare expenditure, and the direction of the changes is not homogeneous across measures and country groups.

The effects on the health WB dimension measures are basically irrelevant and opposite in sign: positive for LEB (but no more than 0.1% at the 2030 horizon) and negative for HLB (no more than -0.1%). This result is due to the different relative sensitivity of the two WB measures to health expenditure (reduced) and long-term care expenditure (increased)

Diversely, all the education WB dimension measures move in the expected direction (negative for DOR and positive for EYS and TEER) in all country groups and in all periods, basically because of the dominance of the effects of the increase in education expenditure. The highest responses in DOR are observed for EUE and the UK (-2.6% at the 2030 horizon), the smallest for EUW (-0.5%). Considering EYS, the maximum increase is observed in 2020 in EUE, EUS and the UK (0.8%, 0.7% and 0.9%, respectively). The effects on TEER are quite sizeable in EUE (3.1% in 2025), EUS and in the UK (2.2% and 2.1%, respectively, in 2020).

The effects on the living standards, social inclusion and employment WB dimension measures are again heterogeneous over time and across country groups. The material deprivation rate (DEPR) increases persistently in EUS and EUW (0.8% and 4.2%, respectively, at the 2030 horizon) whereas a moderate long-term-decrease following the initial increase is observed for EUE and the UK (-2.1% and -1.5% at the 2030 and 2025 horizons, respectively).

Table 4 – Response in WB measures to a modified composition of WEXP (% deviations)

		2013	2014	2015	2016	2017	2020	2025	2030
LEB	EUE	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
	EUN	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1
	EUS	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1
	EUW	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
	UK	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1
HLB	EUE	0.0	0.0	-0.1	-0.1	-0.1	-0.2	-0.1	0.0
	EUN	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0
	EUS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1
	EUW	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1
	UK	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0
DOR	EUE	0.0	0.0	-0.1	-0.7	-1.3	-2.7	-2.3	-2.6
	EUN	0.0	0.0	0.0	-0.2	-0.4	-0.6	-1.4	-1.4
	EUS	-0.3	-0.6	-0.7	-0.8	-0.9	-0.7	-1.7	-1.9
	EUW	0.0	0.0	-0.3	-0.6	-0.8	-1.2	-1.4	-0.5
	UK	0.0	-0.1	-0.5	-1.0	-1.5	-2.2	-2.5	-2.6
EYS	EUE	0.1	0.2	0.3	0.5	0.7	0.8	0.8	0.6
	EUN	0.0	0.0	0.0	0.0	0.1	0.4	0.5	0.3
	EUS	0.0	0.0	0.1	0.2	0.3	0.7	0.8	0.6
	EUW	0.0	0.1	0.2	0.3	0.4	0.6	0.5	0.3
	UK	0.1	0.2	0.3	0.5	0.6	0.9	0.8	0.7
TEER	EUE	0.1	0.3	0.6	1.0	1.5	2.7	3.1	2.3
	EUN	0.0	0.0	0.0	0.0	0.2	0.9	1.1	0.8
	EUS	0.0	0.1	0.3	0.7	1.1	2.2	2.2	1.5
	EUW	0.0	0.0	0.1	0.2	0.5	1.4	1.3	0.8

	UK	0.1	0.3	0.5	0.8	1.2	2.1	2.1	1.6
DEPR	EUE	0.0	0.1	0.2	0.3	0.4	0.3	-1.0	-2.1
	EUN	0.0	0.0	0.1	0.2	0.2	0.1	-0.1	0.0
	EUS	0.0	0.0	0.0	0.1	0.2	0.5	0.7	0.8
	EUW	0.0	0.0	0.0	0.1	0.2	1.1	3.2	4.2
	UK	0.0	0.0	0.1	0.1	0.1	-0.6	-1.5	-1.4
POVR	EUE	0.0	0.0	0.1	0.2	0.2	0.3	-0.3	-0.9
	EUN	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.0
	EUS	0.0	0.0	0.0	0.1	0.1	0.3	0.4	0.5
	EUW	0.0	0.0	0.0	0.0	0.1	0.5	1.5	2.2
	UK	0.0	0.0	0.1	0.1	0.1	-0.1	-0.5	-0.6
GINI	EUE	0.0	0.0	-0.1	-0.1	-0.2	-0.5	-0.4	-0.1
	EUN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
	EUS	0.0	0.0	0.0	0.0	0.0	0.1	0.5	0.6
	EUW	0.0	0.0	0.0	0.1	0.1	0.5	1.0	0.9
	UK	0.0	0.0	-0.1	-0.3	-0.4	-0.7	-0.2	0.3
ERMI	EUE	0.0	0.0	0.0	-0.2	-0.4	-1.1	-1.3	-1.1
	EUN	0.0	0.0	-0.1	-0.1	-0.1	0.0	0.0	-0.5
	EUS	0.0	0.0	0.0	0.0	0.0	-0.6	-1.7	-2.0
	EUW	0.0	0.0	0.0	-0.1	-0.3	-1.2	-3.0	-3.6
	UK	0.0	-0.1	-0.3	-0.6	-1.0	-1.8	-1.0	-1.3

Source: WB module simulations. % deviations from baseline E1-FD are reported

These different effects are the result of the different relative sensitivity of DEPR to pension expenditure (reduced) and other social protection provisions such as social inclusion, family and unemployment protection expenditure (increased). Results for the ERMI measure are clear-cut. Given its strong relation with the pension expenditure dynamics, strong reductions are expected, especially in country groups where public pension transfers are an important source of income on the elderly (EUW and EUS)

Results for the poverty and inequality dimension's measures are - even in this case - different over time and across country groups. Substantially heterogeneity in results is obtained for POVR, for which a long-term increase is obtained for EUS and EUW (0.5% and 2.2%, respectively) and an opposite long-term effect is obtained, again following an initial increase, for EUE and the UK (-0.9% and -0.6%, respectively, at the 2030 horizon). Even in this case, heterogeneity in results is explained by the heterogeneous sensitivity to the different social protection provisions affecting the living standard measures. The Gini index increases persistently in EUS and EUW (0.6% in 2030 and 1% in 2025, respectively); a moderate but positive long-term response is observed for the UK (0.3% in

2030), following an initial decrease peaking in 2020 (-0.7%); a persistently negative response is observed for EUE (-0.5% in 2020), whereas a virtually zero response is obtained for EUN.

These results, aside from their statistical significance and the distortions implied by the recursive structure of the simulation[16], provide useful indications on the potential directions of the changes in WB associated to specific measures affecting the composition of Welfare expenditure.

According to our model, a (reasonable) permanent and gradual contraction in pension and health expenditures leading to an average increase of 10% in the other Welfare provisions does not necessarily lead to an increase in WB. With the exception of the education dimension, for which general positive effects can be identified, the effects on other WB measures are not clear-cut. Positive but basically irrelevant effects are obtained for the living standards dimension measures in EUE and in the UK, whereas negative effects are obtained in EUS and EUW (quite sizeable for the latter area). Similar results characterize the response of the poverty and inequality measures. The contraction in pension incomes dominates the effects associated to the increase in the other social protection measures in the southern and western countries, while the opposite holds true in the eastern countries and in the UK. No relevant effects are observed for the northern cluster.

These differences are likely to be related to the economic and social relevance of the public pension systems in welfare expenditures of western continental and Mediterranean countries and to the more balanced composition of Welfare expenditure in the other areas.

6. Conclusions

The description of the methodology adopted in the econometric implementation of the WB module, the analysis of the sensitivity of its projections to alternative hypotheses and the results obtained under the external and the internal scenarios, have provided encouraging indications about the potential uses of the tool as a useful specification of the demographic and macroeconomic projections produced by the CAM.

[16] The WB module is post-recursive with respect to the CAM model, thus modifications in its structure or hypotheses do not feed-back into the macroeconomic relations defining the variables in the CAM.

From the analysis of simple dynamic sample correlations it has first been verified the viability of linking the evolution of welfare expenditure to the dynamics of demographic, macroeconomic and fiscal policy indicators and, most importantly, the evolution of WB measures to that of its closest drivers, i.e. labor market indicators, macroeconomic variables and welfare expenditure components.

By adopting a weakly structural perspective, the methodological approach described has thus been implemented in an econometric model linking CAM variables to WB drivers and the latter to WB measures.

The sensitivity and multipliers analysis has shown the existence of reasonable degrees of sensitivity of the projections to external and internal scenarios, with long-term changes that resulted statistically relevant in nearly the entire set of measures and of country groups considered in the analyses. Moreover, the economic interpretability of results across country-groups has shown that the heterogeneous transmission mechanisms across country groups can be justified on the basis of the specificities of the areas considered in the analyses.

The projection outcomes obtained under the different European scenarios and the simulation results obtained with a varied composition of welfare expenditure provides a rich set of information that, albeit not fully exhaustive, can be used as a support in analyses oriented to the identification of key policy issues and to the calibration of policy interventions and recommendations.

The WB module has thus the potential of providing internally consistent information on specific WB issues that are generally overlooked in standard macro-simulation and projection analyses. The discussion on policy issues and visions can in fact be related to each WB dimension taken into account in the analysis, such that the main arguments emerging in the economic, sociological and political debate on Social Europe can be supported by a quite specific information. The choice of providing a separate analysis for each well-being dimension is in fact consistent with the aim of considering more specialized arguments, i.e. the key issues emerging in the debate on the future of the health, the education and poverty and equality dimensions as well as on the future trends in living standards and social inclusion.

An important feature of the WB module is that it allows a joint consideration of social along with financial sustainability issues. This perspective appears as particularly relevant considering the present economic and financial crises faced by European countries. Absent fundamental changes in

the policy conduct at the national and European levels, most countries, and in particular those belonging to the southern and eastern blocks, are expected to go into a process of deep fiscal consolidation that will seriously limit their possibility of getting the necessary resources to finance the present levels of social protection and welfare intervention in the short to medium term. These countries will presumably be faced with a financial/social sustainability trade-off.

These considerations, according to the maintained scenarios for Europe, are particularly challenging, since relevant institutional changes will probably be required, irrespective of their direction. The continuation of the present policy agenda (defined in Scenario S1) is neither probable nor desirable considering the persisting structural differences (economic and institutional) across European countries and the absence of effective balancing mechanisms. These circumstances are likely to eventually lead to increased internal regionalization (as in the case of the S2 scenario), with potentially dramatic impacts on social conditions and WB in the most vulnerable countries, or to a process towards increased political and institutional integration (as in the case of the S4 scenario), in which an intermediate stage characterized by a "transfer union" set-up will be required. These prospective changes will necessarily lead to a deep rethinking of the European goals and/or of the national and Community institutions, thus requiring political along with economic vision.

The junction between the prospective well-being evolution under the alternative scenarios and the political issues sketched above can be analyzed in the light of the implied challenges for Social Europe. From this junction important policy issues are expected to emerge, such as the long-term sustainability of the present social standards, the problem of the sufficiency of cohesion and social policies under fiscal austerity for WB improvements and convergence. The conflict between budgetary policies and the need of economic growth and social inclusion, the potential conflict between policies stimulating the elderly participation to the labor market and the need of challenging youth unemployment during a recession, as well as the evident problematic relation between labor market flexibility and the erosion of the contributions to the welfare systems are only few of the many inconsistencies that European authorities are likely to face in the next future. Basically, the WB module allows to address and to anticipate in an internally coherent structure the potential contradictions that are likely to emerge in the future given the present European setting, and to simulate the effects of alternative policy arrangements.

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Appendix

Table A0 – Data definitions and sources

Variable	Definition in model	Source	Definition in DB
Welfare expenditure components			
DIS	Disability expenditure	Eurostat	Social benefits by function - Disability
EDU	Education expenditure	Eurostat	Total public expenditure on education for all levels of education
FAM	Family expenditure	Eurostat	Social benefits by function - Family/Children
HEAL	Health expenditure	Eurostat	Social benefits by function - Sickness/Health care
HOUS	Housing expenditure	Eurostat	Social benefits by function - Housing
LMP	Labor market prot. Exp. - ALMPs	Eurostat	Public expenditure on labour market policies - Actions 2-7
LTH	Long-term care health expenditure	Eurostat	Health care expenditure on long term care
PENS	Pension expenditure	Eurostat	Expenditure on pensions
SI	Social inclusion expenditure	Eurostat	Social benefits by function - Social inclusion n.e.c.
UN	Unemployment prot. Exp. - PLMPs	Eurostat	Social benefits by function - Unemployment - Actions 8-9 of LMP
Well-being measures			
LEB	Life expectancy at birth	Eurostat	Life expectancy in absolute value at birth - Total
HLB	Expected healthy life	Eurostat	Healthy life years in absolute value at birth - Total
NHLB	Non-healthy life	Elaboration	-
DOR	Drop-out rate	Eurostat	Early leavers from education - Total
EYS	Expected years of schooling	Eurostat	School expectancy
TER	Tertiary education rate	Eurostat	Tertiary educational attainment - Total - Age group 30-34
ER	Employment rate	CAM	Employment rate
ECDR	Economic dependency rate	Elaboration	-
DEPR	Deprivation rate	Eurostat	Severely materially deprived people
GINI	Gini coefficient	CAM	Gini coefficient
POVR	Deprivation rate	Eurostat	At risk of poverty rate (cut-off: 60% of median eq. inc. after social transf.)
ERMI	Elderly relative median income	Eurostat	Median relative income of elderly people (Source: SILC)

Table A1 – Dynamic WEXP components multipliers of permanent government shocks

	Year	2013	2014	2015	2020	2025	2030
	Periods	*0*	*1*	*2*	*7*	*12*	*17*
Disability expenditure	EUE	0.39	0.24	0.20	0.24	0.30	0.35
	EUN	0.39	0.48	0.73	1.03	1.00	1.00
	EUS	0.39	0.34	0.44	0.86	0.96	0.99
	EUW	0.39	0.41	0.58	1.01	1.01	1.00
	UK	0.39	0.33	0.40	0.81	0.96	1.00
Education expenditure	EUE	0.15	0.28	0.39	0.73	0.89	0.96
	EUN	0.15	0.53	0.59	0.82	0.91	0.95
	EUS	0.15	0.29	0.40	0.73	0.88	0.94
	EUW	0.16	0.58	0.73	0.93	0.98	1.00
	UK	0.16	0.26	0.35	0.65	0.83	0.93
Family expenditure	EUE	0.33	0.33	0.39	0.71	0.87	0.95
	EUN	0.33	0.78	1.01	1.01	1.00	1.00
	EUS	0.33	0.47	0.56	0.78	0.88	0.94
	EUW	0.33	0.51	0.73	1.01	1.00	1.00
	UK	0.33	0.28	0.15	0.40	0.72	0.89
Health expenditure	EUE	0.80	0.78	0.84	0.98	1.00	1.00
	EUN	0.80	0.86	0.88	0.94	0.97	0.98
	EUS	0.80	0.87	0.90	0.96	0.98	0.99
	EUW	0.80	0.86	0.88	0.94	0.97	0.98
	UK	0.80	0.89	0.92	0.99	1.00	1.00
Housing expenditure	EUE	0.26	-0.14	-0.03	0.41	0.67	0.82
	EUN	0.26	-0.04	0.06	0.76	0.94	0.98
	EUS	0.26	-0.10	0.05	0.54	0.76	0.88
	EUW	0.26	-0.08	-0.05	0.48	0.76	0.90
	UK	0.26	-0.06	-0.04	0.43	0.73	0.89
LM protection expenditure	EUE	0.17	0.28	0.36	0.62	0.78	0.87
	EUN	0.17	1.11	1.46	1.17	1.00	1.00
	EUS	0.17	0.30	0.40	0.72	0.86	0.93
	EUW	0.17	1.13	1.47	1.10	0.99	1.00
	UK	0.17	0.31	0.42	0.76	0.92	0.98
Long-term health expenditure	EUE	0.38	0.43	0.47	0.64	0.76	0.85
	EUN	0.38	0.43	0.47	0.64	0.75	0.82
	EUS	0.38	0.43	0.47	0.63	0.74	0.82
	EUW	0.38	0.43	0.47	0.64	0.76	0.84
	UK	0.38	0.42	0.46	0.61	0.74	0.83

Source: WB module simulations

Table A1 – continued

	Year	2013	2014	2015	2020	2025	2030
	Periods	*0*	*1*	*2*	*7*	*12*	*17*
Pension expenditure	EUE	0.33	0.41	0.55	0.93	1.00	1.01
	EUN	0.33	0.55	0.79	1.02	1.00	1.00
	EUS	0.33	0.37	0.46	0.79	0.91	0.96
	EUW	0.33	0.34	0.40	0.67	0.83	0.91
	UK	0.00	0.18	0.42	0.89	0.99	1.01
Social inclusion expenditure	EUE	1.12	0.65	0.69	0.90	0.97	0.99
	EUN	1.12	0.86	0.85	1.01	1.00	1.00
	EUS	1.12	0.96	0.98	0.99	0.99	0.99
	EUW	1.12	0.74	0.76	0.97	1.00	1.00
	UK	1.12	0.47	0.67	0.85	0.95	0.99
Unemployment expenditure	EUE	0.32	0.04	0.05	0.47	0.74	0.87
	EUN	0.32	0.07	0.12	0.68	0.89	0.95
	EUS	0.32	0.23	0.46	0.99	0.99	1.00
	EUW	0.32	0.11	0.21	0.83	0.98	1.00
	UK	0.32	0.50	0.62	0.64	0.90	0.99
Social protection expenditure	EUE	0.45	0.48	0.58	0.86	0.92	0.94
	EUN	0.51	0.66	0.82	0.99	0.99	0.99
	EUS	0.48	0.53	0.60	0.84	0.94	0.97
	EUW	0.50	0.53	0.60	0.82	0.91	0.95
	UK	0.33	0.40	0.52	0.80	0.86	0.93
Welfare expenditure	EUE	0.39	0.42	0.52	0.82	0.91	0.94
	EUN	0.43	0.63	0.78	0.95	0.96	0.97
	EUS	0.40	0.46	0.54	0.82	0.92	0.96
	EUW	0.42	0.55	0.65	0.85	0.92	0.96
	UK	0.30	0.38	0.49	0.76	0.86	0.92

Source: WB module simulations

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Table A2a - Multipliers and half life disequilibrium for WB driver equations. BS spec.

Equation: DIS_exp							
	Multipliers		half-life disequilibrium				
	gdp	p65+/p	EUE	EUN	EUS	EUW	UK
short-run	0.30	-0.03	1.23	6.38	2.09	2.76	6.58
long-run	-	1					
Equation: EDU_exp							
	Multipliers		half-life disequilibrium				
	gdp	p1564/p	EUE	EUN	EUS	EUW	UK
short-run	0.90	0.03	2.37	7.80	0.94	3.29	6.58
long-run	1	1					
Equation: FAM_exp							
	Multipliers		half-life disequilibrium				
	gdp	(p014+p65+)/p	EUE	EUN	EUS	EUW	UK
short-run	0.43	1.12	9.28	9.28	9.28	9.28	9.28
long-run	1	1					
Equation: HEAL_exp							
	Multipliers		half-life disequilibrium				
	gdp	(p014+p65+)/p	EUE	EUN	EUS	EUW	UK
short-run	0.37	5.28	1.80	4.53	2.25	2.97	2.96
long-run	1	1					
Equation: HOUS_exp							
	Multipliers		half-life disequilibrium				
	gdp	(p014+p65+)/p1564	EUE	EUN	EUS	EUW	UK
short-run	0.62	0.81	0.81	2.94	2.11	6.58	0.73
long-run	1	1					
Equation: LMP_exp							
	Multipliers		half-life disequilibrium				
	gdp	er	EUE	EUN	EUS	EUW	UK
short-run	-0.42	-2.29	1.98	6.58	6.58	4.74	3.98
long-run	1	1					
Equation: LTH_exp							
	Multipliers		half-life disequilibrium				
	gdp	p65+/p	EUE	EUN	EUS	EUW	UK
short-run	0.63	3.63	9.64	9.64	9.64	9.64	9.64
long-run	-	1					
Equation: PENS_exp							

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	Multipliers		half-life disequilibrium				
	gdp	p65+/p	EUE	EUN	EUS	EUW	UK
short-run	0.34	4.86	1.50	4.82	2.75	3.56	0.10
long-run	1	1					

Equation: SI_exp

	Multipliers			half-life disequilibrium				
	gdp	p65+/p	er	EUE	EUN	EUS	EUW	UK
short-run	0.35	11.05	-2.32	1.37	0.62	3.02	6.58	0.79
long-run	1	1	-					

Equation: UN_exp

	Multipliers		half-life disequilibrium				
	gdp	er	EUE	EUN	EUS	EUW	UK
short-run	-0.49	-4.49	1.04	1.24	0.67	1.51	0.58
long-run	1	1					

Source: WB module estimates

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Table A2b - Multipliers and half life disequilibrium for WB driver equations. FD spec.

Equation: DIS_exp

	Multipliers			half-life disequilibrium				
	gdp	gbal	gexp	EUE	EUN	EUS	EUW	UK
short-run	0.30	-0.12	0.39	6.58	1.36	3.63	2.07	4.30
long-run	-	-	1					

Equation: EDU_exp

	Multipliers			half-life disequilibrium				
	gdp	gbal	gexp	EUE	EUN	EUS	EUW	UK
short-run	0.91	-0.06	0.16	4.39	4.86	3.92	3.82	6.72
long-run	-	-	1					

Equation: FAM_exp

	Multipliers			half-life disequilibrium				
	gdp	gbal	gexp	EUE	EUN	EUS	EUW	UK
short-run	0.22	-0.18	0.33	5.95	0.92	6.58	1.52	6.94
long-run	-	-	1					

Equation: HEAL_exp

	Multipliers			half-life disequilibrium				
	gdp	gbal	gexp	EUE	EUN	EUS	EUW	UK
short-run	0.16	-0.13	0.80	2.04	5.42	4.23	6.79	2.29
long-run	-	-	1					

Equation: HOUS_exp

	Multipliers			half-life disequilibrium				
	gdp	gbal	gexp	EUE	EUN	EUS	EUW	UK
short-run	0.25	-0.28	0.26	6.58	4.00	4.49	5.95	6.94
long-run	-	-	1					

Equation: LMP_exp

	Multipliers			half-life disequilibrium				
	gdp	gbal	gexp	EUE	EUN	EUS	EUW	UK
short-run	0.17	-1.05	0.72	12.25	3.98	8.10	2.97	6.79
long-run	-	-	1					

Equation: LTH_exp

	Multipliers			half-life disequilibrium				
	gdp	gbal	gexp	EUE	EUN	EUS	EUW	UK
short-run	0.59	-0.50	0.37	6.58	6.91	5.95	6.25	6.72
long-run	-	-	1					

Equation: PENS_exp

	Multipliers			half-life disequilibrium				
	gdp	gbal	gexp	EUE	EUN	EUS	EUW	UK
short-run	0.41	-0.13	0.33	3.12	1.34	4.63	7.71	1.83
long-run	-	-	1					

Equation: SI_exp

	Multipliers			half-life disequilibrium				
	gdp	gbal	gexp	EUE	EUN	EUS	EUW	UK
short-run	0.00	-0.20	1.12	3.51	1.37	6.15	2.24	2.88
long-run	-	-	1					

Equation: UN_exp

	Multipliers			half-life disequilibrium				
	gdp	gbal	gexp	EUE	EUN	EUS	EUW	UK
short-run	0.00	-0.38	0.32	8.13	5.37	1.62	3.60	4.03
long-run	-	-	1					

Source: WB module estimates

Table A3 - Multipliers and size of the AR component for WB measure equations

Equation: LEB

	Multipliers		
	healexp	lthexp	AR
short-run	0.00	0.00	0.93
long-run	0.03	0.04	-

Equation: HLB

	Multipliers			
	leb	er	lthexp	AR
short-run	0.00	0.54	-0.02	0.98
long-run	0.15	0.05	0.03	-

Equation: EYS

	Multipliers			
	povr	ter	eduexp	AR
short-run	0.00	0.03	0.04	0.73
long-run	0.00	0.11	0.13	-

Equation: DOR

	Multipliers			
	povr	eys	famexp	AR
short-run	0.22	-0.70	-0.12	0.70
long-run	0.73	-2.33	-0.41	-

Equation: TER

	Multipliers			
	k/empl	er	eduexp	AR
short-run	0.16	0.18	0.08	0.85
long-run	1.06	1.20	0.51	-

Equation: DEPR

	Multipliers			
	povr	er	wexp	AR
short-run	1.53	0.00	-0.10	0.63
long-run	1.51	0.00	-0.28	-

Equation: POVR

	Multipliers			
	growth	gini	socprexp	AR
short-run	-0.33	0.06	-0.05	0.98
long-run	-16.50	3.05	-2.30	-

Equation: GINI

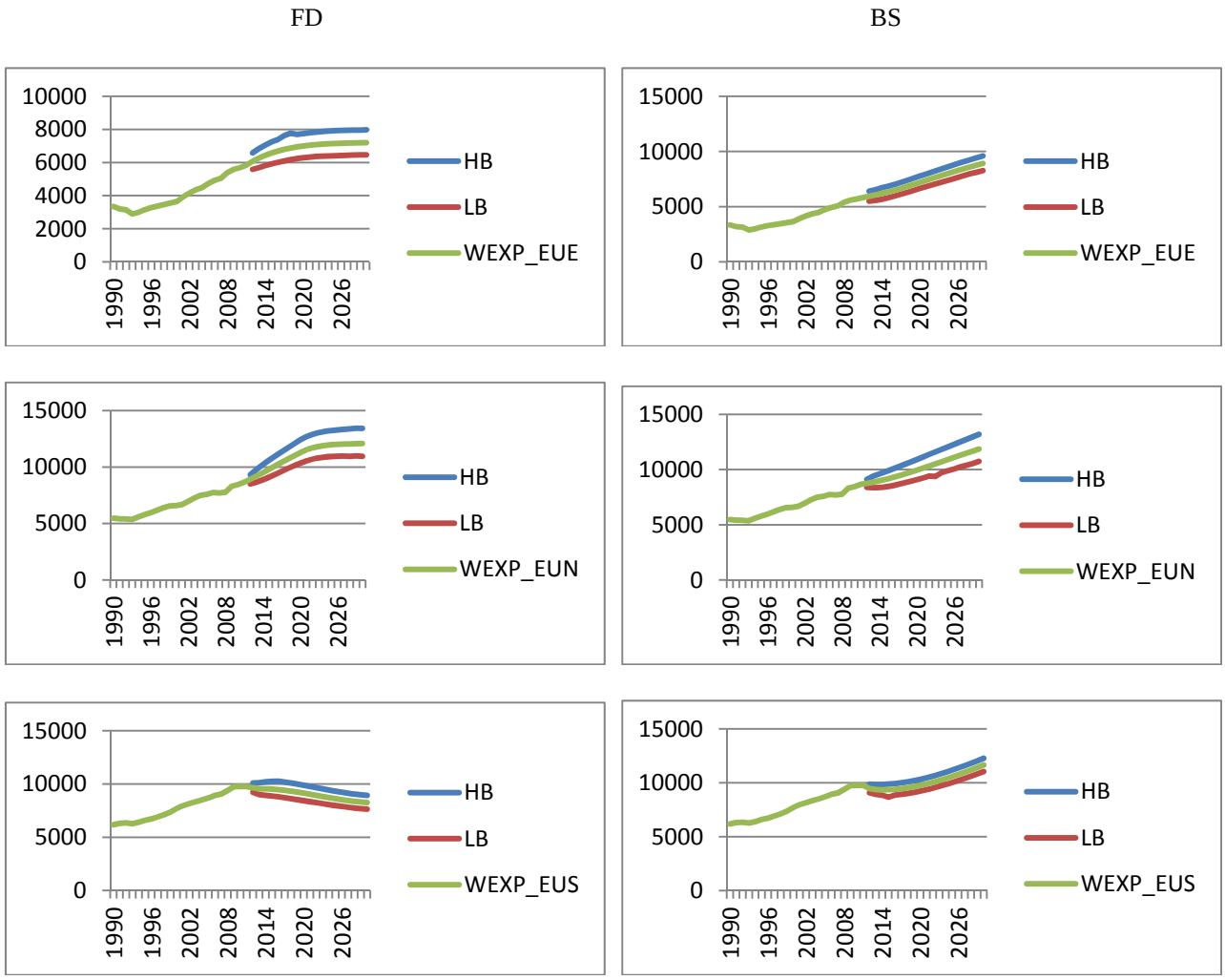
	Multipliers			
	gdp/k	k/empl	ter	AR
short-run	0.72	0.12	0.04	0.76
long-run	2.98	0.50	0.17	-

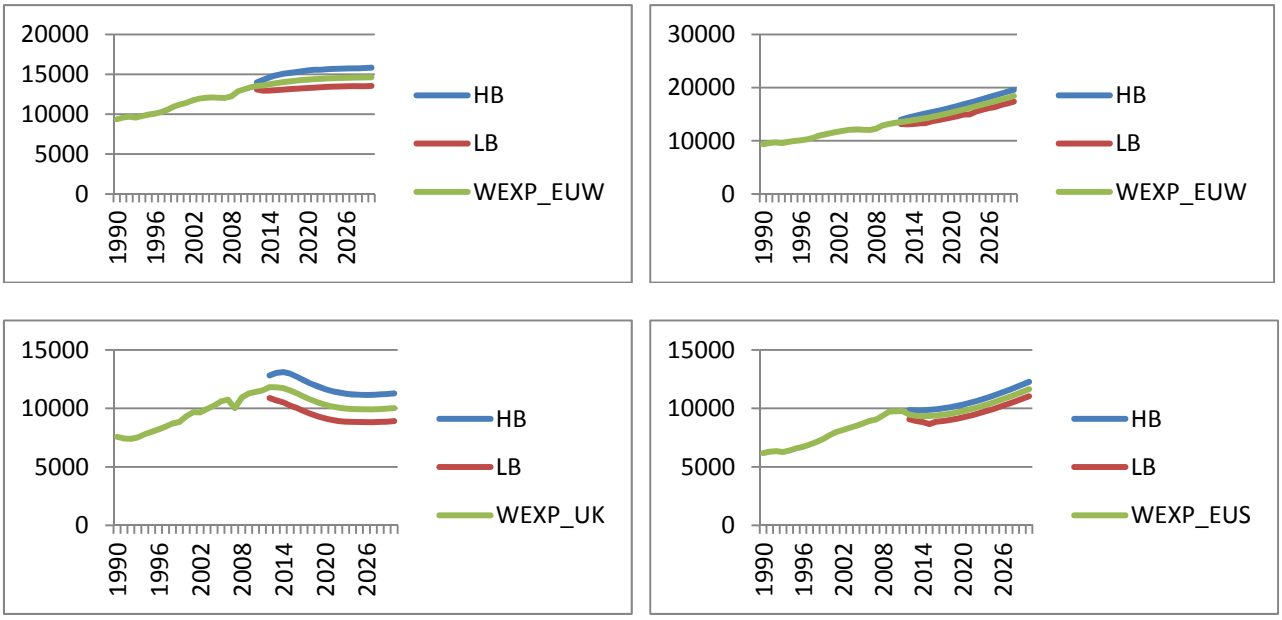
Equation: ERMI

	Multipliers			
	gdp	p65+/p	pensexp	AR
short-run	-0.07	0.04	0.05	0.86
long-run	-0.50	0.16	0.19	-

Source: WB module estimates.

Figure A1 – Statistical significance of WEXP forecasts in the FD and BS specifications

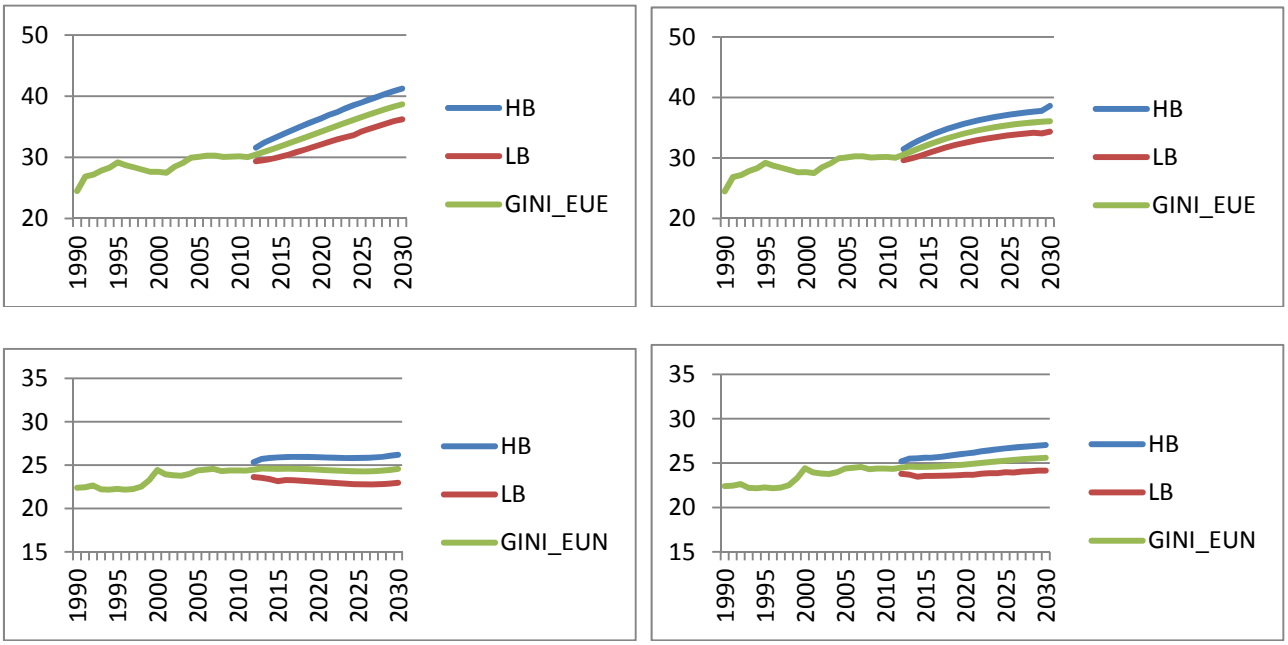




Source: WB module stochastic simulations based on 10000 repetitions. 95% confidence intervals are reported

Figure A2 – Statistical significance of GINI forecasts in the FD and BS specifications

FD DD



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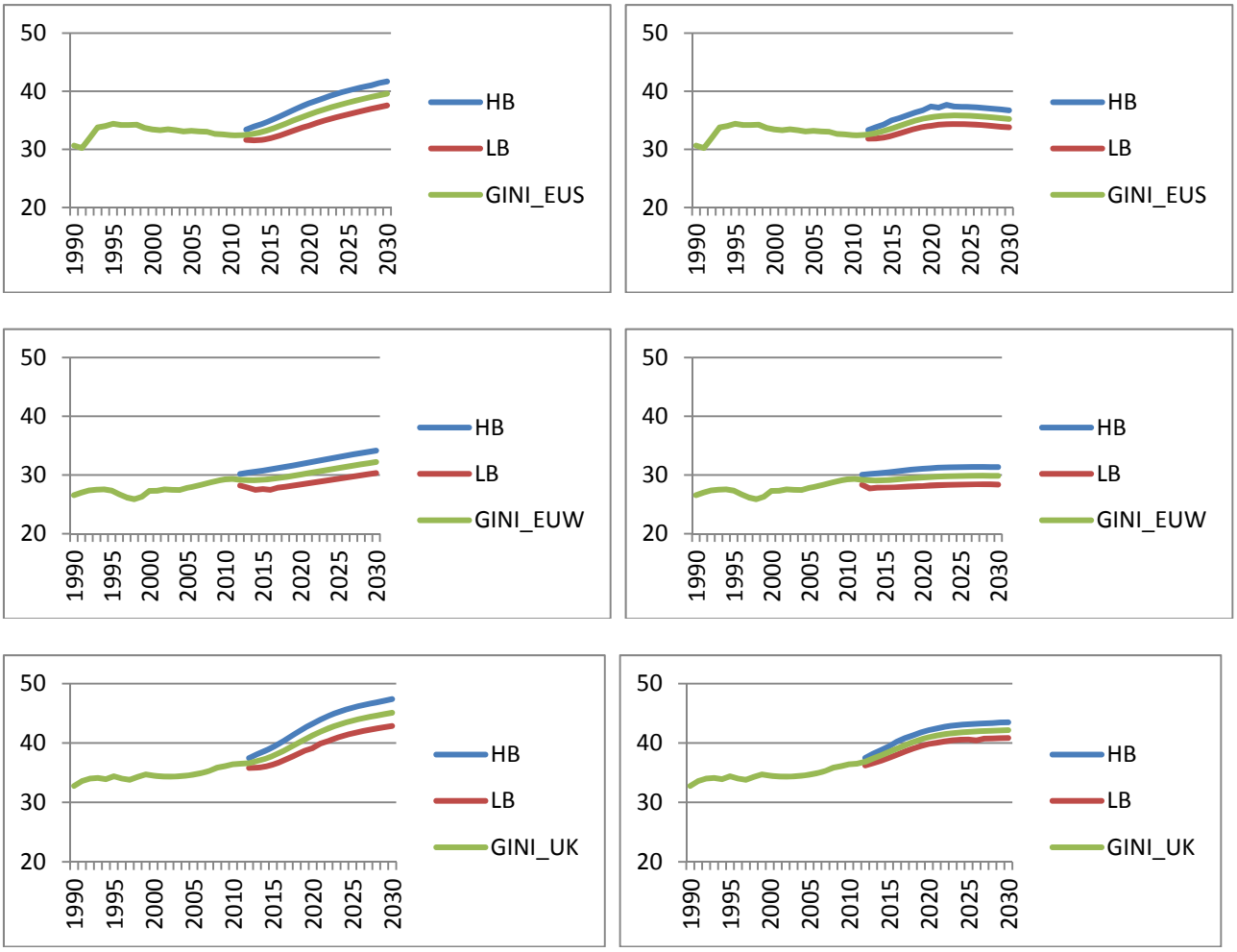

Source: WB module stochastic simulations based on 10000 repetitions. 95% confidence intervals are reported

Table A4a – Projected WEXP components under the BS and FD in scenario E1. 2011=100

		BS				FD			
		2015	2020	2025	2030	2015	2020	2025	2030
DIS	EUE	105	116	130	147	109	120	127	132
	EUN	110	125	140	157	115	129	134	132
	EUS	104	115	126	139	102	100	94	90
	EUW	105	113	121	131	104	106	107	108
	UK	109	119	124	126	100	90	84	84
EDU	EUE	111	126	136	141	111	120	123	124
	EUN	104	110	114	118	112	126	133	134
	EUS	90	91	95	98	101	103	101	99
	EUW	102	107	111	113	103	108	109	109
	UK	93	89	88	89	99	95	95	98
FAM	EUE	108	123	139	156	113	122	126	128

	EUN	106	119	133	148	109	121	125	123
	EUS	101	108	117	130	98	92	87	83
	EUW	108	121	136	154	105	106	108	109
	UK	97	99	101	105	84	79	81	82
	EUE	112	132	152	170	105	109	112	113
	EUN	107	118	133	146	108	117	122	123
HEAL	EUS	93	94	101	112	95	89	84	82
	EUW	104	116	130	145	100	102	103	103
	UK	97	95	99	107	88	78	77	79
	EUE	112	120	128	135	124	145	157	163
	EUN	100	106	112	118	113	134	154	161
HOUS	EUS	99	104	110	118	113	117	112	106
	EUW	97	101	107	116	100	101	101	101
	UK	94	98	106	116	115	113	105	102
	EUE	107	108	111	114	111	111	96	83
	EUN	97	96	97	96	133	196	221	214
LMP	EUS	94	79	76	77	113	95	74	60
	EUW	106	106	107	110	119	123	122	120
	UK	83	62	59	59	143	103	76	67
	EUE	131	187	258	344	109	116	117	114
	EUN	132	179	231	289	127	172	213	244
LTH	EUS	109	129	156	192	104	107	107	105
	EUW	117	147	184	229	106	114	118	120
	UK	108	119	132	151	98	92	91	92
	EUE	103	115	129	142	113	120	122	123
	EUN	101	106	112	118	112	125	130	128
PENS	EUS	98	103	112	123	101	99	94	91
	EUW	104	113	124	135	102	106	108	109
	UK	90	91	95	101	105	91	86	87
	EUE	125	158	203	257	114	122	126	128
	EUN	106	120	138	157	99	110	113	112
SI	EUS	99	112	135	169	89	78	71	67
	EUW	115	137	166	204	96	96	97	98
	UK	108	108	109	112	104	100	99	100
UN	EUE	89	89	91	96	121	139	145	146

	EUN	95	96	99	102	112	130	145	152
	EUS	119	140	163	187	83	74	69	67
	EUW	103	106	112	118	111	116	118	119
	UK	114	127	135	140	112	105	93	89

Source: WB module projections

Table A4b – Projected WEXP components under the BS and FD in scenario E2. 2011=100

		BS				FD			
		2015	2020	2025	2030	2015	2020	2025	2030
	EUE	103	115	130	147	100	99	101	103
	EUN	108	120	135	152	112	118	119	121
DIS	EUS	103	115	126	138	100	99	93	88
	EUW	103	111	119	129	101	98	94	91
	UK	108	116	120	121	99	85	75	70
	EUE	101	101	104	110	98	87	84	87
	EUN	97	94	90	88	104	109	112	114
EDU	EUS	85	87	91	93	96	101	99	95
	EUW	96	96	93	89	96	95	91	87
	UK	91	82	74	70	96	86	79	76
	EUE	103	107	113	123	105	95	89	89
	EUN	102	108	113	118	107	111	113	114
FAM	EUS	98	105	113	124	96	92	87	81
	EUW	105	112	119	126	102	98	94	92
	UK	96	93	90	86	84	79	84	89
	EUE	106	104	109	121	91	76	76	80
	EUN	103	104	106	107	104	106	108	110
HEAL	EUS	90	89	96	104	93	87	83	79
	EUW	100	103	106	108	96	93	89	86
	UK	95	88	83	81	87	72	67	65
	EUE	105	106	110	118	120	129	121	117
	EUN	95	95	97	100	111	126	136	141
HOUS	EUS	95	101	107	113	112	118	113	106
	EUW	93	94	96	100	99	97	93	89
	UK	92	93	95	100	115	111	99	90
LMP	EUE	113	121	120	123	106	84	55	43

	EUN	101	110	106	102	128	158	171	177
	EUS	97	82	77	80	118	110	88	71
	EUW	110	115	115	118	116	111	103	99
	UK	84	66	64	63	143	104	71	58
	EUE	122	152	191	245	93	79	74	74
	EUN	126	155	182	208	118	145	169	191
LTH	EUS	105	123	147	178	100	108	109	106
	EUW	112	132	152	172	100	102	99	95
	UK	106	109	111	113	97	85	77	72
	EUE	99	102	111	122	102	86	82	86
	EUN	98	97	98	101	108	114	116	117
PENS	EUS	96	100	109	119	98	98	93	88
	EUW	102	107	112	117	99	98	95	91
	UK	88	86	85	86	104	86	77	73
	EUE	120	147	184	234	98	88	87	90
	EUN	103	114	126	140	96	100	102	103
SI	EUS	96	110	133	165	88	78	70	66
	EUW	112	134	159	190	93	89	85	82
	UK	107	105	102	102	104	95	88	84
	EUE	96	109	114	117	118	124	108	100
	EUN	100	116	124	133	111	126	134	138
UN	EUS	125	145	169	198	84	74	69	65
	EUW	107	120	133	148	111	111	107	103
	UK	117	139	160	179	112	102	86	78

Source: WB module projections

Table A4c – Projected WEXP components under the BS and FD in scenario E3. 2011=100

		BS				FD			
		2015	2020	2025	2030	2015	2020	2025	2030
DIS	EUE	106	117	132	149	112	126	140	154
	EUN	110	126	142	161	116	134	153	172
	EUS	106	117	129	142	114	139	165	191
	EUW	106	113	122	133	108	119	131	144
	UK	111	121	125	126	109	114	121	129
EDU	EUE	115	139	166	196	116	138	161	183
	EUN	105	114	123	133	114	133	153	173
	EUS	96	108	126	146	113	144	177	209
	EUW	105	115	124	133	110	124	137	151
	UK	99	99	100	101	110	121	132	144
FAM	EUE	110	130	158	196	117	135	152	168
	EUN	106	121	139	162	110	127	145	162
	EUS	104	119	141	172	110	129	152	174
	EUW	110	126	147	173	109	120	132	146
	UK	100	106	112	117	87	76	68	62
HEAL	EUE	114	144	187	245	112	129	146	162
	EUN	107	122	141	165	109	124	140	158
	EUS	97	110	137	176	116	138	162	183
	EUW	107	124	146	174	106	117	128	139
	UK	101	106	114	125	104	110	118	125
HOUS	EUE	114	126	142	161	125	149	171	193
	EUN	101	108	118	128	113	133	155	179
	EUS	103	115	130	147	116	139	166	195
	EUW	99	105	114	127	101	105	110	118
	UK	98	104	113	124	117	127	137	150
LMP	EUE	103	135	145	146	113	106	89	77
	EUN	94	95	97	98	126	167	203	235
	EUS	83	75	81	85	123	140	165	187
	EUW	101	110	119	122	128	142	149	160
	UK	76	65	70	71	151	129	117	121
LTH	EUE	134	203	312	483	113	129	144	157
	EUN	134	184	248	329	127	169	217	270

	EUS	115	150	208	299	120	158	203	248
	EUW	120	156	205	273	111	126	139	152
	UK	114	132	153	177	110	119	130	142
	EUE	104	121	144	170	118	138	157	175
	EUN	102	107	116	127	113	131	149	168
PENS	EUS	101	113	131	154	112	137	164	190
	EUW	106	117	131	147	106	117	127	138
	UK	94	97	102	108	111	116	125	134
	EUE	121	160	215	289	120	140	159	176
	EUN	106	121	142	165	100	116	132	147
SI	EUS	95	113	147	196	111	125	141	155
	EUW	112	135	168	212	102	109	120	131
	UK	108	111	114	118	119	132	144	154
	EUE	77	73	68	65	122	141	152	165
	EUN	91	91	90	88	112	130	151	172
UN	EUS	102	110	118	126	90	108	127	145
	EUW	93	95	98	99	113	123	134	147
	UK	101	108	115	121	122	125	129	139

Source: WB module projections

Table A4d – Projected WEXP components under the BS and FD in scenario E4. 2011=100

		BS				FD			
		2015	2020	2025	2030	2015	2020	2025	2030
	EUE	106	118	132	149	113	127	140	151
	EUN	111	126	142	160	117	133	150	167
DIS	EUS	106	117	129	142	114	137	162	185
	EUW	106	114	122	133	108	118	130	143
	UK	111	122	127	128	109	114	120	127
	EUE	117	146	179	210	117	141	163	181
	EUN	107	115	123	133	115	132	150	169
EDU	EUS	97	112	133	154	114	145	177	205
	EUW	106	117	127	138	110	124	137	152
	UK	99	100	104	109	110	122	135	147
FAM	EUE	111	134	167	209	117	134	149	163

	EUN	107	122	140	162	110	126	142	158
	EUS	105	121	146	179	110	127	147	167
	EUW	111	128	149	178	109	119	131	144
	UK	101	107	114	124	87	75	67	61
	EUE	116	152	204	270	112	128	144	159
	EUN	108	123	143	165	109	122	138	154
HEAL	EUS	98	114	146	188	114	136	157	178
	EUW	107	126	150	180	105	116	126	138
	UK	101	107	118	135	104	109	116	121
	EUE	115	130	148	168	125	149	169	186
	EUN	102	109	118	128	114	132	154	176
HOUS	EUS	104	118	133	151	116	138	162	187
	EUW	100	106	116	130	102	103	108	116
	UK	98	105	116	130	117	127	135	144
	EUE	102	131	139	141	113	102	78	62
	EUN	93	94	97	98	125	165	200	226
LMP	EUS	83	74	79	83	120	127	137	149
	EUW	100	109	118	119	126	135	144	153
	UK	76	65	68	68	151	128	110	106
	EUE	136	212	338	530	114	129	142	150
	EUN	135	186	250	330	128	169	215	263
LTH	EUS	116	155	220	319	120	156	195	233
	EUW	121	158	210	284	111	124	137	149
	UK	114	133	158	192	110	119	129	139
	EUE	105	124	150	178	119	138	155	171
	EUN	102	108	117	127	114	130	146	163
PENS	EUS	102	115	135	159	112	136	161	184
	EUW	106	118	132	150	106	116	126	138
	UK	94	98	105	113	111	116	124	132
	EUE	122	163	221	297	120	138	155	171
	EUN	107	122	142	165	100	114	129	144
SI	EUS	96	115	150	199	109	122	135	148
	EUW	112	135	169	215	101	108	118	129
	UK	108	112	116	121	119	131	141	149
UN	EUE	76	70	65	62	122	139	147	155

	EUN	90	90	89	89	112	130	149	169
	EUS	100	107	113	121	89	104	123	139
	EUW	92	93	96	97	112	121	132	143
	UK	101	107	112	114	122	124	126	132

Source: WB module projections

Table A5a – Projected WB measures under the BS and FD in scenario E1

		BS				FD			
		2015	2020	2025	2030	2015	2020	2025	2030
LEB	EUE	76.7	78.0	79.3	80.6	76.7	77.8	78.7	79.3
	EUN	81.7	82.8	84.0	85.2	81.6	82.4	83.0	83.5
	EUS	82.8	84.0	85.2	86.4	82.8	83.7	84.3	84.7
	EUW	82.3	83.4	84.6	85.8	82.3	83.2	83.8	84.3
	UK	81.6	82.8	84.0	85.2	81.5	82.4	83.0	83.4
HLB	EUE	62.8	63.3	64.0	64.7	62.9	63.7	64.8	65.7
	EUN	61.9	62.3	62.7	63.1	61.9	62.3	62.7	63.0
	EUS	61.5	61.6	62.2	63.2	61.5	61.6	62.1	63.0
	EUW	59.8	60.3	60.9	61.6	59.8	60.3	61.0	61.8
	UK	64.0	64.0	64.9	66.3	64.0	64.1	65.1	66.5
DOR	EUE	7.2	5.5	4.5	3.8	7.2	5.5	4.5	3.9
	EUN	8.8	8.1	7.3	6.6	8.8	7.9	6.9	6.0
	EUS	21.8	21.1	20.5	20.1	21.8	20.9	19.9	19.9
	EUW	10.7	10.2	9.7	9.3	10.7	10.3	9.8	9.6
	UK	15.6	14.4	14.3	14.6	15.6	14.1	13.8	14.4
EYS	EUE	18.6	19.2	19.7	20.1	18.6	19.2	19.5	19.8
	EUN	19.5	19.8	20.1	20.4	19.5	19.9	20.4	20.8
	EUS	17.7	17.8	17.7	17.6	17.8	18.0	17.9	17.7
	EUW	17.7	17.9	18.0	18.1	17.7	17.9	18.0	18.0
	UK	18.1	18.4	18.3	18.2	18.2	18.5	18.4	18.3
TEER	EUE	31.9	34.9	38.3	41.8	31.9	34.9	37.7	40.1
	EUN	47.7	50.4	54.1	58.1	47.7	51.1	55.8	60.0
	EUS	31.5	29.8	28.6	28.4	31.7	30.2	28.6	27.7
	EUW	36.2	36.2	36.8	38.0	36.2	36.1	36.3	36.9
	UK	43.8	41.2	40.1	40.5	44.0	41.1	39.7	40.0
DEPR	EUE	18.1	15.2	13.1	11.5	17.9	14.6	12.8	12.1
	EUN	4.8	4.3	3.8	3.3	4.7	3.9	3.1	2.6
	EUS	6.1	5.7	5.3	4.8	6.1	5.6	5.5	5.8
	EUW	5.5	5.2	4.7	4.2	5.5	5.3	5.1	5.0
	UK	4.4	4.5	4.6	4.5	4.3	4.3	4.7	5.2
POVR	EUE	17.7	16.3	15.2	14.2	17.6	15.9	14.9	14.4
	EUN	13.1	12.4	11.7	11.1	13.0	11.9	10.8	9.9
	EUS	19.6	18.8	18.2	17.3	19.5	18.7	18.4	18.7
	EUW	14.0	13.6	13.0	12.4	14.1	13.7	13.4	13.4
	UK	17.4	17.7	17.8	17.7	17.1	17.2	17.9	18.8
ERMI	EUE	90.6	87.9	85.6	84.7	92.9	88.8	84.4	81.8
	EUN	85.0	89.0	90.6	90.5	87.4	93.2	94.2	92.4

	EUS	94.4	97.6	97.2	95.4	95.1	96.5	93.3	89.1
	EUW	93.5	94.0	93.6	93.6	93.1	92.6	90.7	89.1
	UK	81.5	75.8	70.3	64.7	84.8	75.7	68.6	62.6
	EUE	32.2	34.2	35.4	36.1	31.8	34.2	36.6	38.6
	EUN	24.6	24.9	25.3	25.6	24.6	24.5	24.3	24.6
GINI	EUS	33.6	35.5	35.8	35.3	33.4	36.0	38.0	39.6
	EUW	29.1	29.6	29.8	29.9	29.2	30.1	31.2	32.2
	UK	38.5	41.0	41.9	42.2	37.9	41.3	43.8	45.1

Source: WB module projections. All WB measures defined in rates are expressed in per cent.

Table A5b – Projected WB measures under the BS and FD in scenario E2

		BS				FD			
		2015	2020	2025	2030	2015	2020	2025	2030
	EUE	76.7	77.9	78.9	79.8	76.7	77.6	78.0	78.3
	EUN	81.6	82.6	83.4	84.3	81.5	82.0	82.3	82.5
LEB	EUS	82.8	83.8	84.8	85.8	82.8	83.4	83.7	83.8
	EUW	82.3	83.3	84.2	85.0	82.3	83.0	83.3	83.4
	UK	81.6	82.7	83.6	84.4	81.5	82.1	82.3	82.4
	EUE	62.3	61.9	61.9	62.4	62.4	62.5	62.8	63.4
	EUN	61.4	60.2	59.7	59.7	61.4	60.2	59.7	59.6
HLB	EUS	61.3	61.1	61.5	62.2	61.3	61.0	61.3	61.9
	EUW	59.5	59.1	59.1	59.4	59.5	59.1	59.2	59.5
	UK	63.8	63.2	63.1	63.6	63.8	63.2	63.2	63.7
	EUE	7.2	5.7	5.2	4.9	7.2	5.8	5.5	5.7
	EUN	8.8	8.2	8.0	7.9	8.8	8.1	7.5	7.1
DOR	EUS	21.8	21.4	21.0	21.0	21.9	21.1	20.3	20.4
	EUW	10.7	10.4	10.3	10.5	10.7	10.5	10.6	11.0
	UK	15.6	14.6	15.2	16.6	15.6	14.3	14.5	16.2
	EUE	18.5	18.8	18.9	19.0	18.5	18.6	18.5	18.4
	EUN	19.5	19.6	19.6	19.5	19.5	19.8	19.9	20.0
EYS	EUS	17.7	17.7	17.6	17.4	17.8	17.9	17.8	17.6
	EUW	17.7	17.8	17.7	17.5	17.7	17.7	17.6	17.4
	UK	18.1	18.3	18.0	17.6	18.1	18.4	18.1	17.7
	EUE	29.8	29.8	29.7	29.7	29.8	29.7	29.5	29.4
	EUN	45.5	45.7	45.6	45.4	45.5	45.8	45.8	45.7
TEER	EUS	30.3	30.0	29.7	29.6	30.3	30.1	29.7	29.5
	EUW	35.7	35.6	35.4	35.2	35.7	35.5	35.3	35.1
	UK	44.0	43.5	43.0	42.7	44.0	43.4	43.0	42.7
	EUE	18.2	17.2	16.1	14.7	18.0	17.5	18.8	20.5
	EUN	4.8	4.7	4.5	4.2	4.7	4.4	3.9	3.5
DEPR	EUS	6.1	5.9	5.5	5.1	6.1	5.8	5.6	6.0
	EUW	5.5	5.5	5.4	5.2	5.6	5.7	6.0	6.6
	UK	4.4	4.8	5.3	5.7	4.3	4.5	5.4	6.7
	EUE	17.8	17.5	16.9	16.1	17.6	17.6	18.0	18.9
	EUN	13.1	13.0	12.7	12.3	13.0	12.6	11.9	11.3
POVR	EUS	19.6	19.2	18.5	17.9	19.5	18.9	18.5	18.9
	EUW	14.0	14.0	13.9	13.7	14.1	14.2	14.5	15.2

	UK	17.4	18.1	19.0	20.0	17.1	17.6	19.1	21.2
	EUE	90.0	85.1	83.8	84.5	88.6	81.2	79.4	80.6
	EUN	85.8	93.4	99.9	105.6	85.7	93.1	100.2	107.5
ERMI	EUS	95.2	99.7	99.2	97.7	95.2	100.1	99.6	97.9
	EUW	94.2	96.4	98.2	101.1	93.9	96.0	97.5	100.2
	UK	82.0	77.2	73.5	70.5	82.2	77.4	73.3	70.2
	EUE	32.2	34.2	35.2	35.5	32.1	35.8	39.0	40.6
	EUN	24.4	24.6	25.2	25.4	24.4	24.3	24.5	24.5
GINI	EUS	33.4	35.8	36.8	36.8	33.3	36.0	38.7	41.1
	EUW	29.1	29.9	30.5	30.4	29.2	30.6	32.2	33.2
	UK	38.5	41.6	43.3	43.8	37.8	41.9	45.4	47.0

Source: WB module projections. All WB measures defined in rates are expressed in per cent.

Table A5c – Projected WB measures under the BS and FD in scenario E3

		BS				FD			
		2015	2020	2025	2030	2015	2020	2025	2030
	EUE	76.7	78.0	79.4	81.0	76.7	77.9	78.9	79.9
	EUN	81.7	82.9	84.2	85.6	81.6	82.5	83.3	84.1
LEB	EUS	82.9	84.1	85.6	87.2	82.9	84.0	85.1	86.0
	EUW	82.3	83.5	84.7	86.2	82.3	83.3	84.1	84.9
	UK	81.6	82.9	84.3	85.7	81.6	82.7	83.6	84.4
	EUE	62.9	64.8	66.9	68.9	63.0	65.3	67.7	70.0
	EUN	62.1	63.0	63.8	64.9	62.1	63.0	63.9	64.8
HLB	EUS	62.6	63.9	65.3	67.1	62.6	63.9	65.3	66.8
	EUW	60.5	61.7	62.6	63.8	60.5	61.7	62.7	63.9
	UK	64.2	65.5	66.7	68.2	64.2	65.5	66.8	68.1
	EUE	7.2	5.4	4.3	3.3	7.2	5.4	4.2	3.2
	EUN	8.8	8.0	7.2	6.4	8.8	7.9	6.8	5.6
DOR	EUS	21.7	20.6	19.0	17.2	21.6	20.0	17.1	14.1
	EUW	10.6	10.1	9.4	8.6	10.7	10.0	9.1	8.2
	UK	15.5	14.0	13.4	13.2	15.5	13.6	12.2	11.4
	EUE	18.6	19.3	20.1	20.8	18.7	19.4	20.0	20.7
	EUN	19.5	19.8	20.2	20.6	19.5	20.0	20.5	21.2
EYS	EUS	17.7	17.9	18.1	18.4	17.8	18.3	18.8	19.3
	EUW	17.7	18.0	18.2	18.4	17.7	18.1	18.3	18.6
	UK	18.2	18.6	18.6	18.6	18.3	18.9	19.1	19.2
	EUE	32.0	35.6	41.2	49.6	32.1	35.9	41.4	48.8
	EUN	47.7	50.5	54.9	60.2	47.7	51.3	57.0	63.9
TEER	EUS	31.7	30.8	30.9	33.0	32.1	32.3	33.5	36.5
	EUW	36.3	36.7	37.9	40.2	36.3	36.9	38.3	40.7
	UK	44.0	42.3	42.1	43.3	44.4	42.8	42.5	43.4
	EUE	18.0	14.6	11.6	8.9	17.8	13.6	10.5	8.2
	EUN	4.8	4.2	3.6	2.9	4.7	3.8	2.9	2.1
DEPR	EUS	6.0	5.3	4.4	3.5	5.9	4.7	3.3	2.2
	EUW	5.5	5.0	4.3	3.5	5.5	4.8	4.2	3.5
	UK	4.3	4.2	4.1	3.9	4.2	3.7	3.3	3.0
POVR	EUE	17.7	15.9	14.2	12.5	17.5	15.3	13.4	11.8

	EUN	13.1	12.3	11.4	10.6	13.0	11.8	10.5	9.1
	EUS	19.4	18.1	16.7	15.1	19.3	17.3	14.9	12.5
	EUW	14.0	13.3	12.5	11.5	14.0	13.2	12.3	11.4
	UK	17.2	17.0	16.9	16.7	16.9	16.1	15.5	14.8
	EUE	91.3	90.2	88.0	84.6	92.0	92.4	91.5	88.6
	EUN	85.0	89.2	92.6	94.9	85.1	89.8	95.0	100.0
ERMI	EUS	96.8	93.9	91.2	89.5	98.9	100.3	102.5	104.7
	EUW	94.1	95.9	97.3	98.7	94.6	97.4	99.9	102.7
	UK	83.2	82.2	80.5	77.6	83.6	86.4	87.5	86.0
	EUE	32.1	33.7	34.6	35.3	31.5	33.0	34.6	36.5
	EUN	24.6	24.9	25.3	25.6	24.6	24.5	24.2	24.3
GINI	EUS	33.6	35.6	36.3	36.4	32.7	33.2	33.4	33.9
	EUW	29.1	29.1	28.9	28.6	28.9	28.9	29.0	29.3
	UK	38.5	40.9	41.9	42.3	37.5	39.3	40.1	40.3

Source: WB module projections. All WB measures defined in rates are expressed in per cent.

Table A5d – Projected WB measures under the BS and FD in scenario E4

		BS				FD			
		2015	2020	2025	2030	2015	2020	2025	2030
	EUE	76.7	78.0	79.5	81.2	76.7	77.9	78.9	79.8
	EUN	81.7	82.9	84.3	85.8	81.6	82.5	83.3	84.0
LEB	EUS	82.9	84.2	85.7	87.4	82.9	84.0	85.1	86.0
	EUW	82.3	83.5	84.8	86.3	82.3	83.3	84.1	84.8
	UK	81.6	83.0	84.4	85.9	81.6	82.7	83.6	84.3
	EUE	63.0	65.4	67.9	70.3	63.1	65.8	68.8	71.6
	EUN	62.3	63.3	64.3	65.5	62.3	63.3	64.4	65.5
HLB	EUS	62.7	64.2	66.0	67.9	62.7	64.2	65.9	67.6
	EUW	60.6	61.9	63.1	64.5	60.6	61.9	63.2	64.7
	UK	64.3	65.6	67.1	68.9	64.3	65.6	67.2	68.9
	EUE	7.2	5.4	4.1	3.1	7.2	5.3	4.1	3.1
	EUN	8.8	8.0	7.1	6.3	8.8	7.9	6.7	5.6
DOR	EUS	21.7	20.5	18.6	16.6	21.6	20.0	17.0	14.0
	EUW	10.6	10.1	9.3	8.4	10.7	10.0	9.1	8.2
	UK	15.5	14.0	13.3	12.8	15.5	13.5	12.2	11.3
	EUE	18.7	19.4	20.3	21.2	18.7	19.4	20.2	20.9
	EUN	19.5	19.8	20.2	20.7	19.5	20.0	20.6	21.2
EYS	EUS	17.7	18.0	18.2	18.6	17.8	18.3	18.8	19.3
	EUW	17.7	18.0	18.2	18.5	17.7	18.1	18.3	18.7
	UK	18.2	18.6	18.6	18.7	18.3	18.9	19.1	19.3
	EUE	32.2	36.8	44.5	56.1	32.2	36.9	44.0	53.4
	EUN	47.7	50.9	56.1	62.3	47.7	51.5	57.9	65.5
TEER	EUS	31.7	31.1	31.9	34.9	32.1	32.4	34.1	37.8
	EUW	36.3	36.9	38.6	41.6	36.3	37.0	38.8	41.7
	UK	44.0	42.4	42.8	44.9	44.4	42.9	43.0	44.4
	EUE	18.0	14.2	11.0	8.3	17.7	13.3	10.2	8.2
DEPR	EUN	4.8	4.2	3.5	2.9	4.7	3.8	2.9	2.1
	EUS	6.0	5.2	4.3	3.3	5.9	4.6	3.3	2.3

	EUW	5.5	4.9	4.2	3.4	5.5	4.8	4.2	3.6
	UK	4.4	4.2	4.0	3.7	4.2	3.6	3.3	3.0
	EUE	17.6	15.6	13.8	12.1	17.5	15.1	13.2	11.7
	EUN	13.0	12.2	11.4	10.5	12.9	11.8	10.5	9.2
POVR	EUS	19.4	17.9	16.4	14.7	19.3	17.2	14.8	12.6
	EUW	14.0	13.3	12.4	11.3	14.0	13.2	12.3	11.4
	UK	17.2	17.0	16.7	16.2	16.9	16.1	15.4	14.7
	EUE	90.8	87.8	83.4	78.9	91.4	89.3	85.5	81.2
	EUN	84.6	88.1	91.1	93.4	84.6	88.3	93.0	97.7
ERMI	EUS	96.3	93.5	90.9	88.1	98.1	99.2	100.5	100.9
	EUW	93.7	94.7	95.6	96.2	94.1	95.8	97.6	99.4
	UK	83.2	81.6	78.4	73.2	83.5	85.6	84.4	79.5
	EUE	32.1	33.7	34.7	35.4	31.6	33.3	35.4	37.7
	EUN	24.6	24.9	25.1	25.4	24.6	24.5	24.2	24.2
GINI	EUS	33.6	35.6	36.2	36.1	32.8	33.6	34.0	34.5
	EUW	29.1	29.0	28.7	28.4	29.0	29.0	29.1	29.4
	UK	38.5	40.9	41.8	42.4	37.5	39.3	40.3	41.2

Source: WB module projections. All WB measures defined in rates are expressed in per cent.