The Macroeconomics of Europe 2020 Reform Strategy and the Potential Effects on the Italian Economy*

Barbara Annicchiarico† Fabio Di Dio‡ Francesco Felici§

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Abstract

This paper studies the potential effects on the Italian economy of various reform packages in the spirit of the Europe 2020 strategy. Using the European Commission's model QUEST III with R&D calibrated to match important features of the Italian economy, we provide a quantitative assessment of the possible effects in terms of growth, employment, sustainability of public finances and external imbalances of several knowledge-oriented, labor and product market reforms. We observe that labor market reforms are likely to bring about sizable long-run gains in output and employment and that most of these gains accrue to low skilled workers, while real wages tend to increase especially for high skilled workers. Some interventions are likely to have some transitional costs as they give rise to a temporary decline in consumption and/or employment, but the simultaneous implementation of all reforms may tend to mitigate these effects already in the medium run. As a result of higher growth, in the no costly reform scenarios, the public debt-to-GDP ratio declines substantially. However, the analysis shows that non-budget neutral structural reforms may have considerable side effects on the external imbalances.

JEL Classification Codes: E10, E60, E47.

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†*Corresponding author*: University of Rome "Tor Vergata", Department of Economics, Via Columbia 2, 00133 Roma, Italy. Phone: +390672595731. E-mail: barbara.annicchiarico@uniroma2.it.

‡Consip S.p.A., Department of Public Finance, Macroeconomic Modelling Unit. E-mail: fabio.didio@tesoro.it.

§Italian Ministry of Economy and Finance, Department of the Treasury, Economic and Financial Analysis and Planning Directorate. E-mail: francesco.felici@tesoro.it.

1 Introduction

After some years of deep recession and high unemployment, a wide-ranging economic reform process is taking place in Europe, primarily to restore macroeconomic stability and enhance employment, economic growth and social cohesion. This reform process, launched by the European Commission in March 2010, foresees a complex economic strategy, known as the Europe 2020 strategy, consisting in several structural reform packages with the scope of achieving smart, sustainable and inclusive growth.

This ten-year strategy, formally adopted in June 2010, offers a timetable to achieve improvements centered around some key policy areas for economic recovery and growth: knowledge and innovation, enhanced competition in the product markets, education, labor market participation and fight against poverty (for details see European Commission 2010a and European Council 2010).

Notably, the predicted positive effects on productivity, growth and employment, delivered by innovative and productive activities and more flexible labor and product markets, depend crucially on the interactions between policy areas, the synergies between reforms and the interdependencies between Member States. From this point of view, progresses towards the Europe 2020 objectives need concerted and planned reforms with all European countries, as recently emphasized by the European Commission (2011). In order to ensure a more complete harmonization with national legislation, each country is expected to set its own headline targets taking into account country-specific political and economic constraints. At a first step, policy reforms need to be focused on those sectors which require fast and urgent interventions (i.e. frontloading measures), tackling the main bottlenecks to growth; only after that, long-range measures, including internal market developments and infrastructures, can be undertaken.

In this paper we will explore the potential effects of some structural reforms envisaged in the Europe 2020 strategy for the Italian economy through simulations made using the QUEST III model adapted to Italy (see Roeger et al. 2008), with particular attention on the implications for growth, employment, fiscal sustainability and external imbalances. QUEST III with R&D is an extension of the original Dynamic General Equilibrium (DGE) model for quantitative policy analysis developed by the Directorate General for Economic and Financial Affairs (DG ECFIN) of the European Commission (see Ratto et al. 2008). In particular, in our simulation exercise we will use the version already employed by the Commission in several multi-country analyses of structural reforms (e.g. D'Auria et al. 2009). To the best of our knowledge this paper represents a first attempt to analyze the implications of a comprehensive and ambitious reform package on the Italian economy by employing a dynamic general equilibrium model.

The literature studying the potential macroeconomic effects of structural reforms is quite large and a complete survey is beyond the scope of this paper. Hence, we will only briefly refer to a few of those studies evaluating the effects of structural reforms in the context of DGE models. Most of these models integrate typical New Keynesian elements (such as imperfect competition and nominal rigidities) into a general equilibrium framework (e.g. Smets and Wouters 2003, 2007; Galí and Gertler

2007; Christiano et al. 2005, Woodford 2003, among others). This modeling approach represents a useful tool for macroeconomic evaluation and policy analysis in an environment with several market imperfections, capturing the dynamic linkages between the main macroeconomic variables, the interactions between rigidities on labor and product markets and, as a consequence, the effects on economic growth in a coherent way.

It is not until relatively recently that DGE models have been used to this purpose. First of all, the European Commission has produced several contributions investigating the effects of a battery of policy interventions on the EU economy and/or single member states using QUEST III with R&D (e.g. Roeger et al. 2008 and D'Auria et al. 2009), studying the implications of the implementation of reform packages in the spirit of the Europe 2020 strategy on the EU (see Hobza and Mourre 2010), concentrating on reform areas fostering innovation and knowledge creation in the EU, consistently with the Lisbon Agenda (see Roeger et al. 2009), exploring the growth potential stemming from comprehensive environmental and innovation policy interventions (see Conte et al. 2010). In variants of the International Monetary Fund's Global Economy Model (GEM) Bayoumi et al. (2004) study the impact of introducing pro-competitive reforms in the overall euro area, while Everaert and Schule (2006) focus on national-level reforms, considering a large economy, France, and a small one, Belgium. As regards Germany, Heer and Trede (2003) explore the effects of two tax reforms: a flat-rate income tax reform and a shift from income tax to consumption tax. Gomes et al. (2011) study the domestic and the cross-country effects of competition enhancing reforms occurring in Germany and Portugal using the Euro Area and Global Economy (EAGLE) model, stressing the benefits of cross-country coordinated policies. In a DGE model calibrated to Greece, Papageorgiou (2009) examines the implications of tax reforms, such as tax shifts from capital and labor income to consumption, on welfare and growth. Forni et al. (2010) study the effects of increasing competition in the service sector in Italy, employing a two-region currency union DGE model.

In this paper we focus on Italy which provides a case study of an economy industrially advanced but ultimately failing to take off in sustained growth at rates above the EU 15 average and in need of economic reforms. Notably, a slowdown in productivity was the key factor dragging down economic growth (see e.g. Codogno 2009, OECD 2011). In the decade 1997-2006 the average annual gross national income growth rate was 1.6% for Italy and 2.5% for EU 15.[1] Turning to the labor market, according to EUROSTAT data[2], in 2009 Italy recorded an employment rate equal to 60.5% (against a 62.8% in 2007 before the advent of the crisis), Germany to 69.9% (73.4% in 2007), France to 69.1% (69.5% in 2007) Spain to 65% (62.5% in 2007) with an EU 27 average employment rate of 67.7% (70% in 2007). Hence, despite considerable progress made in the last decade, the employment rate is still significantly lower than the EU average. In 2009 the share of population at risk of poverty or social exclusion is found to be 24.7% for Italy, 20% for Germany, 18.4% for France, 23.4% for Spain and 23.1% for

[1]Annual growth rates computed on gross national income at 2000 market prices, see Annual macro-economic database (AMECO) - European Commission.

[2]See EUROSTAT, Europe 2020 Indicators, Table t2020_10.

EU 27.[3] As regards to the tax burden on labor income, Italy stands out among the EU member states with the largest implicit tax rate on labor (in 2008 42.8% against 36.5% for EU 27)[4]. Furthermore, in 2006 the gross domestic expenditure on R&D was just 1.1% of GDP, well below the EU 27 share of 1.9%[5]. A number of weaknesses can also be identified in the education sector, with a high number of early school leavers (in 2009 19.2% vs. 14.4% for EU 27) and a low share of tertiary-educated population (in 2009 19% against 32.3% for EU 27)[6]. Finally, the very high public debt (in 2010 the debt-to-GDP ratio is 118.9%[7]) and the related-debt servicing costs continue to weigh on the Italian economy and force to commit to a fiscal consolidation process leading the debt ratio towards a steadily declining path. These features of the Italian economy call for the immediate implementation of economic reforms able to relaunch growth, foster social inclusion, favor the full utilization of the economy labor potential and promote knowledge-creation activities. In what follows we will explore the potential impact of several reforms on macroeconomic performance by simulations. More precisely, our analysis covers three wide policy areas of intervention: innovation and knowledge, internal market and labor market.

The first policy area includes a set of measures aimed at promoting and enhancing innovation, which is the driving force behind economic growth, and at improving education. On the one hand, investments in R&D aim at improving existing production processes, creating new products, increasing the country capacity to absorb new technologies and to upgrade the quality of domestic products increasing non-price competitiveness (quality upgrading). On the other, the amelioration of educational standards aims at reducing the school drop-out rates and increasing the average skill level of the labor force. The second policy area includes reform packages focussing on promoting market competition and favoring business (through the creation of a more business friendly environment). Finally, the paper looks at labor market reforms including measures directed to enlarge the labor force participation rate (especially of women and young workers), to expand social inclusion of low income and low skilled people, to remove distortions in the labor markets and to align wages to labor productivity trends.

In order to fully exploit the advantages of a micro-founded model, we analyze the implications of the economic reform packages on the main macrovariables and the dynamic interactions of reforms in each area of policy intervention by introducing simultaneously all changes to the policy variables. In fact, although we are not able to simulate all types of reforms envisaged in the Europe 2020 strategy, by using a DGE model, we can explore the interlinkages and the synergies between the different policy areas. Policies promoting investments in knowledge, for example, have a strong impact on competition; viceversa, stronger competition provides stimulus for producers to invest in product and process innovation. On the other hand, a well functioning labor market facilitates a more efficient allocation of resources.

[3]See Eurostat, Europe 2020 Indicators, Table t2020_50.

[4]See Eurostat, Government finance statistics, Table gov_a_tax_itr.

[5]See Eurostat, Europe 2020 Indicators, Table t2020_20.

[6]See EUROSTAT, Europe 2020 Indicators, Tables t2020_40 and t2020_41.

[7]See European Commission, General Government Data.

Unfortunately, some changes involved by these reforms imply a potential trade-off between implementation and fiscal sustainability, that is why, in some circumstances, an additional plan for fiscal consolidation may be necessary to meet the recent Stability and Convergence Programme requirements. Some of these reforms, in fact, entail a negative impact on public finance attenuating the positive effects resulting from other interventions.

In particular, we find the following results. We show that reforms intervening in the policy areas of innovation and knowledge and of internal market are likely to affect output and employment especially in the long run, whereas labor market reforms mainly materialize in the short run. After ten years since the beginning of the reform phase, we observe an increase in income of 8.54% in the substantial reform scenario with costly measures and of 7.63% in case of advanced reforms with no ex-ante impact on public finances. After a decade, reforms allow an increase in total employment up to 5.49% and of low skilled employment up to 8.01%. Furthermore, in the most advanced scenarios we observe that real wages tend to increase and the benefits mainly accrue to the high workers. The positive effects on income and the improvements in employment support fiscal consolidation decreasing the public debt-to-GDP ratio also in the scenarios entailing costly measures. As regards to the external imbalances, in the ex-ante budget neutral scenarios we observe a reduction of prices in the tradable sector which boosts domestic competitiveness and improves the external balance through higher exports. Conversely, in the costly scenarios the external asset position always deteriorates. In general, according to the simulations, winning policies enhance competition in goods market, increase labor supply and align wages to productivity trends.

The remainder of the paper is organized as follows. Section 2 is devoted to a brief description of QUEST III with R&D and discusses the calibration of the version adapted to Italy. Section 3 describes the Europe 2020 strategy in the three policy areas under analysis with particular attention on the reform scenarios to be simulated and to the strategy adopted to map policy interventions onto QUEST. Section 4 explores and discusses the potential impact of structural reforms through simulation analysis. Section 5 concludes

2 QUEST III with R&D: Model Setup and Calibration

In the version of QUEST III used in the present analysis the economy is confined to Italy, modeled as a small open economy. This country-specific version of QUEST has been employed by the Commission in several multi-country analyses of structural reforms (e.g. D'Auria et al. 2009). The version of the QUEST III model we employ in this paper belongs to the so called DGE models which combine a rigorous microfoundations of the behavioral equations of the macrovariables with an empirically plausible calibration and/or estimation matching the steady-state ratios and fitting the long-run behavior of macro data. With this approach one is able to derive a direct relationship between the deeper structural parameters of an economy and the reduced-form

parameters. As a result of this, DGE models are less subject to the Lucas critique, since deeper structural parameters are less likely to change in response to economic policy changes and reforms.

QUEST III with R&D enriches the QUEST III DGE model described in Ratto et al. (2008) by incorporating an endogenous growth mechanism (see Roeger et al. 2008 for details) in the spirit of Jones (1995, 2005) and adapting the Romer's (1990) model with R&D. This version of QUEST is more suitable to study the impact of structural reforms according to the Europe 2020 strategy. In the policy area of knowledge and innovation the explicit consideration of an R&D sector allows to map many policy interventions aimed at increasing the rate of knowledge creation (i.e. smart growth policies). By modeling final and intermediate goods markets as imperfectly competitive and by embodying entry and administrative burden costs, the model can be used to assess the effects of competition-enhancing policy (i.e. internal market policies). Similarly, given the distinction of employment in three skill categories (low, medium, high), the inclusion of benefit replacement rates, labor taxes and of imperfect competition, it is possible to fruitfully study the implications of many labor market reforms (i.e. inclusive growth policies). The model, calibrated to quarterly data, features eight types of economic agents: households-workers, trade unions, final goods firms, intermediate goods firms, R&D sector, foreign sector, the government and the central bank. Adjustment costs on nominal and real variables enable QUEST to capture the typical persistence of macrovariables and mimic their empirical dynamics in response to shocks.

In what follows we describe the main features of QUEST with endogenous growth, emphasizing the key ingredients and describing the policy variables to be used in our simulation exercise.

2.1 Households and Wage Setting

The economy is populated by two types of households: the non liquidity constrained and the liquidity constrained. The composition of the population is constant and the shares of liquidity and non liquidity constrained households are denoted by s_{LC} and s_{NLC}, respectively. The non liquidity constrained households own domestic and foreign assets, accumulate physical capital which they rent out to the intermediate goods producers, buy the patents produced in the R&D sector and license them to the intermediate goods sector, supply medium and high skilled labor services to the final goods sector and to the R&D sector, choose the optimal consumption plan on the basis of all the available information and taking into account all technological, institutional and budgetary constraints of the economy. The population shares of low, medium and high skilled are, respectively, denoted by s_L, s_M and s_H. Policy aimed at achieving a skill upgrade of the labor force will imply changes in these shares.

The liquidity constrained households, instead, do not have access to financial markets hence, consume all their after tax labor income (i.e. they are not able to smooth consumption) and only supply low skilled labor services to the final goods sector (see Roeger et al. 2008). This feature of the model allows to deviate from Ricardian equivalence and is relevant to reproduce empirically consistent effects of fiscal policy (see

e.g. Galí et al. 2007 for details).

Within each skill category (high, H, medium,M, and low, L) households supply differentiated labor services. Trade unions set wages in monopolistically competitive labor markets, while nominal wage rigidities are due to the existence of convex adjustment costs for changing wages.

The representative non liquidity constrained household i lifetime utility is

$$V_0^i = E_0 \sum_{t=0}^{\infty} \beta^t \left(U\left(C_t^i, C_{t-1}\right) + \sum_s V\left(1 - L_t^{i,s}\right) \right), \tag{1}$$

where E_0 is the conditional expectation operator (on the basis of the information available at time $t = 0$), β is the discount factor, $U(\cdot) = (1 - habc)\log(C_t^i - habc\, C_{t-1})$ with $habc > 0$ being the critical parameter governing habit persistence, C_t^i a consumption basket (index) of domestic and foreign goods with constant elasticity of substitution, which determines the market power of each producer and the price markup, and C_{t-1} the past level of the economy average consumption representing the stock of habit. In this sense habits are external to the individual household. $L_t^{i,s}$ denotes the typical labor service of household i belonging to the skill category $s = H, M$ and $V(\cdot) = \omega_s \left(1 - L_t^{i,s}\right)^{1-\kappa} / (1-\kappa)$ with $\omega_s > 0$ being a skill specific preference parameter and $\kappa > 0$.

Non liquidity constrained households decide how much to consume, how much to work, how much to invest in financial assets (domestic and foreign assets, labeled as B_t^i and $B_t^{F,i}$) and in physical capital K_t^i, and make decisions about the purchase of new patents (the so called intangible capital A_t^i) and the degree of capacity utilization in order to maximize (1) subject to a sequence of flow budget constraints, the accumulation equations of physical capital and of the stock of existing patents and the standard transversality conditions.

Households receive labor income, profits from the final and the intermediate goods firms, transfers from the government, are eligible for benefits when unemployed and pay lump-sum taxes, consumption taxes, wage income taxes and capital income taxes on tangible and intangible capital, less depreciation allowances and tax credits (at rates τ^K, τ^A). Policies aimed at boosting private investments in R&D through tax incentives will require a decrease of τ^A.

Turning to the capital markets, households demand risk premia rp^K and rp^A for investing into tangible and intangible capital K and A. Policies oriented to improve access to finance in the final goods sector and in the R&D intensive sector are mapped onto QUEST as risk premia reduction.

Finally, households face quadratic adjustment costs on investments in physical capital, on capacity utilization and on nominal wage changes (for more details, see Roeger et al. 2008).

Trade unions set the nominal wage for each category of labor service in order to maximize households' expected utility, given firms' labor demand. Each specific kind of labor service is an imperfect substitute for services supplied by other workers under the assumption of a constant elasticity of substitution which determines the degree of market power: the lower the elasticity of substitution, the higher the markup and the

lower the employment level. Notice that the presence of tax on labor, unemployment benefits and consumption taxes together with the wage markup introduce a wedge between the real wage rate and the marginal rate of substitution between leisure and consumption, $MRS_{t,C,1-L}$, that is

$$\frac{W_t^s}{P_t^C} = \mathcal{MU}_{W^s} \frac{1+t^C}{1-t^{w,s}-b^s} MRS_{t,C,1-L}, \tag{2}$$

where index $s = L, M, H$ denotes the skill level, W_t^s the nominal wage, P_t^C the consumption price index, $\mathcal{MU}_{W^s}$ denotes the gross wage markup, t^C the consumption tax rate, $t^{w,s}$ wage income tax rate and b^s the unemployment benefit rate. As we will see, most of the reforms intervening in the labor market and aimed at increasing the employment rate tend to reduce this wedge.

2.2 Final Goods Sector

In the final goods sector each product j is made by a monopolistic firm facing a demand function with price elasticity equal to σ_d, which is also the elasticity of substitution between different products in the spirit of Dixit and Stiglitz (1977) and determines the degree of market power in the final goods sector.

The typical firm j faces the following technology:

$$Y_t^j = \left[A^{exog}\left(L_{Y,t}^j - FC_L\right)\right]^{\alpha} \left[\sum_{i=1}^{A_t} \left(x_{i,t}^j\right)^{\theta}\right]^{\frac{1-\alpha}{\theta}} KG_t^{1-\alpha_G} - FC_Y, \quad \theta, \alpha, \alpha_G \in (0,1), \tag{3}$$

where Y_t^j is the final output, A^{exog} is labor productivity, $L_{Y,t}^j$ is a CES combination of labor services (see below), FC_L denotes the so called overhead labor which captures the notion that a firm must employ a minimum amount of labor to produce any output at all (this includes hours spent on administrative tasks, supervisory labor, breaks, meetings and so on); A_t is the number of varieties of intermediate inputs $x_{i,t}^j$ which are imperfect substitute with and an elasticity of substitution equal to $1/\theta$, KG_t is public capital whose level depends on the public infrastructure investment decisions I_t^G and evolves as $KG_t = (1-\delta_G)KG_{t-1} + I_t^G$ with δ_G being the depreciation rate. Finally, FC_Y is a fixed cost capturing a variety of institutional failures as well as the effort to enter the market. Measures to cut entry barriers are simulated by reducing this cost.

The labor input $L_{Y,t}^j$ is defined by the following CES aggregator:

$$L_{Y,t}^j = \left[s_L^{\frac{1}{\sigma_L}} \left(ef_L L_t^L\right)^{\frac{\sigma_L-1}{\sigma_L}} + s_M^{\frac{1}{\sigma_L}} \left(ef_M L_t^M\right)^{\frac{\sigma_L-1}{\sigma_L}} + s_{H,Y}^{\frac{1}{\sigma_L}} \left(ef_H L_t^{HY}\right)^{\frac{\sigma_L-1}{\sigma_L}}\right]^{\frac{\sigma_L}{\sigma_L-1}}, \tag{4}$$

where s_L, s_M are the shares of labor force for low and medium skill categories and $s_{H,Y}$ denotes the share of high skilled workers employed in the final good sector. The coefficients ef_L, ef_M, ef_H measure efficiency and L_t^L, L_t^M, L_t^{HY} the labor inputs for the three categories. Finally, the parameter σ_L denotes the elasticity of substitution between the three skills (see Roeger et al. 2008).

The objective of each firm j is to maximize profits by setting the optimal price P_t^j and making choices about labor inputs and intermediate goods, given quadratic adjustment costs on price resetting (i.e. nominal frictions *à la* Rotemberg 1982) and quadratic adjustment costs on employment changes (i.e. real frictions). Imperfect competition in the final goods market reflects on prices which will be equal to a markup, denoted as $\mathcal{MU}_P$, over marginal costs. Pro-competitive policy interventions in the product market will be introduced into the model by decreasing this markup.

2.3 Intermediate Goods Sector and the R&D Sector

The intermediate goods sector is also characterized by the presence of monopolistically competitive firms, indexed by i (for $i = 1, ..., A$), producing different varieties of the intermediate good x_t, employing physical capital k_t, rented from households at a rental rate i_t^k. The technology is linear and is such that to produce one unit of x_t is necessary to employ one unit of physical capital. In order to enter the market and starts to produce, intermediate goods firms must license a patent from the households at a rate i_t^A, and pay a fixed cost equal to FC_A. The optimal price set by firm i will be equal to a markup over, denoted as $\mathcal{MU}_{PX}$, marginal cost. See Roeger et al. (2008) for further details. As in the final goods sector, structural policies aimed at cutting entry barriers can be simulated by reducing FC_A, while pro-competitive interventions are introduced through markup reduction.

The number of available intermediates goods depend on the number of patents created in the economy (i.e. the stock of knowledge), which, in turn, depends on the R&D activity. In particular in the R&D sector the production of new patents depends on the number of high skilled workers employed, L_t^{RD}, and on the domestic and the international aggregate stocks of knowledge (labeled as A and A^*, respectively), measured as the existing stock of patents. The knowledge production function is of the form:

$$\Delta A_t = v A_{t-1}^{*\omega} A_{t-1}^{\varphi} (L_t^{RD})^{\lambda}, \quad \omega, \varphi, \lambda \in (0,1)\,, \tag{5}$$

where $v > 0$ is a measure of total productivity, ω and φ capture the international and the domestic spillover effects of existing knowledge (the so called "standing on shoulders" effect) and λ measures the contribution of high-skilled labor services to the R&D activity (where decreasing returns of research activity is due to a sort of "stepping on toes" effect related to the risk of duplication of new discoveries and creations). This sector is also characterized by real frictions deriving from the existence of quadratic costs on labor inputs adjustments.

Firms operating in the R&D sector may benefit from a subsidy on the wages paid to the high skilled employed. For future reference we denote this subsidy as s_W^{RD}. Increasing wage subsidy for the R&D personnel is one of the policy intervention we will consider in our simulation exercise.

From (5) it can be easily shown that the rate of new patents creation, g_A, on balanced growth path (i.e. when all relevant variables of the economy grow at the same constant rate) is equal to

$$g_A = \frac{\omega g_A^* + \lambda n}{1 - \varphi}, \tag{6}$$

where g_{A^*} denotes growth rate of the international stock of patents and n is the growth rate of population which, under the assumption that the composition of the workforce stays constant, corresponds to the growth rate of skilled population employed in the R&D sector. Clearly, in this setup long-run growth is not affected neither by saving decisions nor by the number of workers employed in the R&D, that is why all policies intervening in this sector and promoting growth are able to affect the growth rate g_A only along the transitional path. This growth framework follows very closely the so called "semi-endogenous" growth model by Jones (1995, 2005) according to which the growth process (i.e. the rate of creation of new patents) is "endogenous" in the short-medium run and "exogenous" in the long run.

2.4 Foreign Sector, Monetary and Fiscal Authorities

The foreign sector is completely exogenous since the model is developed under a small open economy hypothesis. It is assumed that both final and investment goods are traded and that the elasticity of substitution between domestic and foreign bundles of goods is constant. Foreign and domestic areas exporters act as monopolistic competitors in their market and charge a mark-up over domestic prices.

The monetary policy is described by a Taylor rule (see Taylor 1993) allowing for a certain degree of inertia of the interest rate i_t in response to inflation π_t and output gap $ygap_t$ (defined as deviation of capital and labor utilization from their long-run trends):

$$i_t = \tau_{lag} i_{t-1} + (1 - \tau_{lag}) \left[r^{eq} + \pi_t^T + \tau_\pi \left(\pi_t - \pi_t^T \right) + \tau_y ygap_t \right], \tag{1.8}$$

where r^{eq} is the long-run real interest rate, π_t^T is the inflation target, τ_{lag} is the smoothing parameter, while τ_π, τ_y are the policy parameters governing the reaction to inflation and to output gap movements.

The fiscal authority behavior is described by a set of equations according to which expenditures and receipts also depend on economic fluctuations. The government collects lump-sum taxes, taxes on labor income, on consumption and on tangible and intangible capital, net of tax credits and tax allowances, pays transfers and unemployment benefits to households, confers wage benefits to the R&D firms and decides on public consumption, G_t, and public investment spending and may issue public debt bonds to finance current imbalances. By assumption, to ensure fiscal solvency and avoid any explosive behavior of public debt, the lump-sum component of taxation evolves as a function of the deviation of the debt-GDP ratio from a target level (for more details see Roeger et al. 2008). In our simulations, however, we will switch off the rule for 20 years in order to isolate the effects deriving from the implementation of economic reforms from those implied by the automatic adjustment of lump-sum taxation implied by the fiscal rule.

2.5 Calibration

The QUEST III model is calibrated on quarterly basis in order to match steady-state ratios and specific features of the Italian economy in 2007 and consistently with the

estimates of the basic QUEST III model (see Ratto et al. 2009). The parametrization is summarized in Tables 1a and 1b (see D'Auria et al. 2009). As a benchmark, we also present the basic parametrization of QUEST III for the EU as reported in Roeger et al. (2008) and in Roeger and in't Veld (2009, 2010). This extra piece of information is useful to understand how some country-specific economic features of Italy are mapped into the Italian version of the QUEST model with respect to the EU version.

Labor skill categories are defined so that low skilled workers are those with up to lower secondary education, high skilled workers are those with a tertiary education in science and technology, while medium skilled workers are defined residually. The skill distribution of the labor force in QUEST - Italy points to a high share of low skilled s_L who represent 50% of the labor force and to a very low share of high skilled, $s_H = 3\%$. Unskilled labor is only supplied by liquidity constrained individuals, hence $s_{LC} = s_L$. It is worth mentioning that in QUEST III calibrated to the EU $s_{LC} = s_L = 0.35$ and $s_H = 6\%$.

The employment rate is set at 63%, below the EU counterpart of 69%, consistently with data. The employment level of the low skilled is only 52%, well below the rate of the high skilled equal to 81%. The skill premium of high skilled versus medium skilled is set at 37%, well below the calibrated level for the EU of 50%, implying that skilled workers appear not to take advantage of attaining high education level.

The final goods sector, employing labor and intermediate goods as inputs, is identified as the service sector, while the intermediate goods sector, which is capital and R&D intensive, is identified as the manufacturing sector. For details on the calibration strategy adopted for QUEST, see Roeger et al. (2008) and D'Auria et al. (2009). Net markups present more than 20% in the final goods sector, about two times the one reported for the intermediate goods sector. This is consistent with the fact that markups in services tend to be higher than in manufacturing (e.g. Christopoulou and Vermeulen 2008). The high fixed entry costs, FC_A, set for the Italian version of QUEST emphasizes the cumbersome regulation borne by firms before they are able to operate legally which represents a significant bottleneck to productivity growth and capital accumulation.

The R&D sector is calibrated so as to highlight the weaknesses of the Italian economy in the knowledge creation process. In particular, the contribution of R&D labor to knowledge creation, governed by the parameter λ, is only 0.37 (vs. 0.73 for the EU) and R&D intensity is 1.10%, below the EU level set at 1.84%.

The tax system calibration points to heavy taxation on labor income (51%) and a high share of transfers as a percentage of GDP (27%), while the tax rate is tangible capital is below the rate set for the EU version of QUEST. Finally, the monetary policy parameters are set consistently to the literature (i.e. see Galí 2008).

3 The Europe 2020 Strategy and Reform Scenarios

The simulation exercise quantifies the likely gains of implementing a set of reforms inspired to the EU 2020 strategy for the Italian economy, in terms of growth, employment, fiscal sustainability and external imbalances. However, as in a similar exercise

carried out by the Commission for the whole Europe (see Hobza and Mourre 2010), the reform scenarios considered in this paper do not include several interventions in the spirit of the Europe 2020 strategy, such as those aimed at achieving sustainable growth and development (i.e. green growth), since the relevant mechanisms are not considered in the model. In this Section will briefly describe the key policy areas of interventions of the Europe 2020 strategy, show how reforms are mapped onto QUEST III with R&D and describe the reform scenarios.

3.1 Policy Areas and QUEST III Variables

The first policy area of intervention labeled "knowledge and innovation" includes all measures aimed at promoting growth through innovation activity and improvement in education. Some examples of possible reform measures include: (i) fiscal incentives aimed at increasing private R&D activity which are introduced into the model by increasing the tax credit rate on intangible capital τ^A and subsidies on wages of the R&D personnel s_W^{RD}; (ii) policies improving access to credit (i.e. notably credit constraints may limit R&D activity and so growth), which are mapped onto QUEST by a reduction in the risk premium on intangible capital rp^A; (iii) interventions aimed at reducing the costs and the time necessary to start up a new firm in the R&D intensive sector, which are simulated by a reduction in FC_A representing a measure of the entry barriers; (iv) policies promoting competition in the R&D intensive sector, i.e. the manufacturing sector, which are simply simulated by a reduction in the intermediate goods price markup $\mathcal{MU}_{PX}$; (v) interventions enhancing education, reducing the drop-out rate, improving the level of human capital are introduced into the model by an increase in the level of public spending G and increase in the share of medium skilled s_M.[8]

The second area of intervention labeled "internal market" includes all policies promoting competition in the product markets such as: (i) policies improving access to credit which are mapped by a reduction in the risk premium on tangible capital rp^K; (ii) interventions improving competition and ameliorating the business environment in which firms operate, simply modeled as a reduction in the markup in the final goods sector $\mathcal{MU}_P$; (iii) reduction of barriers to economic activity, simulated as a reduction in fixed entry costs FC_Y in (3); (iv) reduction of administrative and regulatory burdens, improving the efficiency of public administration services and favoring the economic activity, is introduced in QUEST by a decrease in FC_L in (3).

The third area of policy interventions labeled "labor markets" includes a set of policies aimed at increasing employment, favoring social inclusion and augmenting participation rate such as: (i) tax reforms with the scope of reducing distortions in the labor market and providing more incentives to labor market participation (especially of the low skilled) such as tax shifts from labor income (i.e. a reduction in $t^{w,s}$) to

[8] In order to map the increase in public education spending on the skill composition of the labour force we have considered the annual public spending per student at secondary level and the drop-out rate according to ISTAT data in 2009. Following the increase in public expenditure on education the share of medium skilled will increase by 0.78% in the moderate reform scenarios and by 1.56% in the substantial reform scenarios.

consumption (i.e. an increase in t^C) and from the low to the high skilled, and as reduction in the unemployment benefit rate b^s; these interventions, in fact, tend to reduce the wedge between the real wage and the marginal rate of substitution between leisure and consumption (see eq. 2); (ii) reforms aimed at reducing the bargaining power of insiders and align wages to productivity trends, which are simply mapped by a reduction in the wage markup $\mathcal{MU}_W$ (see again eq. 2).

Most of the above interventions are likely to reduce and redistribute rents, inducing agents to adjust their choices in accordance with the new conditions. Notably, on the one hand, deviations from perfect competition in the product market create rents, on the other hand, non-competitive labor markets allow workers to participate in these rents.[9] Therefore, internal market deregulation, which implies a lower markup over marginal costs, would tend to reduce the bargained wage rate. From this point of view, in some circumstances workers may oppose to labor market deregulation if this is not accompanied or anticipated by a corresponding product market deregulation. In this exercise, however, in all scenarios we are considering a comprehensive reform package which is likely to have pervasive beneficial effects on productivity, innovation, firm entry and, ultimately, on employment, real wages and output. In this context, opposition to reforms could be the result of limited rationality and/or of a myopic planning horizon.

3.2 Scenarios

In order to quantify the effects of structural reforms in the three policy areas of interventions we build four reform scenarios differing in the degree of progress made (moderate vs. substantial) and in the impact they have on public finances (ex ante budget neutral or not). In particular, in the simulations we consider: (i) a moderate reform ex-ante budget-neutral scenario (scenario A); (ii) a moderate reform scenario (scenario B); (iii) a substantial reform ex-ante-budget-neutral scenario (scenario C); (iv) a substantial reform scenario (scenario D). All scenarios are described in Table 2.

In the simulation exercise we suppose that the policy measures start to be implemented at time $t = 1$. The policy changes are assumed to be permanent, as common practice in applied economic modelling when exploring the long-run effects of policy interventions.[10]

With the exception of the increase in the population share of medium skilled (as a result of the higher education spending), which is always assumed to progress in 10 years, we consider two different speeds of implementation: phasing in over 5 years and 10 years.[11] On the one hand, a period of 5 years represents a realistic time span for a reasonably smooth implementation timetable, on the other a 10-year gradual

[9] On this debate, see Blanchard and Giavazzi (2003) and the recent paper by Commendatore and Kubin (2009) and references therein.

[10] For details on the implementation strategy adopted in QUEST to solve the terminal conditions problem for the forward looking variables, see Roeger and in't Veld (1999).

[11] We have also run simulations under the assumption that all changes take place immediately according to the so called "big bang" approach. Of course, the case of immediate implementation is expected to be an upper bound of the possible effects deriving from the reform plan. These results are available upon request.

introduction of all reforms allows us to analyze the effects of a slower implementation motivated by the possible delays due to the need to form consensus for reforms to eventually occur.[12] As will see in the next Section, the effects of some reforms may take time to materialize and the gains may be diffuse and unevenly distributed.

The definition of three intervention areas provides a natural design for the simulation analysis. Reforms in each area are first simulated separately and then simultaneously in order to explore the interlinkages and the synergies of the model. Finally, notice that agents have perfect foresight so that there is no uncertainty about the time path of the reforms. The implicit assumption is that the announced reform plans are fully credible.

4 Simulation Results

In this section we first illustrate the impact of all reforms showing the effect on the main macrovariables after 10 years. Then, we show the transitional dynamics for a 40-quarter time horizon.

4.1 Long-run Effects of Structural Reforms

Tables 3a-3d report the simulation results for key macroeconomic variables in the four scenarios as percentage deviations from the initial steady-state. In Table 3a we consider the effects of the reforms on income, investments on tangible capital and consumption, distinguishing between non liquidity constrained households (NLC) and liquidity constrained (LC) households, who represent the share of the population supplying only low skilled labor services and are at higher risk of poverty. Table 3b presents the effects on total employment disentangling the effects for three skill categories; Table 3c illustrates the effects on real wages; finally, Table 3d reports the effects on the public debt-to-GDP ratio, on the terms of trade and on the net foreign assets. Our interest on external variables, such as the net foreign assets position and the terms of trade, is to be related to the policy debate in the aftermath of the recent crisis.[13]

In particular, we observe that structural reforms could help to boost income with respect to the initial steady state from 3.29% in the moderate reform scenario A, under the assumption of slow implementation, up to 8.54% in the substantial reform scenario D, under the assumption of fast implementation. The major contribution is to be attributed to the policies intervening in the labor market which boost income up to 3.85% in scenario D through a higher employment rate. The measures aimed at promoting the internal market induce an increase in income of 1.31% in the moderate reform scenarios A and B, up to 3.30% in the substantial reforms scenarios B and D.

[12] On the political economy of structural reforms debate about pros and cons of shock therapy versus gradualism see Rodrik (1996) and Wei (1997) among others.

[13] Recent developments during the crisis in Europe call for the need of broadening the surveillance in macroeconomic imbalances other than fiscal imbalances and of an early warning system to prevent future crises. Notably, the last crisis has shown how excessive external imbalances and losses in competitiveness in international markets have strongly reduced the resilience of some EU countries and of the Euro area as a whole. See European Commission (2010b).

The reforms in the policy area of "knowledge and innovation" have modest impact. Intuitively, all the gains deriving from policy interventions promoting innovation and knowledge accumulation, as an increase in public spending on education and R&D, would materialize in the very long run.

Internal market policies seem to play an important role in explaining the increase in investments on tangible capital. This is mainly due to the reduction in the risk premium on tangible capital. A lower user cost of capital, in fact, stimulates investments and the entry of new firms in the market. Overall aggregate consumption would increase up to 4.03%. Most of the gains accrue to the liquidity constrained households by virtue of the reforms improving the efficiency of the internal market.

Turning to employment, the moderate reform scenario A would imply an increase of 2.55% (slow implementation), while the substantial reform scenario D an increase of 5.49% (fast implementation). In general, it can be be noted that employment is strongly and positively affected by all the labor market interventions which have a direct impact on labor and supply schedules. Wage moderation pushes toward an alignment of wages to productivity trends and, at the same time, fiscal reforms aimed at narrowing the labor tax wedge, reduce fiscal distortions and deadweight losses due to the strong fiscal pressure on labor income. As a result of this, it is easy to explain how stronger efforts in this direction, coupled with a reduction in the benefit replacement rate, can bring about higher employment rates and higher growth. We observe a stronger effect on the employment rate of low skilled workers. All the remaining measures produce very small effects on employment, since in QUEST the labor market is characterized by strong rigidities (adjustment costs) which are responsible for the slow and costly adjustment of employment in response to shocks.

Table 3c reports the effects on real wages. It should be noted as in general we observe that the positive effects on real wages due to knowledge and innovation policies and to pro-competitive interventions in the product markets tend to be compensated by the negative effects due to labor markets reforms. The net effect tends to be positive only in the more advanced scenarios C and D.

Table 3d shows that, as expected, the terms of trade deteriorate in response to the reforms. This effect is simply the result of a decline in the export prices as a consequence of higher competition in the domestic economy. The negative terms of trade effect tends to mitigate the positive effects on consumption and investments stemming from the reforms.

More interestingly, in all scenarios for the policy areas of knowledge and innovation and internal markets, we observe that structural reforms worsen the net external position especially in the costly scenarios B and D, consistently with a twin deficit story. Conversely, labor market interventions are likely to improve the net external asset position. Intuitively, the effect on the net external position will depend on how a policy intervention is likely to affect imports, exports, private and public savings, investments and capital flows. Knowledge and innovation reforms boost investments and capital inflows, so producing a negative effect. Internal market reforms enhancing competition through price moderation have a positive effect on the current account through higher exports, but those creating a more friendly business environment expand investments with a negative effect on the current account. Labor market reforms

increase labor supply leading to a fall in the country's relative wage and prices and so boosting exports and improving the next external asset position.

Finally, consider the impact of the reforms on public debt to GDP ratio. It can be observed that reforms reduce the public debt to GDP ratio with respect to the initial steady state, even when a considerable effort is made in increasing knowledge-oriented expenditure, as in Scenarios B and D. The improvement can be easily explained by the fact that the positive effects on employment and GDP start materializing already in the first years of the simulation time horizon, increasing the tax base and the tax collection during all the decade. As a result, by increasing GDP and tax revenues the reforms will favor fiscal consolidation.

4.2 Transitional Dynamics and Effects of Single Interventions

Figures 1-4 plot the transition path of the main macrovariables in response to the simultaneous implementations of all reforms phasing in 5 years. Clearly, nominal and real adjustment costs prevent immediate adjustment to a new equilibrium following the implementation of the reform plan.

Income and investments in tangible capital increase smoothly all along the time interval. However, we observe that in the substantial reforms scenarios C and D, the effects on investments are stronger than those on income.

Turning to consumption we notice that only in the case of substantial and costly reform scenario consumption of the non liquidity constrained households initially declines. The improved growth prospects make it optimal to consume less and invest more.

In the moderate reform scenario A the employment of the high skilled tends to slowly decline, while in the other scenarios we observe an increase in the employment level for three categories of workers. Intuitively, the effects of the budget-neutral fiscal reforms in favor of low skilled workers tend to prevail in the moderate reform scenarios, while in the substantial reform scenarios the major progress made in all policy areas (especially in the knowledge and innovation area) is able to push up high skilled employment as well.

Aggregate real wages respond gradually, first increasing and then decreasing. The net effect after 40 quarters depend on how much ambitious the reform plan is. The very smoothed dynamics is due to the adjustment costs on wages and prices. The real wage of high skilled workers show an upward path. Conversely, the real wage of low skilled workers tend to decrease in the two budget-neutral scenarios. Medium-skilled workers' real wage time path is instead slightly declining in the two costly scenarios B and D.

The path of the terms of trade in response to reforms is always declining, while net foreign assets always decrease in the two costly scenarios. In this case, in fact, the higher public expenditure in R&D and education reduces public savings and undermines the external position. By contrast, in the budget-neutral scenarios, we observe an upward trend. In this case the benefits deriving from the lower prices of exported goods dominate the negative effects of higher investments. Finally, the response of the public-debt-to-GDP ratios tend to be smooth in the no costly scenarios.

Tables 4a, 4b and 4c report the effects of the single policy interventions for different time horizons. In particular, we observe the following. In the area of knowledge and innovation the major source of changes is to be ascribed to the increase in public education spending. Among the reforms improving the functioning of the internal markets, instead, we observe that the major source of change in income is due to the risk premium reduction, while public finances tend to improve mainly in response to the markup reduction. All reforms intervening in the labor markets are likely to reduce the public debt-to-GDP ratio and with the exception of the tax shift from labor to VAT, we also observe an improvement in the net external assets position. The more pervasive contribution in this area is to be attributed to the reduction in the benefit replacement rate.

5 Conclusions

Current growth prospects for Italy call for immediate implementation of reform packages aimed at increasing supply potential and improving competitiveness. This paper has quantified the potential effects on the Italian economy of four policy reform scenarios including a broad range of policy interventions and differing in the progress made in three policy areas: knowledge and innovation, internal markets and labor markets.

According to the simulations, winning policies enhance competition in goods market, increase labor supply and align wages to productivity trends. This is a powerful reason to call for structural reforms fostering competition and participation rate in the labor market. However, the effects of the policy interventions on knowledge and innovation could be underestimated. Reforms in the policy area of knowledge and innovation, in fact, are likely to improve the quality of domestic products increasing non-price competitiveness (i.e. quality upgrading).

In some circumstances the costs of the transition may be quite high, implying a temporary decline in consumption and/employment which start to fade away in the medium run by virtue of the higher growth potential deriving from the joint implementation of all reforms.

Quantifying the impact of such structural reforms on the main macrovariables is extremely difficult. All results have been generated through a model, which, although built up with the purpose of evaluating the effects of structural reforms, only provides a stylized representation of an economy. The tight theoretical assumptions of QUEST impose limitations which must be taken into consideration when interpreting the results. Moreover, the semi-endogenous growth mechanism of the model is likely to underestimate the positive impact of knowledge oriented policies. In addition, the time lags in reforms implementation, the cross-country spillovers and complementarities, the trade-offs between reforms in different domains and the effects of short-term economic fluctuations make it difficult to disentangle the effects of reforms undertaken from others determinants of performance. We have assumed that the announced reform plans are fully credible and that agents have perfect foresight. However, there might be an initial lack of credibility and a problem of uncertainty about the effects of the reforms.

The political economy interactions between product and labor market interventions are not considered here. The literature has shown that more competition in product markets may generate support for labor market deregulation, since lower rents in the goods markets reduces the incentives for trade unions to ask for higher rents when setting wages. From this point of view priority should be given to pro-competitive reforms in the product markets so as to create the required social consensus for labor and social protection reforms

Finally, the scenarios considered in the exercise do not include several policy interventions in the spirit of the Europe 2020 strategy, such as those aimed at achieving sustainable growth and development. We think that future research should also address the green growth challenges, exploring the opportunities for industries, innovation, growth and job creation and the possible interactions with the other reform plans.

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Table 1a: QUEST III with R&D - Calibration for Italy and the EU

	Italy	EU	Source
Households and labor market			
Share of liquidity constrained s_{LC}	0.5	0.35	EUROSTAT
Share of non liquidity constrained s_{NLC}	0.5	0.65	EUROSTAT
Habit persistence on consumption $habc$	0.7	0.7	QUEST3/estimates
Preference parameter on leisure κ	5	4	calibration
Population share of low-skilled s_L	0.5	0.35	EUROSTAT
Population share of medium-skilled s_M	0.47	0.59	EUROSTAT
Population share of high-skilled s_H	0.03	0.06	EUROSTAT
Employment, low skilled L_L	0.52	0.57	EUROSTAT
Employment, low skilled L_M	0.74	0.74	EUROSTAT
Employment, low skilled L_H	0.81	0.84	EUROSTAT
Employment rate L	0.63	0.69	EUROSTAT
Skill elasticity of substitution σ_L	2	1.4	Katz and Murphy (1992)
Wage premium, high v. medium (%)	37	50	EUROSTAT
Wage premium, medium v. low (%)	27	24	EUROSTAT
Efficiency level, low skilled ef_L	0.23	1	calibration - implied
Efficiency level, medium skilled ef_M	0.36	2.1	calibration - implied
Efficiency level, high skilled ef_H	0.69	8	calibration - implied
Labour adjusment cost (% of total wage costs)	18	18	estimates
Benefit replacement rate	0.4	0.4	estimates
Final and intermediate goods sectors			
Net markup (%), final $\mathcal{MU}_P - 1$	21	24	EUKLEMS
Net markup (%), intermediate $\mathcal{MU}_{PX} - 1$	10	12	EUKLEMS
Depreciation rate, tangible capital δ_K (%)	1.5	1.5	calibration
Fixed entry costs, intermediate, FC_A	0.45	0.38	Djankov et al. (2002)

Table 1b: QUEST III with R&D - Calibration for Italy and the EU

	Italy	EU	Source
R&D sector			
Elasticity of R&D wrt labour λ	0.37	0.73	Bottazzi and Peri (2007)
Elasticity of R&D wrt domestic ideas ϕ	0.64	0.53	Bottazzi and Peri (2007)
Elasticity of R&D wrt foreign ideas ϖ	0.34	0.45	Bottazzi and Peri (2007)
R&D efficiency ν	0.20	0.35	calibration - implied
R&D intesity (%)	1.10	1.84	EUROSTAT
Taxes, public spending and public debt			
Labour tax t^L (%)	51	34	calibration
Tax rate on tangible capital income t^K (%)	33	45	Warda (2006)
Consumption tax t^C (%)	17	17	EC
Transfers (%GDP)	27	16	EUROSTAT
Government consumption (% GDP)	20	18	calibration
Taylor rule parameters			
Smoothing parameter τ_{lag}	0.82	0.85	QUEST3/estimates
Sensitivity to inflation τ_π	1.5	1.5	QUEST3/estimates
Sensitivity to output gap τ_y	0.05	0.07	QUEST3/estimates

Table 2: Reform Scenarios

		Scenario A	Scenario B	Scenario C	Scenario D
Degree of reform interventions		moderate	moderate	substantial	substantial
Budget neutral (ex ante)		yes	no	yes	no
Knowledge and innovation	Reduce risk premium on intangible capital	10 basis points	10 basis points	50 basis points	50 basis points
	Reduce entry cost	5%	5%	10%	10%
	Reduce markup in the intermediate goods sector	0.5%	0.5%	1%	1%
	Increase public R&D spending		0.5% of GDP		1% of GDP
	Increase public education spending		0.5% of GDP		1% of GDP
Internal market	Reduce markup in the final foods sector	0.5%	0.5%	1%	1%
	Reduce administrative burden	10%	10%	20%	20%
	Reduce fixed cost	5%	5%	10%	10%
	Reduce risk premium on tangible capital	10 basis points	10 basis points	50 basis points	50 basis points
Labor market	Tax shifts from labor to VAT and from low to high skilled	0.1% of GDP	0.1% of GDP	0.1% of GDP	0.1% of GDP
	Wage moderation	0.5%	0.5%	1%	1%
	Reduce benefit replacement rate	2.5%	2.5%	5%	5%

Table 3a: Long-Run Effects of Structural Reform Scenarios
(Deviations from the initial steady state in % after 10 years)

		Scenario A		**Scenario B**		**Scenario C**		**Scenario D**	
Degree of gradualism		5 years	10 years	5 years	10 years	5 years	10 years	5 years	10 years
Income	Knowledge and innovation	0.19	0.17	0.65	0.65	0.40	0.35	1.16	1.18
	Internal market	1.31	1.18	1.31	1.18	3.30	2.97	3.30	2.97
	Labor market	2.21	1.92	2.21	1.92	3.85	3.37	3.85	3.37
	Sum of the effects	3.71	3.27	4.17	3.75	7.55	6.69	8.31	7.52
	Simultaneous implementation	3.74	3.29	4.46	4.00	7.63	6.74	8.54	7.69
Investments	Knowledge and innovation	0.53	0.51	0.75	0.79	1.06	1.02	1.47	1.56
	Internal market	1.99	1.82	1.99	1.82	7.34	6.86	7.34	6.86
	Labor market	1.33	0.99	1.33	0.99	2.32	1.76	2.32	1.76
	Sum of the effects	3.85	3.32	4.07	3.60	10.72	9.64	11.13	10.18
	Simultaneous implementation	3.88	3.34	4.24	3.70	10.88	9.72	11.31	10.28
Consumption	Knowledge and innovation	0.03	0.01	0.06	0.08	0.11	0.07	-0.03	0.02
	Internal market	0.78	0.68	0.78	0.68	1.10	0.88	1.10	0.88
	Labor market	1.64	1.44	1.64	1.44	2.85	2.51	2.85	2.51
	Sum of the effects	2.45	2.13	2.48	2.20	4.06	3.46	3.92	3.41
	Simultaneous implementation	2.44	2.13	2.73	2.43	3.97	3.38	4.03	3.51
Consumption (NLC)	Knowledge and innovation	-0.03	-0.04	-1.19	-1.16	-0.05	-0.07	-2.50	-2.43
	Internal market	0.70	0.60	0.70	0.60	0.54	0.35	0.54	0.35
	Labor market	1.98	1.77	1.98	1.77	3.54	3.17	3.54	3.17
	Sum of the effects	2.65	2.33	1.49	1.21	4.03	3.45	1.58	1.09
	Simultaneous implementation	2.65	2.32	1.60	1.31	3.97	3.40	1.59	1.10
Consumption (LC)	Knowledge and innovation	0.17	0.15	0.88	0.86	0.54	0.42	1.62	1.62
	Internal market	0.99	0.87	0.99	0.87	2.57	2.27	2.57	2.27
	Labor market	0.72	0.58	0.72	0.58	1.02	0.75	1.02	0.75
	Sum of the effects	1.88	1.60	2.59	2.31	4.13	3.44	5.21	4.64
	Simultaneous implementation	1.88	1.61	3.12	2.82	3.95	3.34	5.40	4.80

Table 3b: Long-Run Effects of Structural Reform Scenarios
(Deviations from the initial steady state in % after 10 years)

		Scenario A		**Scenario B**		**Scenario C**		**Scenario D**	
Degree of gradualism		5 years	10 years	5 years	10 years	5 years	10 years	5 years	10 years
Employment	Knowledge and innovation	0.00	0.00	0.31	0.32	0.00	0.00	0.62	0.63
	Internal market	−0.08	−0.06	−0.08	−0.06	−0.09	−0.06	−0.09	−0.06
	Labor market	2.88	2.60	2.88	2.60	4.95	4.51	4.95	4.51
	Sum of the effects	2.80	2.54	3.11	2.86	4.86	4.45	5.48	5.08
	Simultaneous implementation	2.82	2.55	3.45	3.17	4.91	4.49	5.49	5.09
Employment (H)	Knowledge and innovation	0.01	0.02	0.08	0.10	0.04	0.05	0.12	0.13
	Internal Market	−0.02	−0.02	−0.02	−0.02	0.03	0.02	0.03	0.02
	Labor market	-0.37	−0.34	-0.37	−0.34	0.81	0.73	0.81	0.73
	Sum of the effects	-0.38	−0.34	−0.31	−0.26	0.88	0.80	0.96	0.88
	Simultaneous implementation	-0.38	−0.35	−0.07	−0.06	0.89	0.81	1.02	0.96
Employment (M)	Knowledge and innovation	0.01	0.01	0.05	0.06	0.02	0.02	0.10	0.12
	Internal Market	−0.04	−0.04	−0.04	−0.04	0.02	0.02	0.02	0.02
	Labor market	1.61	1.47	1.61	1.47	2.88	2.65	2.88	2.65
	Sum of the effects	1.58	1.44	1.62	1.49	2.92	2.69	3.00	2.79
	Simultaneous implementation	1.59	1.45	1.86	1.71	2.96	2.72	3.03	2.81
Employment (L)	Knowledge and innovation	−0.01	−0.01	0.04	0.04	−0.04	−0.02	0.06	0.07
	Internal Market	−0.13	−0.10	−0.13	−0.10	−0.26	−0.18	−0.26	−0.18
	Labor market	4.88	4.39	4.88	4.39	8.09	7.34	8.09	7.34
	Sum of the effects	4.74	4.28	4.79	4.33	7.79	7.14	7.89	7.23
	Simultaneous implementation	4.77	4.30	5.30	4.80	7.90	7.20	8.01	7.32

Table 3c: Long-Run Effects of Structural Reform Scenarios
(Deviations from the initial steady state in % after 10 years)

		Scenario A		Scenario B		Scenario C		Scenario D	
Degree of gradualism		5 years	10 years	5 years	10 years	5 years	10 years	5 years	10 years
Real wage	Knowledge and innovation	0.19	0.16	0.24	0.22	0.42	0.37	0.24	0.23
	Internal Market	0.87	0.75	0.87	0.75	2.30	1.99	2.30	1.99
	Labor market	-1.26	-1.22	-1.26	-1.22	-2.08	-2.07	-2.08	-2.07
	Sum of the effects	-0.20	-0.31	-0.15	-0.25	0.64	0.29	0.46	0.15
	Simultaneous implementation	-0.22	-0.32	-0.28	-0.38	0.56	0.23	0.72	0.40
Real wage (H)	Knowledge and innovation	0.35	0.33	0.54	0.54	0.94	0.90	0.00	-0.01
	Internal Market	0.95	0.83	0.95	0.83	2.48	2.17	2.48	2.17
	Labor market	0.68	0.58	0.68	0.58	0.41	0.27	0.41	0.27
	Sum of the effects	1.98	1.74	2.17	1.95	3.83	3.34	2.89	2.43
	Simultaneous implementation	1.99	1.76	2.12	1.89	3.86	3.37	4.29	3.81
Real wage (M)	Knowledge and innovation	0.17	0.15	-0.55	-0.57	0.37	0.32	-1.26	-1.27
	Internal Market	0.84	0.73	0.84	0.73	2.21	1.92	2.21	1.92
	Labor market	-0.53	-0.56	-0.53	-0.56	-0.93	-1.02	-0.93	-1.02
	Sum of the effects	0.48	0.32	-0.24	-0.40	1.65	1.22	0.02	-0.37
	Simultaneous implementation	0.48	0.32	-0.32	-0.48	1.62	1.21	0.19	-0.21
Real wage (L)	Knowledge and innovation	0.18	0.16	1.07	1.05	0.40	0.35	1.99	1.98
	Internal Market	0.89	0.77	0.77	0.89	2.04	2.37	2.04	2.37
	Labor market	-2.12	-2.02	-2.02	-2.12	-3.30	-3.39	-3.30	-3.39
	Sum of the effects	-1.05	-1.09	-0.20	-0.16	-0.91	-0.62	0.72	0.97
	Simultaneous implementation	-1.08	-1.12	-0.40	-0.43	-0.77	-1.01	1.02	0.77

Table 3d: Long-Run Effects of Structural Reform Scenarios
(Deviations from the initial steady state in % after 10 years)

		Scenario A		Scenario B		Scenario C		Scenario D	
Degree of gradualism		5 years	10 years	5 years	10 years	5 years	10 years	5 years	10 years
Terms of trade	Knowledge and innovation	-0.08	-0.07	-0.02	-0.01	-0.15	-0.13	0.02	0.02
	Internal Market	-0.64	-0.58	-0.64	-0.58	-1.51	-1.34	-1.51	-1.34
	Labor market	-1.42	-1.26	-1.42	-1.26	-2.42	-2.18	-2.42	-2.18
	Sum of the effects	-2.14	-1.91	-2.08	-1.85	-4.08	-3.65	-3.91	-3.50
	Simultaneous implementation	-2.13	-1.90	-2.19	-1.96	-4.06	-3.63	-3.92	-3.51
Net foreign assets (%GDP)	Knowledge and innovation	-0.42	-0.35	-7.74	-5.09	-1.31	-0.93	-14.72	-9.39
	Internal Market	-1.21	-1.86	-1.21	-1.86	-3.92	-4.24	-3.92	-4.24
	Labor market	5.28	2.43	5.28	2.43	9.50	4.68	9.50	4.68
	Sum of the effects	3.65	0.22	-3.67	-4.52	4.27	-0.49	-9.14	-8.95
	Simultaneous implementation	3.71	0.32	-4.81	-6.65	4.98	0.20	-9.00	-8.87
Public debt (%GDP)	Knowledge and innovation	-1.19	-0.73	15.92	10.37	-1.41	-1.23	32.34	20.66
	Internal market	-2.56	-2.74	-2.56	-2.74	-11.72	-8.99	-11.72	-8.99
	Labor market	-18.62	-16.07	-18.62	-16.07	-31.55	-27.73	-31.55	-27.73
	Sum of the effects	-22.37	-19.54	-5.26	-8.44	-44.68	-37.95	-10.93	-16.06
	Simultaneous implementation	-22.44	-19.49	-5.11	-9.15	-45.54	-37.70	-12.78	-16.26

Figure 1: Transitional Dynamics - Scenario A (Phasing in 5 Years)

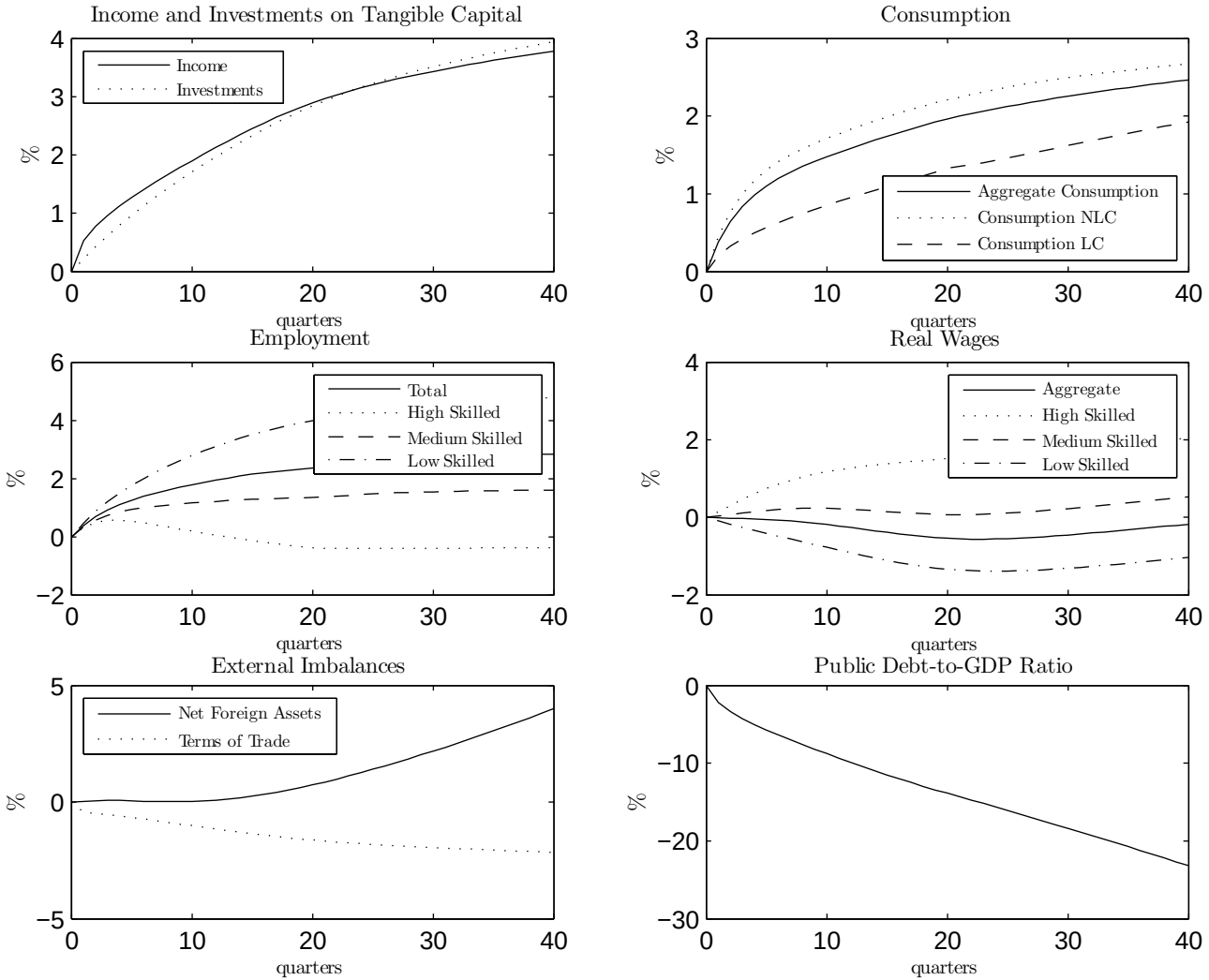

Figure 2: Transitional Dynamics - Scenario B (Phasing in 5 Years)

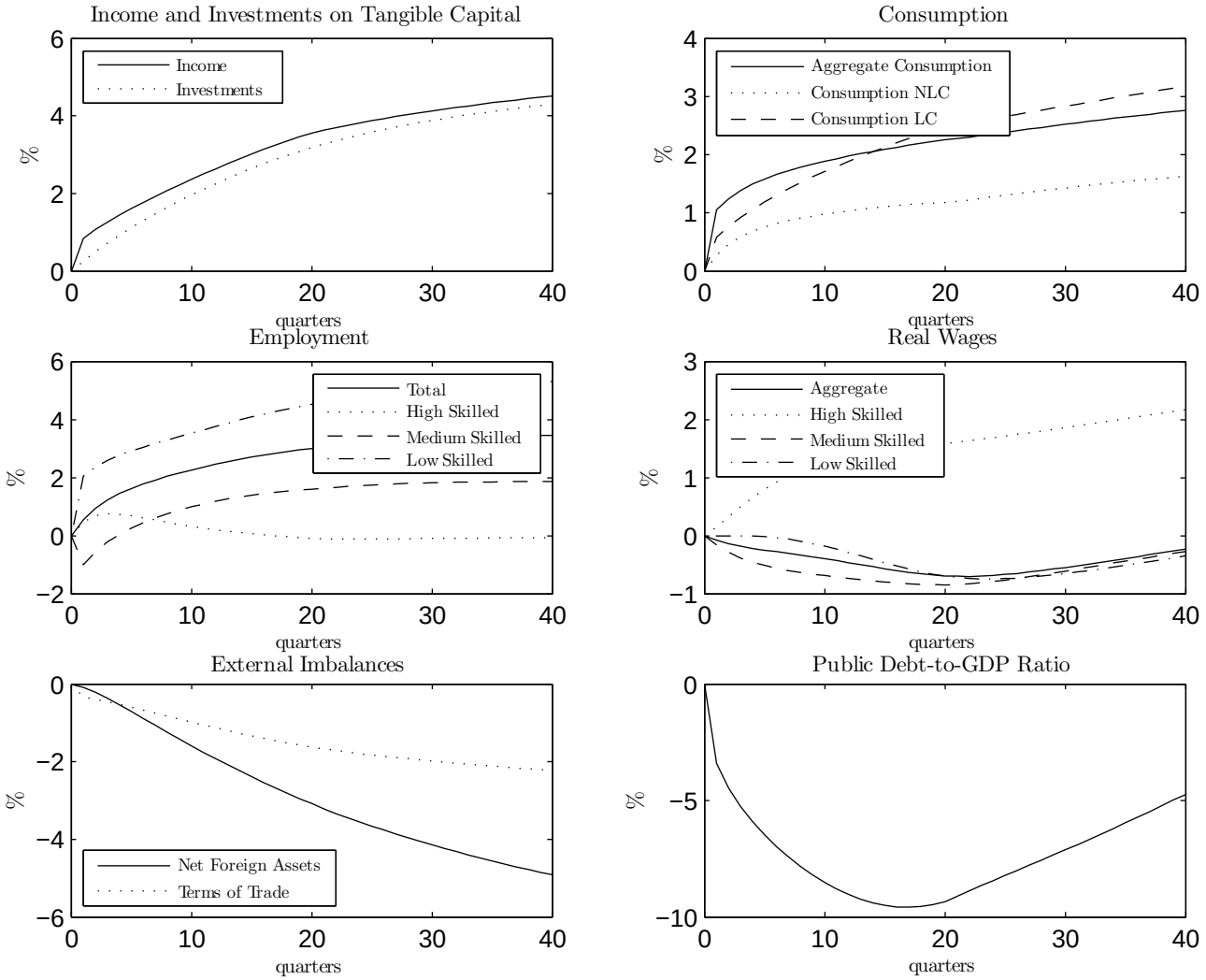

Figure 3: Transitional Dynamics - Scenario C (Phasing in 5 Years)

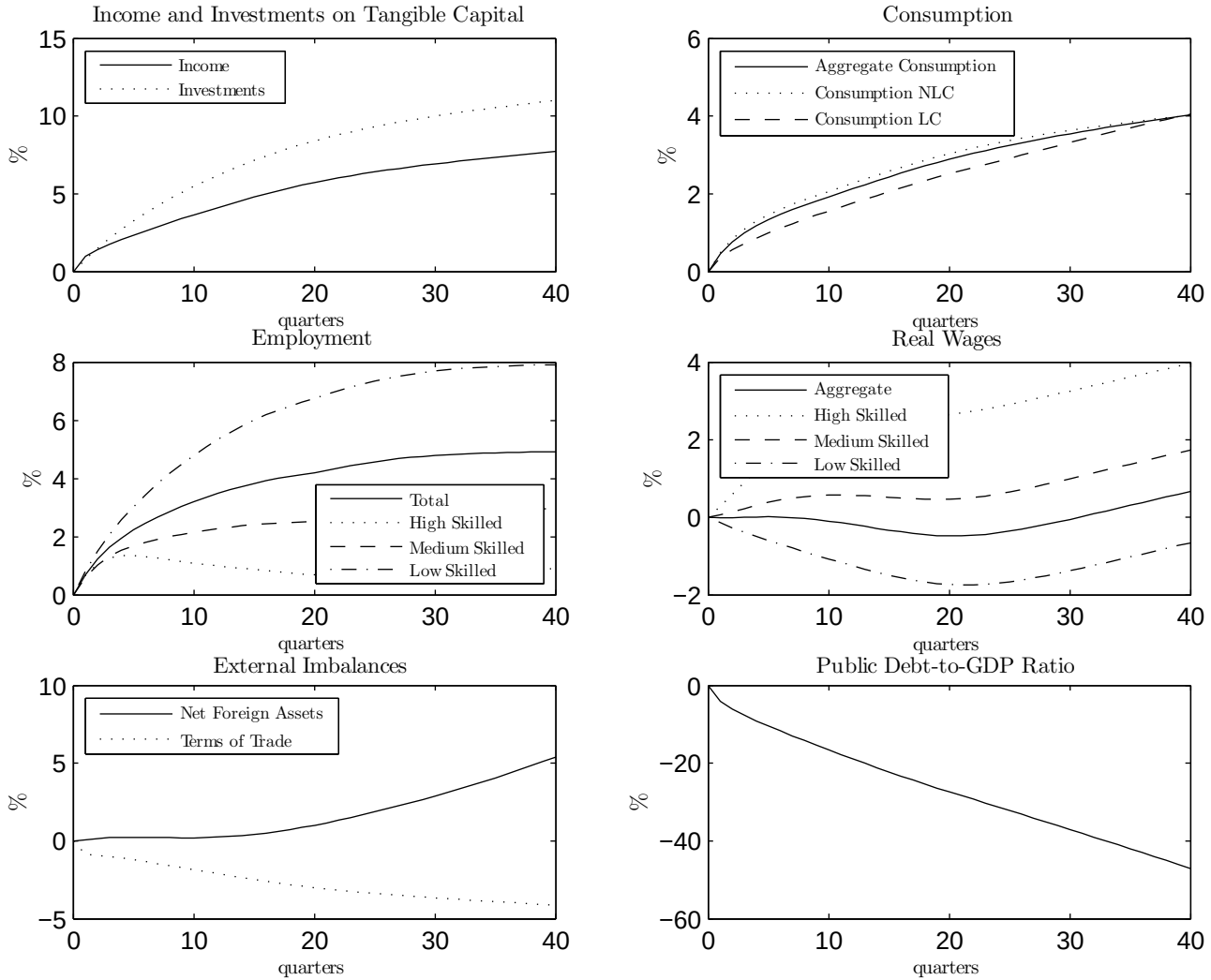

Figure 4: Transitional Dynamics - Scenario D (Phasing in 5 Years)

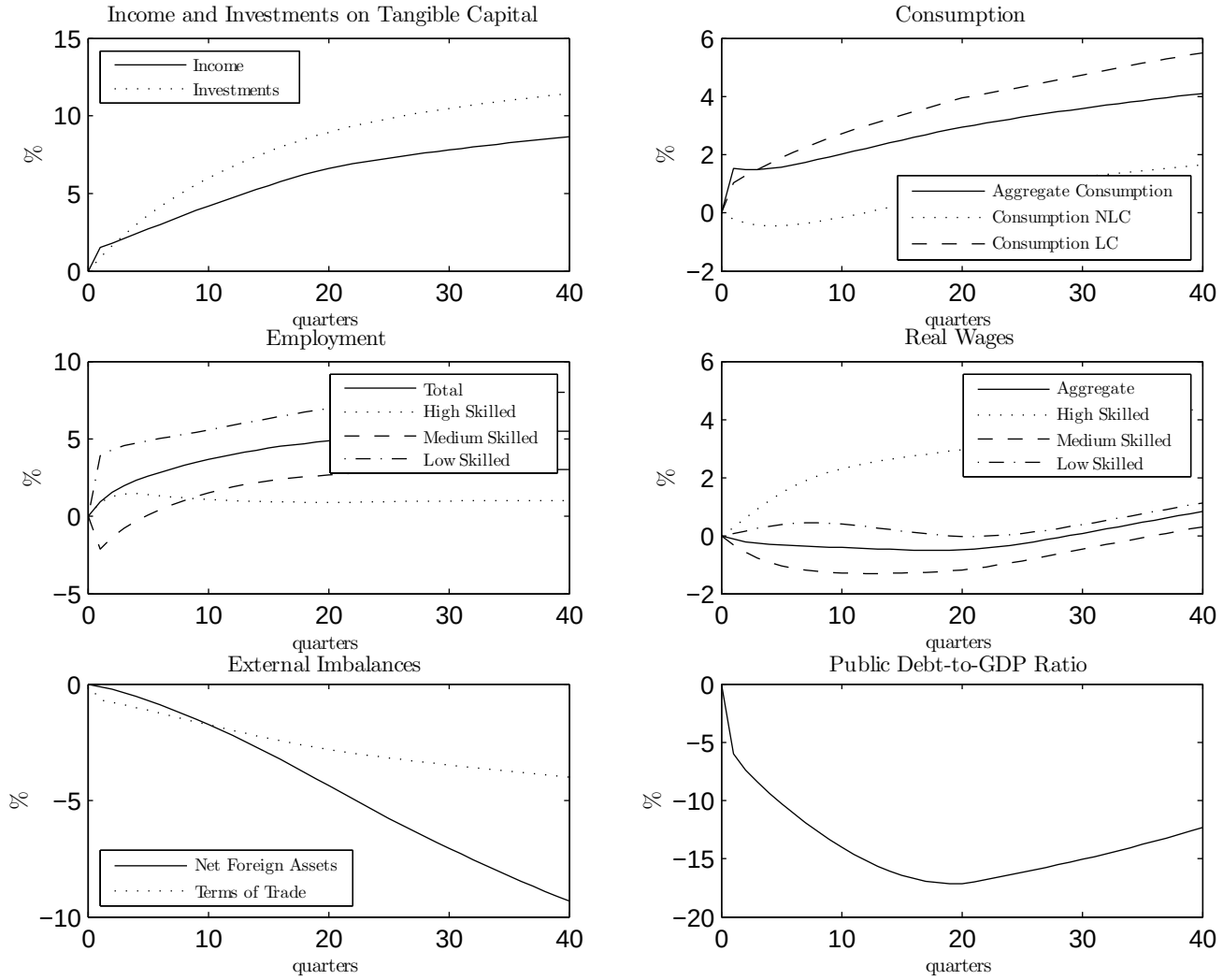

Table 4a: Effects of Single Policy Interventions: Knowledge and Innovation
(Deviations from the initial steady state in % - Phasing in 5 years)

	Reduce risk premium on intangible capital (50 bp)			Reduce entry cost (10%)			Reduce markup in the inter. goods sector (1%)			Increase public R&D spending (1% of GDP)			Increase public education spending (1% of GDP)		
	1 year	5 years	10 years	1 year	5 years	10 years	1 year	5 years	10 years	1 year	5 years	10 years	1 year	5 years	10 years
Income	0.00	0.01	0.05	0.00	0.04	0.17	0.03	0.18	0.19	0.00	0.00	0.02	0.38	0.82	0.89
Consumption	0.02	0.03	0.06	0.05	0.11	0.2	-0.12	-0.17	-0.16	0.01	0.02	0.03	0.62	0.01	0.02
Consumption (NLC)	0.02	0.04	0.06	0.07	0.13	0.2	-0.17	-0.27	-0.27	0.02	0.03	0.04	-1.3	-2.34	-2.34
Consumption (LC)	0.00	0.02	0.06	0.01	0.08	0.19	0.01	0.12	0.14	0.00	0.01	0.02	0.69	1.32	1.39
Investments	0.00	-0.01	0.01	-0.01	-0.04	0.04	0.25	0.92	1.02	0.00	-0.01	0.00	0.18	0.55	0.43
Employment	0.01	0.01	0.00	0.03	0.04	0.01	-0.02	-0.01	-0.01	0.00	0.01	0.00	0.29	0.67	0.63
Employment (H)	0.12	0.04	0.01	0.41	0.16	0.06	-0.34	-0.11	-0.03	0.03	0.03	0.01	0.17	0.13	0.13
Employment (M)	0.00	0.01	0.00	0.02	0.02	0.01	0.00	0.01	0.01	0.00	0.00	0.00	-2.32	0.00	0.09
Employment (L)	0.01	0.01	0.00	0.02	0.05	0.02	-0.01	-0.04	-0.04	0.00	0.01	0.00	2.65	0.31	0.09
Real wages	0.01	0.06	0.09	0.04	0.2	0.31	-0.02	0.01	0.05	0.00	0.02	0.04	-0.19	-0.14	0.06
Real wages (H)	0.12	0.42	0.41	0.42	1.54	1.53	-0.31	-1.01	-0.86	0.04	0.18	0.19	-0.02	0.08	0.19
Real wages (M)	0.00	0.03	0.07	0.02	0.12	0.23	0.01	0.06	0.09	0.00	0.01	0.03	-0.72	-1.68	-1.46
Real wages (L)	0.00	0.03	0.07	0.01	0.1	0.23	0.01	0.09	0.12	0.00	0.01	0.03	0.47	1.65	1.77
Terms of trade	0.01	0.00	-0.03	0.03	0.01	-0.08	-0.04	-0.07	-0.07	0.01	0.01	-0.01	0.12	0.17	0.13
Net foreign assets (% GDP)	-0.01	-0.14	-0.25	-0.04	-0.51	-0.9	0.04	0.21	0.07	-0.01	-0.13	-0.28	-0.47	-4.71	-14.25
Public debt (% GDP)	0.00	-0.06	-0.32	0.01	-0.09	-0.95	-0.12	-0.93	-1.3	0.00	0.09	0.37	-1.02	8.81	33.76

Table 4b: Effects of Single Policy Interventions: Internal Markets
(Deviations from the initial steady state in % - Phasing in 5 years)

	Reduce markup in the final goods sector (1%)			Reduce administrative burden (20%)			Reduce fixed cost (10%)			Reduce risk premium on tangible capital (50 bp)		
	1 year	5 years	10 years	1 year	5 years	10 years	1 year	5 years	10 years	1 year	5 years	10 years
Income	0.08	0.46	0.6	0.26	0.73	0.89	0.26	0.64	0.69	-0.02	0.54	1.11
Consumption	0.34	1.37	1.64	0.06	0.34	0.48	-0.13	-0.29	-0.28	1.27	4.58	5.45
Consumption (NLC)	-0.23	-0.16	-0.04	0.42	0.85	0.95	0.43	0.89	0.93	-0.64	-1.02	-0.7
Consumption (LC)	-0.35	-0.53	-0.49	0.54	1.12	1.23	0.54	1.13	1.18	-0.89	-1.59	-1.34
Investments	0.11	0.82	1.15	0.1	0.16	0.18	0.12	0.27	0.27	0.01	0.46	0.97
Employment	0.07	0.24	0.11	0.12	-0.2	-0.18	0.14	-0.12	-0.13	-0.04	0.12	0.1
Employment (H)	0.11	0.16	0.09	0.14	-0.14	-0.1	0.12	-0.11	-0.08	-0.01	0.12	0.11
Employment (M)	0.06	0.22	0.14	0.12	-0.2	-0.16	0.13	-0.14	-0.12	-0.02	0.17	0.16
Employment (L)	0.07	0.26	0.08	0.13	-0.2	-0.22	0.15	-0.09	-0.14	-0.05	0.05	0.01
Real wages	0.16	1.2	1.68	-0.02	-0.23	-0.3	0.02	0.05	0.01	0.03	0.37	0.91
Real wages (H)	0.22	1.38	1.78	0.02	-0.18	-0.24	0.04	0.01	-0.03	0.03	0.42	0.95
Real wages (M)	0.16	1.21	1.66	-0.01	-0.24	-0.32	0.04	0.06	0.00	0.01	0.34	0.87
Real wages (L)	0.16	1.17	1.7	-0.04	-0.23	-0.29	0	0.05	0.02	0.05	0.4	0.94
Terms of trade	-0.16	-0.3	-0.35	-0.06	-0.29	-0.41	-0.11	-0.34	-0.37	0.00	-0.04	-0.4
Net foreign assets (% GDP)	0.15	1.44	2.59	-0.11	-1.55	-2.83	-0.05	-0.63	-0.8	0.06	-0.88	-3.23
Public debt (% GDP)	-0.26	-4.54	-13.73	-1.23	-0.17	7.98	-1.24	-0.75	5.08	0.07	-4.18	-11.38

Table 4c: Effects of Single Policy Interventions: Labor Markets
(Deviations from the initial steady state in % - Phasing in 5 years)

	Tax shift from labor to VAT (0.1% of GDP)			Tax shift from low to high skilled (0.1% of GDP)			Wage moderation (1%)			Reduce benefit replacement rate (5%)		
	1 year	5 years	10 years	1 year	5 years	10 years	1 year	5 years	10 years	1 year	5 years	10 years
Income	0.03	0.07	0.09	0.02	0.1	0.13	0.08	0.24	0.33	0.84	2.52	3.38
Consumption	0.00	0.02	0.05	0.00	0.04	0.08	0.00	0.09	0.19	0.02	1	2.03
Consumption (NLC)	0.07	0.08	0.08	-0.01	0.09	0.11	0.09	0.2	0.24	0.85	1.99	2.46
Consumption (LC)	0.09	0.07	0.06	-0.03	-0.03	-0.01	0.11	0.27	0.32	1.12	2.8	3.29
Investments	0.03	0.11	0.12	0.05	0.41	0.45	0.02	0.00	0.03	0.16	-0.16	0.27
Employment	0.03	0.09	0.11	0.03	0.2	0.26	0.09	0.32	0.41	0.95	3.49	4.3
Employment (H)	0.02	0.04	0.05	-0.2	-1.59	-2.05	0.06	0.14	0.17	0.65	1.46	1.72
Employment (M)	0.03	0.06	0.07	0.00	-0.01	-0.02	0.07	0.2	0.25	0.75	2.16	2.58
Employment (L)	0.04	0.14	0.17	0.09	0.64	0.85	0.11	0.5	0.65	1.25	5.46	6.82
Real wages	0.00	-0.04	-0.05	-0.02	-0.14	-0.17	-0.02	-0.16	-0.18	-0.22	-1.78	-1.79
Real wages (H)	0.01	-0.01	-0.01	0.12	0.95	1.14	0.01	-0.04	-0.02	0.08	-0.41	-0.17
Real wages (M)	0.00	-0.02	-0.03	0.00	0.01	0.01	-0.01	-0.09	-0.08	-0.06	-0.98	-0.84
Real wages (L)	-0.01	-0.06	-0.08	-0.05	-0.35	-0.43	-0.04	-0.25	-0.29	-0.43	-2.73	-2.86
Terms of trade	0.01	-0.03	-0.05	-0.03	-0.06	-0.08	-0.05	-0.16	-0.21	-0.57	-1.66	-2.16
Net foreign assets (% GDP)	-0.03	-0.26	-0.29	0.02	0.18	0.29	0.01	0.17	0.76	0.11	2.37	8.96
Public debt (% GDP)	-0.15	-0.28	-0.06	-0.04	-0.38	-0.87	-0.34	-1.32	-2.69	-3.66	-14.31	-29.22