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Macroeconomic Effects of EU Transfers in New Member States

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IMF Working Paper

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Abstract

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Large inflows from the European Union to the New Member States are likely to significantly impact macroeconomic outcomes. In this paper, we use the IMF's Global Integrated Monetary and Fiscal model (GIMF) to analyze the impact of the transfers and show the conditions under which they would help speed up convergence. We find that the EU funds need to be directed predominantly to investment rather than to income support and that to best accompany the EU fund inflows, the policy-mix would need to combine counter-cyclical policy with a strong commitment to the existing monetary regime.

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I. INTRODUCTION

1. **Large inflows from the European Union over the next few years could significantly impact macroeconomic outcomes.** The European Union's cohesion policy provides the basis for substantial transfers to member countries and regions that lag behind in terms of income or face particularly high unemployment. For the eight new member states (NMS) that joined the union in 2004,² and for the additional two that joined in 2007,³ this implies transfers that could exceed 3-4 percent of GDP per year during 2007-13 (Rosenberg and Sierhej (2007) and Appendix I). Understanding of the macroeconomic impact of inflows of this size is key to assessing current and future economic outcomes, hence informing policy alternatives.

2. **The discussion of the impact of EU funds resounds with issues still debated in the aid and transfers literatures.** These funds are essentially a cross-country transfer of resources, just like the Franco-Prussian War indemnity payments of the 19th century, the German reparation payments following World War I, or the official development assistance flowing annually into low-income countries. The growth dividend of aid continues to be disputed, but there seems to be a growing consensus in favor of the argument that aid boosts growth by increasing total savings (Bulir and Lane, 2004; Easterly, 2003; Tressel, 2007). In this respect, the real exchange rate behavior is critical, reflecting opposing forces exerted by a transfer's income effects in the donor and recipient countries (Brock, 1996; Devereux and Smith, 2005). The impact of EU funds on incomes and savings should similarly be key in assessing their overall macroeconomic effect on NMS.

3. **In addition, a complete analysis of the macroeconomic effects of EU funds should account for the NMS convergence process.** The large income gap between these countries and the EU average is essentially a reflection of the NMS's lower productivity and capital stock. Gains in both currently underpin the rapid catch-up process; and, EU funds should further support convergence to the extent that they encourage investment, for example. But EU funds could also slow convergence if the associated wealth effect increases demand for leisure and decreases labor supply. In this paper, we modify the IMF's Global Integrated Monetary and Fiscal model (GIMF) to reflect the convergence process underpinning the NMS's economies, and use it to analyze the impact of EU inflows on the latter. We show the conditions under which the inflows would help speed up convergence, and the consequences on resource reallocation, intertemporal saving and investment decisions, and the real exchange rate. Our results also help assess the impact of EU funds inflows on inflation and government budget outcomes, impacts that should be brought to bear in identifying policy choices.

² These are the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia and Slovenia.

³ Bulgaria and Romania.

4. **The rest of this paper is organized as follows.** Section II offers a focused review of the vast aid and transfer literature that the paper builds on. Section III describes the main features of the GIMF model and how it was modified to account for income convergence and EU transfers. Section IV spells out the channels through which EU funds affect the recipient countries depending on how they are filtered into the economy, while section V shows what current plans for EU funds entail for the macro economy. In highlighting potential risks related to the authorities' policy choices, section VI draws four lessons for policy-makers. Section VII concludes.

II. REVIEW OF THE LITERATURE

5. **The EU's cohesion policy is based on the view that transfers from high- to low-income members change a tendency to income divergence into one of income convergence.** Even the theoretical, let alone the empirical, foundations of this proposition are controversial. Depending on the growth model used, implications for the possibility of income catch-up differ.⁴ The standard Solow-Swan neoclassical model implies convergence of per capita output, while endogenous growth theories, by incorporating increasing returns and technological change, suggest that convergence in (per capita) levels does not take place but convergence in growth rates could. However, in either model, adverse sociopolitical conditions or insufficient savings can delay or disrupt convergence. In fact, in the presence of high fixed costs or externalities generating increasing returns, market competition can result in income *divergence* as trade openness and infrastructure improvements push resources into areas with low costs or positive externalities. Catch-up in these conditions would thus require policy intervention, validating EU's cohesion policy to bring initial conditions to more comparable levels between regions, as noted by Boldrin and Canova (2001).

6. **Views on whether EU funds have been successful in speeding up income convergence in the past are mixed.**⁵ Two broad methodological approaches inform these views: model simulations and econometric studies (Everdeen and others, 2003; Bradley, 2005). Simulations could be interpreted as identifying the *ex-ante* impact of EU funds—that is the effect they would be expected to have if they finance projects that are devised and implemented optimally and efficiently. Econometric studies, on the other hand, come closer to an assessment of the *ex-post* impact of EU funds:

- ***Econometric studies offer meager support for a positive impact of EU funds on the pace of convergence.*** These studies generally base their conclusions on cross-country growth regressions. While some find evidence of a positive impact of EU funds (Fayolle and Lecuyer,

⁴ De la Fuente, 2002; Martin and Sunley, 1998; Rassekh, 1998; Temple, 1999.

⁵ The related question of how effective aid and public investment/capital are in promoting growth has been addressed at length, by a literature too broad to be reviewed here. On balance, however, the conclusion would seem to suggest a positive impact—see for example Bradley and others (2005a) or Genbger (2005) for more details.

2000; Garcia-Solanes and Maria-Dolores, 2001), others present inconclusive results (Gaspar and Leite, 1994 and Cappelen and others, 2001), or positive effects only for open economies (Everdeen and others, 2003). Boldrin and Canova (2001) find no evidence of income catch-up in the EU after the mid-70s, whether or not countries receive EU funds. Nor do they find evidence that supports the growth divergence theory, the platform on which the EU's cohesion policy rests. Boldrin and Canova's results are in line with Tondl (1998), Fagerberg and Verspagen (1996), and Corrado and others (2005).

- ***Conversely, model-based simulations tend to support the convergence view:***
 - The first models to be used were **macro-econometric models** with conventional Keynesian demand-side features and backward-looking expectations, like the European Commission's HERMES model and its successor, the HERMIN model (Bradley, 2002; Bradley and others, 2005b; Bradley, 2002). For Greece, Portugal, Ireland and Spain, which received some 1½ to 3 percent of GDP per year during the second half of the 1990s, HERMIN simulations find that real GDP growth was initially boosted by between 1 and 4½ percent but projected it to be only ½ to 2 percent higher by 2010.⁶
 - The European Commission has also drawn on **dynamic general equilibrium** (DGE) models with micro-foundations and forward-looking optimizing agents, like QUEST II, to evaluate the impact of EU funds.⁷ For transfers over 1989–96, Roger (1996) finds that demand effects dominated in the short run as the investments they financed took time to generate a growth impact. He also points to a risk of real exchange rate appreciation and rising interest rates overshadowing the positive growth impact in the medium term. Nevertheless, the model predicts a permanent and positive supply-side impact on GDP in the long run.
 - **Outside the Commission**, Pereira and Gaspar (1999), in a two-sector endogenous growth model calibrated to Portugal, find that annual EU fund inflows of 3½ percent of GDP during 1989–93 increased growth by about ½ percentage point a year (both in the short and long run). Impact on growth was maximized when EU funds were spent on infrastructure rather than on private physical or human capital accumulation. Similarly, Gaspar and Pereira (1995), and Pereira (1997) find a positive growth impact of EU funds disbursed to Greece, Ireland and Portugal. In their survey paper, Goybet and Bertoldi (1994) conclude that the overall impact of EU funds on annual growth reaches only 0.4 percentage point, a result comparable to what Lolos and others (1995)

⁶ In contrast, Barry and others (2001) conclude from a survey of the literature that EU funds explained at most ½ percentage point per year of Ireland's 8 percent annual growth during the 1990s.

⁷ See Roger and in't Veld (2002) for a full description of the QUEST model.

and Lolos and Theodoulides (2001) find for Greece over 1989-99 using a computable general equilibrium model.

7. **Differences in methodology partially explain the divergence between results from these two strains of evaluation.** Everdeen and others (2003) have noted that it is not surprising to find less favorable assessments from econometric (ex post) studies, as several factors can hinder the optimal use of EU funds (as assessed in ex ante model simulations)—such as crowding out, rent seeking, and capacity constraints. The findings of econometric studies may also be constrained by limitations in their approaches, ranging from data availability and reliability to vulnerability to the Lucas critique. On the other hand, model-based simulations require strong assumptions on structural parameters that may be hard to link to available data.

8. **The literature on the impact of EU funds in NMS is less abundant, though it tends to have a broader focus than previous modeling of EU funds.** Lolos (2001), in discussing the possible impact of EU funds in NMS, interprets the past experience as suggesting a boost of $\frac{1}{2}$ percentage point to GDP growth for each 1 percent of GDP additional funds. In its most recent cohesion report, the Commission, based on simulations of ECOMOD, HERMIN and QUEST, finds that by 2020, GDP would be increased by 3 percent on average across the NMS if EU funds available through 2013 are fully utilized (European Commission, 2007). Bradley and others (2006) and the Magyar Nemzeti Bank (2006) reach similar conclusions for Poland and Hungary respectively. Kaczor (2006) finds a much larger effect on GDP and reports increases in employment, labor productivity, and prices in the near term. Bradley and others (2006) also note that the external current account would deteriorate over the period of EU funds inflows but turn into a small surplus thereafter.

9. **This paper builds on results from the QUEST model by focusing on effects of EU funds not only on growth, but also on broader macroeconomic effects and related policy issues.** Like QUEST, the model used here, GIMF, is an intertemporal DGE model. However, unlike in applications of QUEST, we specifically model the ongoing convergence process of the NMS and trace the path of EU funds through the economy so that effects on inflation, nominal and real exchange rates, current account positions and fiscal positions are seen. Modeling these linkages places in sharp relief the monetary and fiscal policy choices recipient countries face when trying to maintain low inflation, promote a vibrant traded goods sector, and maximize the impact of EU funds on convergence. At a more procedural level, the study departs from most applications of QUEST by examining a representative NMS receiving EU funds inflows consistent with the newly released 2007–13 Financial Perspective, rather than each member country separately. This allows us to hone in on the general effects and policy issues rather than the specific circumstances of each individual country.

III. THE MODEL

10. **GIMF, with its rich specification of monetary and fiscal policies, is well-suited to capture the effects of EU funds on key variables of interest to policy makers as well as on convergence.** It is a large scale version of new open-economy macroeconomic models with microeconomic foundations based on optimizing forward-looking consumers and producers under real and nominal rigidities, monopolistic competition and explicit cross-country linkages (Kumhof and Laxton, 2007a and 2007b). For our purposes, GIMF has a number of advantages over traditional large scale models:⁸ non-Ricardian consumers⁹ ; a richly defined production structure that includes public capital and allows intra-industry (in addition to final goods) trade across economies ; a monetary sector that can support either a fixed exchange rate or an inflation targeting regime ; and an explicit fiscal reaction function. We consider a two-country version of the model where one country represents the EU15 (the donor of EU funds) and the second country represents the NMS recipient of these funds.¹⁰ We examine two alternative types of recipient countries: one moderately-sized, relatively open inflation targeter (IT) and another very small, very open fixed-exchange rate economy (FE). These obviously correspond to Czech Republic, Hungary, Poland and Romania on the one hand and the three Baltic countries, Bulgaria, and (looking ahead) Slovakia on the other.

11. **An explanation of the five types of agents in the GIMF and the markets in which they operate provides the best intuitive framework for understanding results from the model.**

- **Households** are forward-looking, and hence know that the inflows of EU transfers are temporary. They receive income from labor provided to firms, interest on financial assets, and dividends on equity in domestic firms, which they own. They pay distortionary taxes on income and consumption. They maximize their utility, defined as a constant elasticity of substitution (CES) function of both leisure and consumption of a composite good (comprising domestically produced traded and non-traded goods and imports), subject to their budget constraint, and except for a portion of households that do not have access to financial markets (liquidity-constrained households), all agents make their consumption decision intertemporally. Households hold three types of financial assets: domestic equities, which are not traded and are supplied according to firms' investment decisions ; domestic government bonds

⁸ In particular, unlike traditional macroeconometric models, it is not subject to the Lucas critique when structural changes modify underlying behaviors, as is likely the case in converging NMS.

⁹ This is important because barriers to full intertemporal consumption smoothing are likely still pervasive in NMS.

¹⁰ GIMF cannot capture an economy's position in the cycle. Rather, it assumes that each country operates at potential. Obviously, therefore, since EU Fund recipients will typically be at non-neutral points in their cycles, the actual experience of any country is unlikely to look exactly like the model simulations. For example, if EU funds are disbursed to a country at the peak of its cycle, the actual impact on prices of a short-run boost in demand is likely to be larger than shown by the model.

remunerated at the interest rate set by the central bank; and foreign-currency denominated loans to/from foreign households, remunerated at the foreign interest rate set by the foreign central bank.¹¹

- **Firms** decide on inputs and produce goods according to CES production functions using labor, capital, intermediate foreign and domestically-produced inputs, and public infrastructure (financed by the government). They pay taxes on profit. Goods and labor differentiation provides firms and unions (which buy labor from households and sell it to firms) with monopolistic market power. Because of nominal and real adjustment costs, macroeconomic variables respond gradually to shocks.
- **The government** follows a countercyclical fiscal policy. Tax revenues from households and firms provide resources for public consumption and investment. In the long run, taxes adjust to achieve the governments' budget target (assumed to be the average balance over the last ten years). In the short run, however, automatic stabilizers are allowed to work: *temporary* revenue windfalls from cyclical upturns are used to reduce debt, while the fiscal balance is allowed to temporarily deteriorate in downturns. Any *permanent* change in the fiscal balance, on the other hand, is corrected through an adjustment in tax rates. Government consumption and investment levels are exogenously driven by policy decision.
- **The central bank** sets the domestic interest rate. In Central European countries, it uses a Taylor rule to target inflation (at 2½ percent), which is related to the varying exchange rate and, through households' consumption decisions, to the level of the interest rate. In FE countries, the central bank sets the rate at the level in the rest of the world, so as to keep the nominal exchange rate fixed, while domestic inflation responds to produce a current account equilibrating real exchange rate.¹² There is no money in the model, so questions about the role or effectiveness of sterilized intervention in the face of inflows of transfers to the government cannot be addressed.
- **Foreigners** operate in the domestic economy through the trade channel, by buying and selling intermediate and final tradable goods, and in the financial sector, by lending or borrowing to domestic households. These latter transactions are reflected in the country's net foreign asset position. There are no capital restrictions so that uncovered interest parity holds at all times. In addition, in our amended version of the model, foreigners also disburse EU funds, which enter the current account balance (reported including official transfers) as a positive item.

¹¹ Because households own firms and investment is determined by firms' profit maximization process, households passively accept resulting levels of equity and channel all additional savings into interest-earning financial assets.

¹² In order to keep the model as simple as possible, the risk premium is assumed to be zero. Monetary policy in "the rest of the world" is based on a 2 percent inflation target.

Two adjustment mechanisms are central to the behavior of the economy following shocks.

First, changes in the relative price of traded to non-traded goods play a key role in returning the current account deficit (including transfers) to balance following any disturbance. A positive balance of payments shock results in either a nominal appreciation (IT) or an increase in the price of non-traded goods (FE) until the current account position returns to balance. Second, the government sets taxes to regain fiscal balance following a shock that either raises spending or lowers tax inflows. Together, these mechanisms ensure that neither the ratio of public debt to GDP nor the net foreign asset position fall into an explosive path.

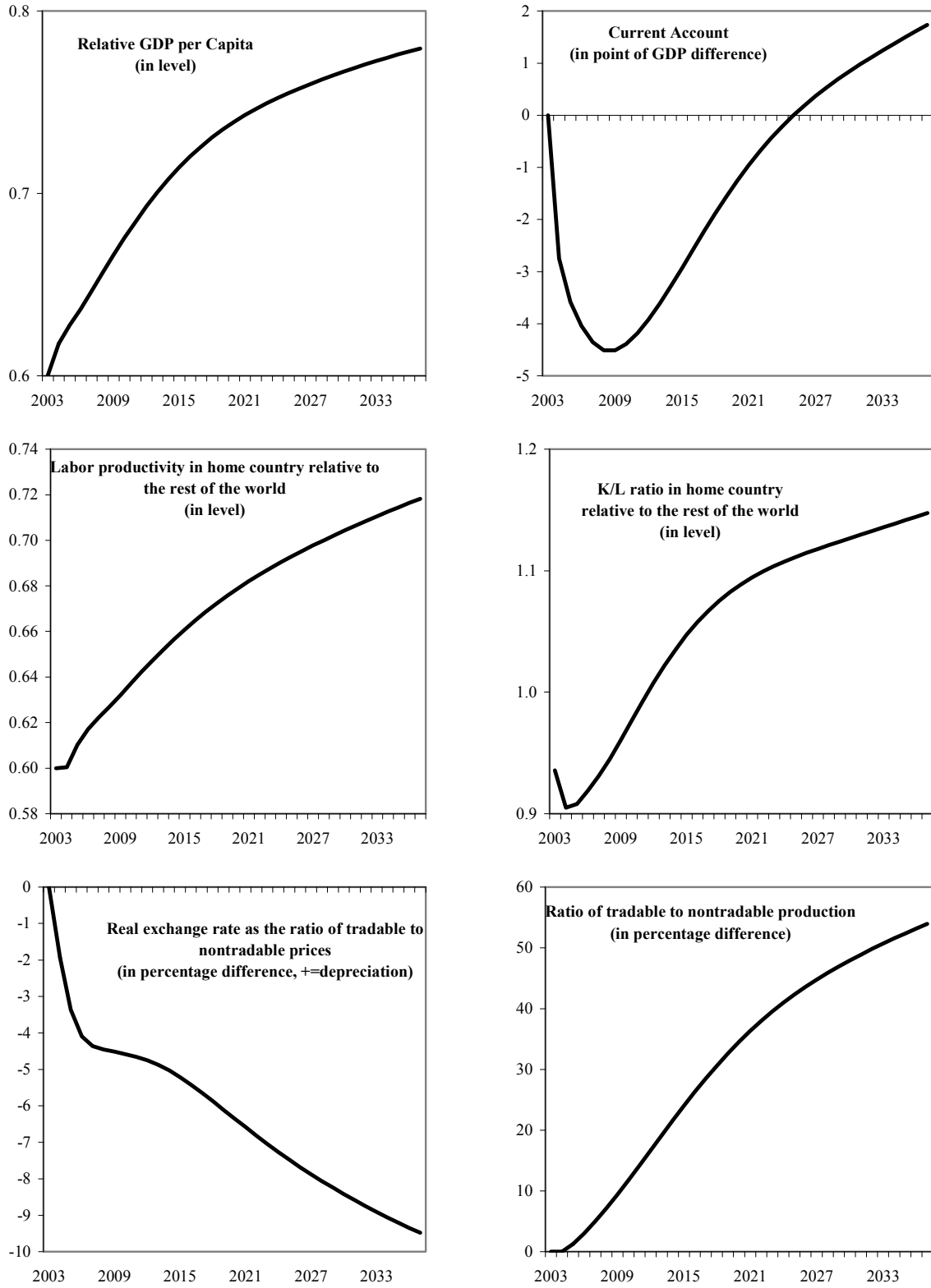
12. We also modify GIMF to capture the catch-up process currently experienced by the NMS as well as the transfers of financial resources from the EU.¹³

- ***Convergence baseline:*** In contrast with the standard GIMF setting where both countries are already at the same level of development, we design a baseline scenario where the EU fund recipient country converges towards the EU15 level. More specifically, our baseline scenario has the NMS's GDP per capita gradually rising from 60 percent of the EU15 level in 2003 to close to 75 percent twenty years later, through a catch-up in total factor productivity in the tradable sector (Figure 1).¹⁴ As a consequence, throughout the convergence path, the labor productivity gap gradually closes and the capital to labor ratio rises, capturing a trend of capital accumulation that would happen even in the absence of EU fund inflows. Part of the production shifts to the tradable sector as it becomes more productive. Still, the rise in demand also leads to a deterioration of the trade balance. Productivity gains in the tradable sector lead to wage increases that firms in the nontradable sector pass on to consumers, triggering an increase in nontradable prices relative to tradable prices and generating a trend appreciation of the real exchange rate.
- ***Impact of EU funds throughout the economy:*** We introduce cross-country transfers from the EU15 to the NMS in the model in the form of a flow of (financial) resources transiting through the current account. These transfers have to be spent in the year they are received. Furthermore, we distinguish between transfers to the private sector, which go directly to support households' income, and transfers to the public sector, which finance public investment. We also look at the case where these transfers are directed to finance private investment.

¹³ Appendix II explains in more detail the modifications to the standard GIMF model. A previous exercise also included some additional positive impact of public investment on total factor productivity, given the nature of the EU fund infrastructure projects akin to a public good boosting private firms' profitability. For details on this exercise, see Allard (2008).

¹⁴ See Appendix I for more details on GDP per capita in the NMS.

Figure 1. Convergence Scenario (baseline for shocks), 2003–40 1/



Source: IMF Staff estimates.

1/ The charts correspond to the baseline for a country with fixed exchange rate regime, but the trajectories are similar in the case of inflation-targeting monetary regime.

13. **The model is calibrated on historical averages of data for IT and FE countries over the past decade** (Table 1 and Appendix III). Values of the exogenous and steady state endogenous variables for the IT countries are constructed by averaging the corresponding data for the Czech Republic, Hungary, Poland, Slovakia and Slovenia over 1995–2005.¹⁵ Values for the FE countries are constructed by averaging data for Estonia, Latvia and Lithuania over the same period. Structural parameters, typically not available for NMS, are largely taken from the literature on Western Europe (Bayoumi, Laxton and Pesenti (2004), Everaert and Schule (2006)) or Chile (Kumhof and Laxton, 2007c). In addition, we assumed lower adjustment costs to nominal variables in the FE than in the IT countries, as agents are expected to be willing to change prices more often when the nominal exchange rate is not available as an adjustment variable.¹⁶ The expected flow of EU transfers over 2004–15—as described in Appendix I and in Rosenberg and Sierhej (2007)—is used to calibrate the transfers in the model.

Table 1. Selected Calibration Parameters

	CEEs	Baltics	EU15
Ratios (in percent of GDP)			
Investment Share	25.0	28.7	18.4
Net Financial Asset Position	-40.7	-66.7	-
Government Expenditures	21.6	19.2	22.0
Government Debt	37	32	66
Households' parameters			
Share of Liquidity Constrained Consumers (in percent)	45	45	25
Population Ratio	1/29.5	1/161.7	1
Rigidities And Competition Parameters			
Price Adjustment Costs in Productive Sector	13	1.3	13
Price Adjustment Costs in Trade Sector	10	1.0	10
Quantity Adjustment Costs in Retail and Trade Sectors	7	0.7	7
Quantity Adjustment Costs for Investment	9	4	9
Mark-up Between Varieties (in percent)			
Productive Sector	14	14	14
Retail Sector	5	5	5
Trade Sector	2.5	2.5	2.5
Production parameters			
Elasticity of GDP to Public Capital Stock	0.1	0.1	0.1
Elasticity of GDP to Public Consumption Stock	0.01	0.01	0.01

Source: Eurostat; authors' calculations.

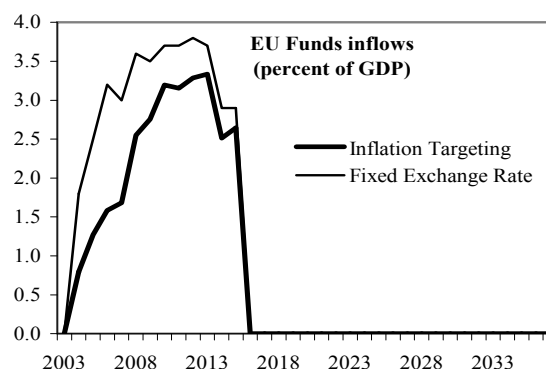
¹⁵ Slovakia and Slovenia are included in this group historically because they had flexible exchange rate regimes until 2009 and 2007 respectively. Romania is excluded because high inflation during much of this period created discontinuities vis-à-vis the period going ahead when conditions are likely to be more stable. Bulgaria is excluded from the fixed exchange rate group averages for similar reasons.

¹⁶ Appendix 7 shows the impact of these assumptions on the results of the shocks in the FE countries. When a country with fixed-exchange regime still has high adjustment costs both to quantities and prices, the economy tends to exhibit strong cycles: in the absence of the nominal exchange rate as an adjustment variable, imbalances tend to build up more frequently, with real and nominal variables adjusting more slowly and overshooting.

IV. CHANNELS FOR EU FUNDS TO RECIPIENT COUNTRIES

14. Perhaps the most important influence on the effects of EU transfers is how they are

filtered into an economy. Effectively, there are three broad ways transfers can enter an economy: first to boost households' income, second to augment public investment, and third to help finance private investment upgrades. In fact, each country will use transfers in some combination of these three channels, but in this section we report on three separate simulations, each tracing the effects of using all transfers in one of these three ways. In the first, all transfers go directly to



households as grants; in the second, transfers go through the government budget and are spent entirely on public investment; and in the third, all the transfers are channeled to private firms, which use them to increase their capital stocks. The point of showing these simulations separately is to clarify the distinct effects of the various ways of channeling EU funds into the economy so that implications for structural changes in the economy, household welfare, and policy choices can be identified.¹⁷ For sake of legibility, we report the results in each case for the fixed exchange rate regime only. Fiscal policy is neutral, with automatic stabilizers allowed to play. Differences between the FE and IT regimes and in fiscal policy responses are explored later in the paper when the allocation of transfers among the three uses is calibrated to the expected actual allocation. Charts showing the results for both monetary regimes are reported in appendices 4, 5 and 6.

Channeling EU transfers to households' income support:

15. **Of the three possible uses of EU Funds, channeling transfers to household income support results in the smallest lasting effect on convergence** (Figure 2). During the life of the transfers, the combination of higher consumption and crowding out of investment results in relative price adjustments producing a temporary bout of Dutch disease. But, once the transfers end, the economy settles back largely to its ex-transfer trajectory.

16. **Transfers channeled to households have an immediate effect on private consumption and saving.** Utility maximizing households use the transfers—which they know to be temporary—to smooth their consumption: they spend part of the transfers immediately on the composite consumption good and, after lowering their labor supply and therefore wage income, save the remainder of their transfer-augmented income. The extra savings are invested

abroad, however, because there are no positive impact effects on firms' investment decisions (and therefore no additional domestic investment opportunities) nor additional government financing needs. The net foreign asset position consequently increases, alongside a strengthening current account (including transfers) position, though by less than the total inflow of transfers.

17. **Relative price shifts consequent upon rising consumption start a Dutch disease process.** Increased demand for the composite consumption good puts upward pressure on non-traded goods prices and raises imports.¹⁸ This prompts a shift of firms' investment and production to the non-traded sector. But, with lower labor supply and higher non-traded input prices, firms cannot meet the full increase in demand, so non-traded prices continue to rise and demand shifts further toward imports. The trade balance and competitiveness deteriorate. However, this deterioration must unwind when EU funds cease or even diminish. Thus, once the initial boost to consumption from the transfers is completed, the process of returning relative prices and the external position begins. Higher production of non-traded goods together with moderating increases in non-traded goods consumption gradually reverses the impact on relative prices, altering external competitiveness to strengthen the trade balance.

18. **Rather counter-intuitively, total investment actually drops relative to the baseline.** Though investment in production of the non-traded input rises, lower labor supply (producing higher wages) and higher non-traded input prices reduces the marginal productivity of capital in the traded sector, depressing total investment relative to the baseline. Why do the additional savings of households not lower interest rates enough to offset these negative effects on investment? In fact, with fixed exchange rates, the nominal interest rate is maintained at the level of the foreign interest rate. The jump in the level of non-traded goods prices raises the measured inflation rate in the short term, thereby lowering the real interest rate in terms of non-traded goods prices initially. However, non-traded goods inflation shortly stabilizes at the pre-EU fund inflow rate and long-term inflation expectations are unaffected. The real interest rate is therefore broadly unresponsive to domestic conditions. In the case of inflation targeting, (as shown in Appendix figure 5a), the increase in inflation is followed by a commensurate increase in the domestic nominal interest rate, leading to a similarly muted reaction of domestic real interest rate.

¹⁷ In order to simplify the discussion in this section, we assume that all households smooth their consumption pattern without any liquidity constraint. We later introduce liquidity constraints when we evaluate the impact of EU funds using the actual expected breakdown between income support and investment.

¹⁸ In the version of GIMF that was available at the time of the study, there is no traded and non-traded final goods. Instead, as explained in section C, traded and non-traded wholesale goods are packaged into a composite good, which is then put on the market. Households' demand is expressed in terms of that composite final good.

Figure 2. EU Transfers to Households' Income Support
 (Results in percentage point difference to baseline, unless otherwise stated)

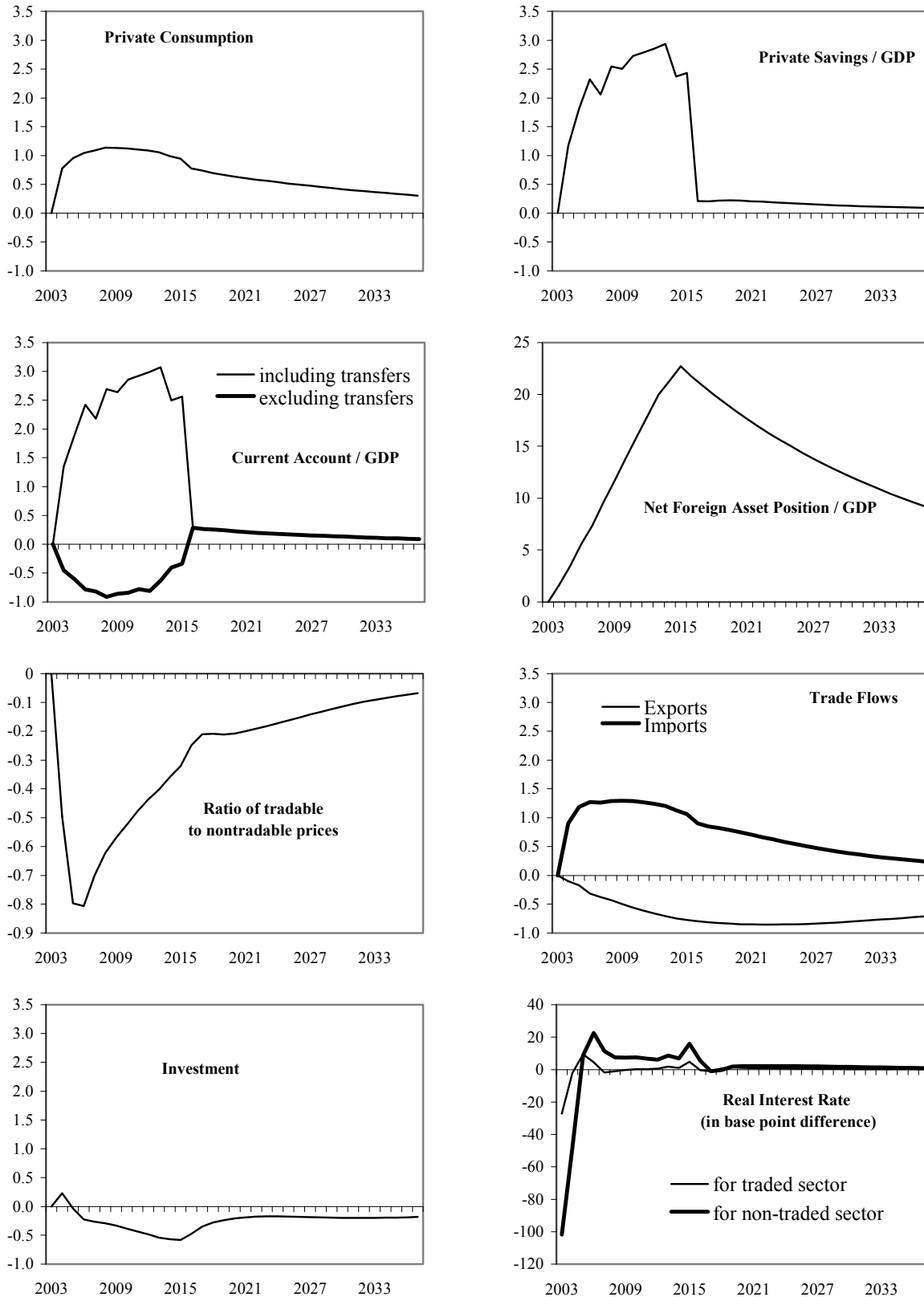
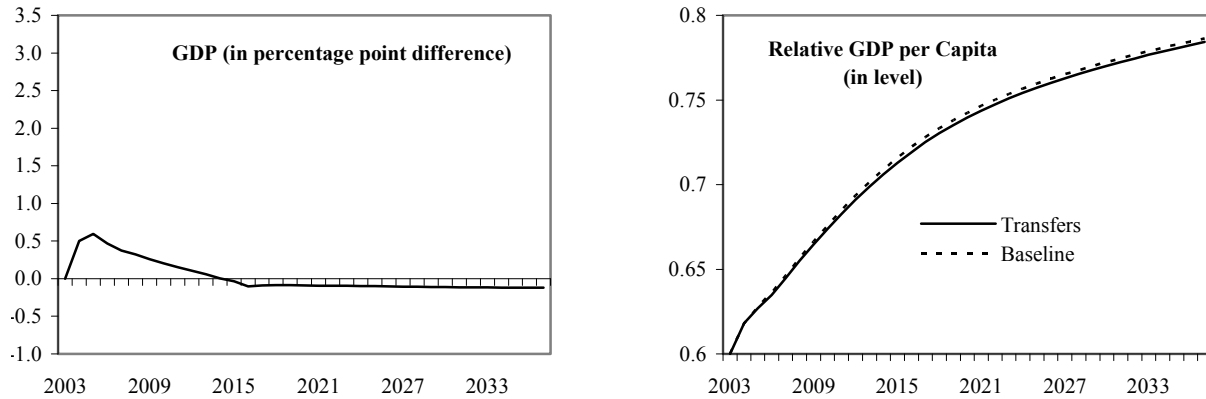


Figure 2 (Continued). EU Transfers to Households' Income Support



19. **All effects of the transfers fade out over the long term, and convergence is only marginally affected.** Once the effects on price and labor supply behaviors fade away, firms' incentives essentially return to the pre-EU fund situation as productivity is unchanged. The current account position returns to balance and investment settles at approximately its ex-EU transfer level. As a consequence, the initial demand-driven increase in GDP fully disappears as soon as the EU funds stop flowing in, and GDP per capita is virtually unchanged.

Channeling EU transfers to public infrastructure investment

20. **Channeling EU transfers to public investment produces the largest boost to convergence of the three uses we examine** (Figure 3). Although consumption—like in the income support scenario—increases relative to baseline, positive influences on investment, productivity and labor supply push up output and incomes to yield sustainably higher output per capita. Dutch disease effects occur, but unlike in the income support scenario, are more than fully reversed over time.

21. **As in the other scenarios, private consumption responds fastest to the inflow of funds, though the response is part of a more sustainable rise.** Households integrate in their consumption decision the expectation that permanent income will be lifted by productivity gains. They, therefore, bring forward the increase in consumption by reducing savings and increasing their supply of labor—two key departures from the income support scenario.

22. **As in the income support scenario, immediate relative price shifts start a Dutch disease process, but subsequent supply side adjustments dampen and then reverse it.** The immediate increase in private consumption and infrastructure spending pushes up the price of non-traded goods, while demand for the traded good component of the composite good is met through higher imports. But over time, as firms respond to the additional demand by investing in and producing more non-traded inputs, price pressures subside and the price of traded goods relative to non-traded goods rises almost back to the baseline by the end of the simulation

period. The endpoint gap is a reflection of the greater income convergence achieved in the public investment scenario than in the convergence without EU transfers scenario.

Figure 3. EU Transfers to Public Infrastructure Investment
(Results in percentage point difference to baseline, unless otherwise stated)

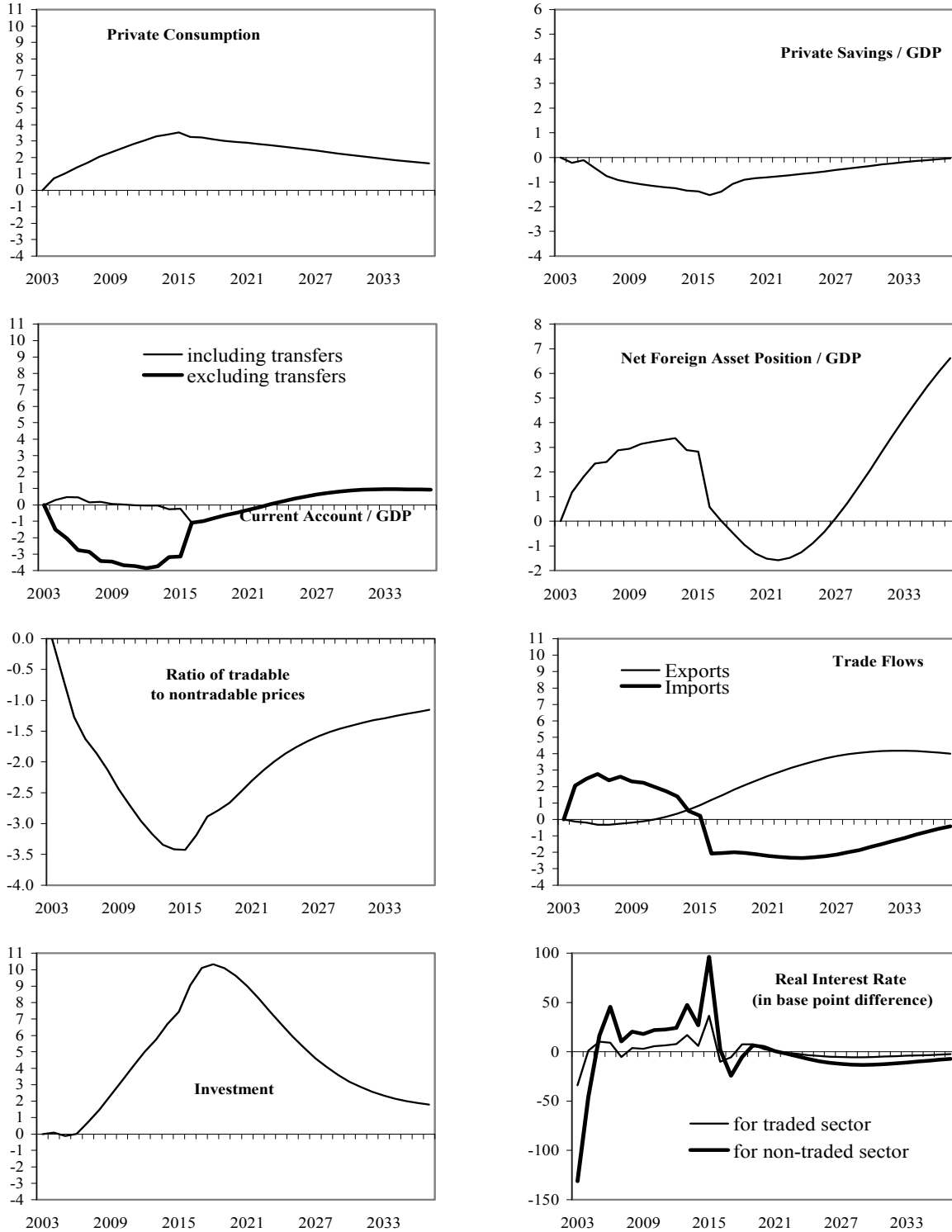
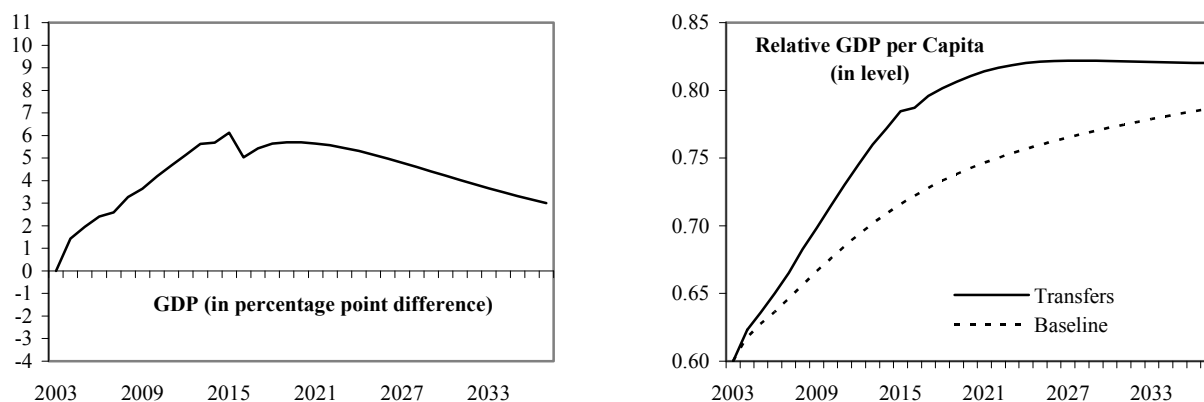


Figure 3 (Continued). EU Transfers to Public Infrastructure Investment



23. **The implication of these relative price developments is that, in contrast to the income support scenario, EU funds channeled to infrastructure provide incentives for firms to invest more.** In the short run, the increase in consumption and public sector demand for inputs to produce infrastructure has a crowding out effect on investment in traded goods production. Investment in the non-traded goods sector, in contrast, benefits from a drop in the real interest rate in terms of non-traded goods, offsetting increases in prices of non-traded goods produced. Even more importantly in the medium run, investment in both traded and non-traded goods sectors benefits from productivity gains provided by the upgrade in public infrastructure, and, to a lesser extent, from the increase in labor supply. The net effect is an increase in total investment, initially led by investment in the non-traded sector. Over time, as production of non-traded goods responds to higher public and private investment and non-traded goods prices fall relative to traded goods prices, investment and production begin to switch back to the traded goods sector. Overall, after the transfers end and their full effects work through, both the public and private capital stocks are higher than in the baseline.

24. **Current account developments mirror the shifts in investment and production between traded and non-traded goods.** With households saving less and the full amount of EU inflows used immediately to boost public investment, pressures on domestic resources materialize more decisively than in the income support scenario, and net imports surge. Nevertheless, the transfer is not fully affected—that is, it does not fully translate into higher inflows of goods and services because some of the transfer is bottled up in the non-traded goods sector—so net foreign assets rise slightly in the short run. However, as the fund transfers wind down, NFA accumulation reverses, before picking up again as traded good production starts to respond strongly to higher investment, greater labor supply and higher productivity growth. Over the simulation period, the ultimate strength of traded goods production leaves imports about at baseline, while exports, boosted by higher competitiveness, shift substantially above baseline. The current account position ultimately improves compared to baseline.

25. **As public infrastructure spending spurs productivity, the real effects on GDP outlive the inflows and thus provide a lasting income convergence effect.** GDP per capita relative to that in the EU15 rises by close to 10 percentage points compared to baseline. Results in this scenario of course depend critically on the government's ability to identify productivity enhancing public investment and to execute it efficiently without waste in resource use.

Channeling EU transfers to private investment

26. **The impact on the economy of channeling EU funds to private investment parallels that of channeling funds to public infrastructure** (Figure 4).¹⁹ In particular, private consumption picks up and labor supply increases. Assuming that the distribution of investment is spread in proportion to initial shares in total investment between traded and non-traded sectors, effects on production and non-EU funds financed investment follow the public investment scenario. An initial drop in the ratio of traded to non-traded goods prices and a fall in the real interest rate for non-traded goods producers starts a Dutch disease process, and the trade balance deteriorates. But very rapidly higher investment starts to push up productivity and output growth ; and the supply response allows competitiveness to improve: because of enhanced productivity, domestic exporters can sell at relatively lower prices, and the real exchange rate depreciates. Similarly, the trade balance strengthens and convergence speeds up.

27. **Despite these similarities, the impact of channeling funds through private investment is less permanent than that of channeling them through public infrastructure.** This derives from the fact that private capital depreciates more quickly than public infrastructure. As we measure here only the impact of EU funds transfers—therefore assuming that the investment effort is not sustained beyond 2015— the private capital stock declines more quickly afterwards, diminishing the positive returns in the long run.

28. **Still, spending the EU funds on private investment as opposed to public investment mitigates the Dutch disease process.** Productivity gains diffuse more quickly in the economy, and there is no crowding out of investment in the traded good sector. This would be even more the case if the funds were channeled entirely to traded goods producers.

¹⁹ In that scenario, actual private investment is the sum of EU fund inflows (akin to a grant) and of the level of investment that comes out from the firms' profit maximization.

Figure 4. EU Transfers to Private Investment
 (Results in percentage point difference to baseline, unless otherwise stated)

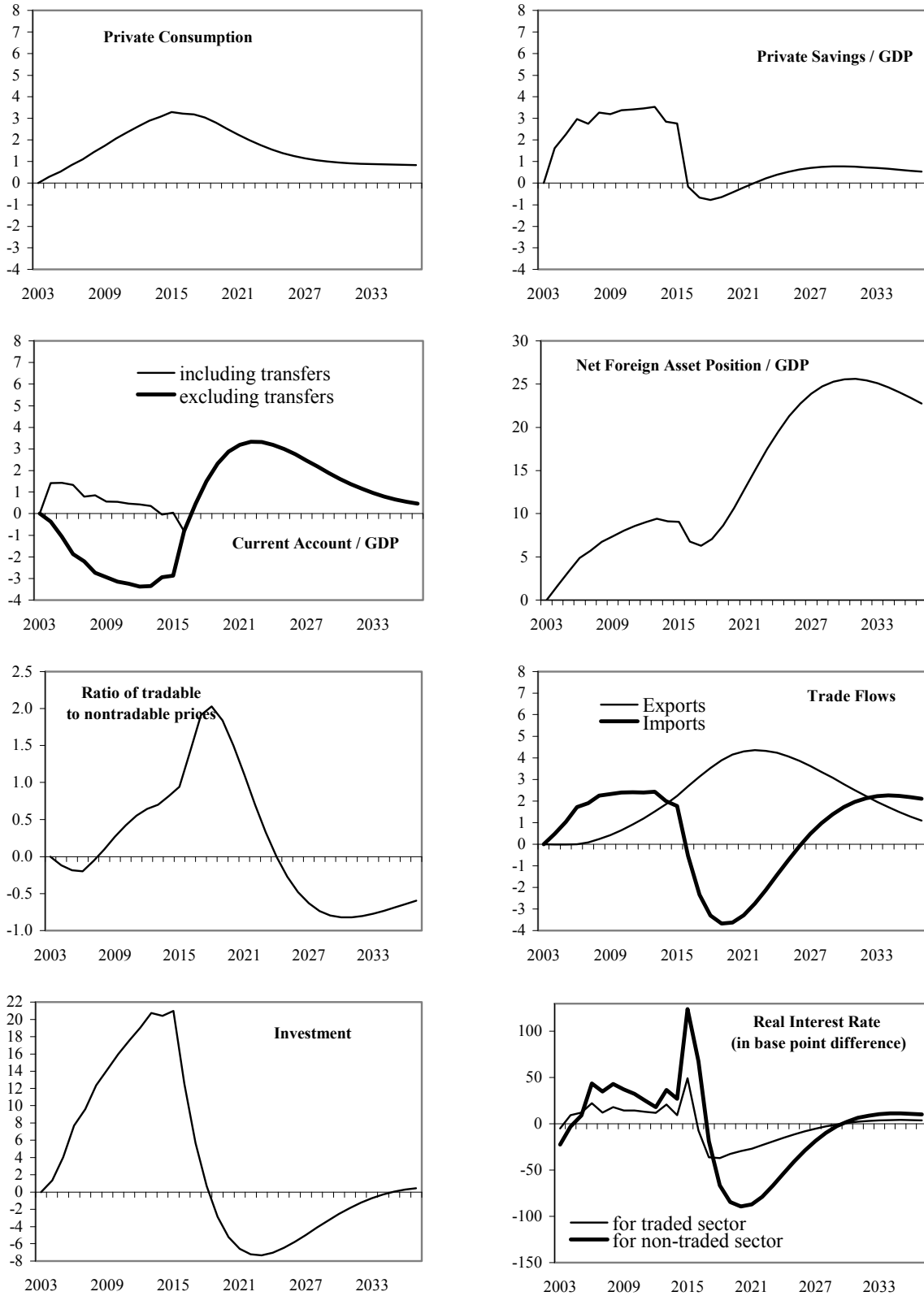
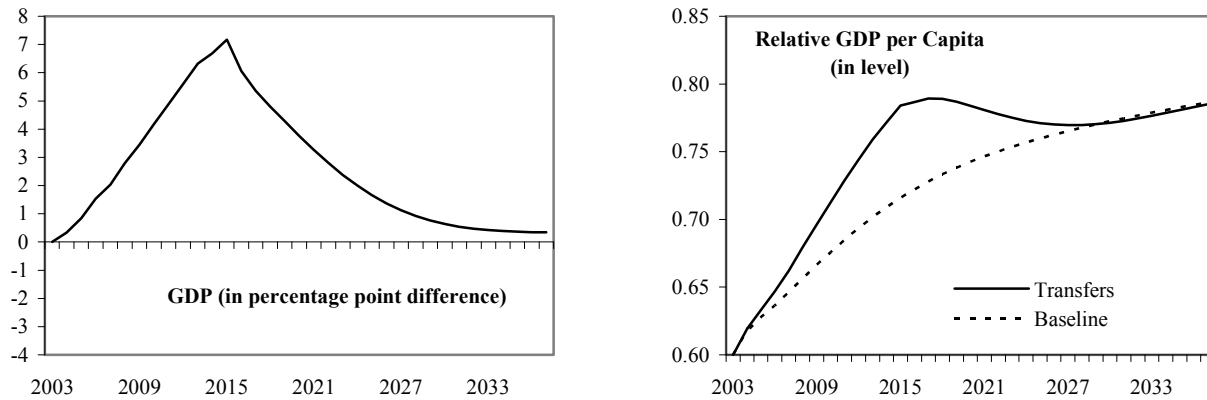


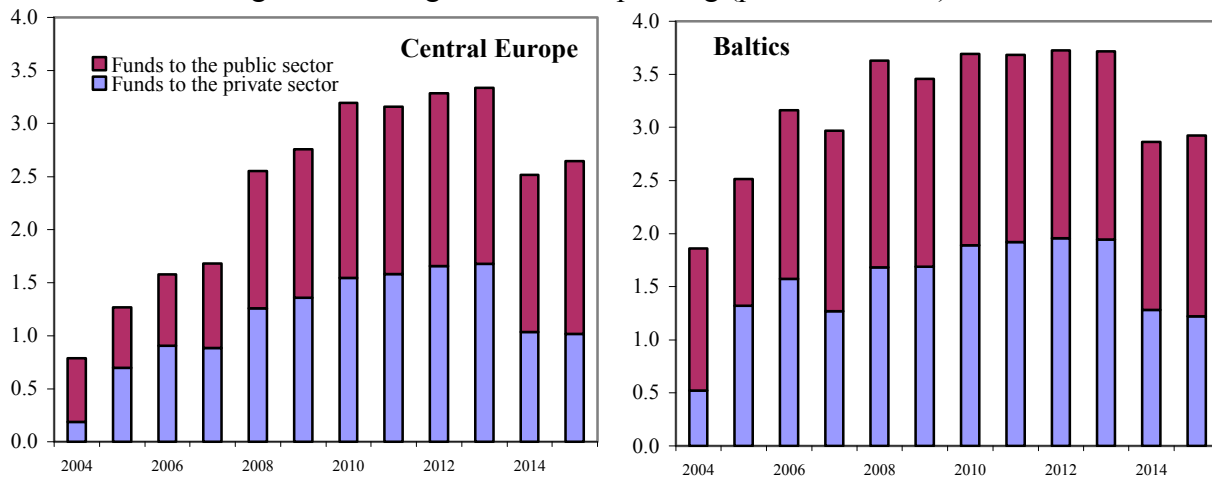
Figure 4 (Continued). EU Transfers to Private Investment



V. COMBINING THE CHANNELS: WHAT DO CURRENT PLANS IMPLY FOR THE MACRO ECONOMY

29. **Actual use of EU funds will entail disbursement through all these channels, so realistic scenarios must combine investment with household income support components.** We evaluate the impact of EU funds using the estimated breakdown between income support and public investment provided by Rosenberg and Sierhej (2007), by assigning all funds to the private sector to households and the ones to the public sector to public investment (Figure 5).²⁰ Effectively, current plans suggest that EU funds will be divided about evenly between public and private sectors. Of course, it is not clear that all funds channeled to the public sector will in

Figure 5. Average EU Funds Spending (percent of GDP) 1/



Source: Rosenberg and Sierhej (2007); IMF WEO. 1/ The aggregation is derived from a simple average.

²⁰ This assumption might slightly underestimate the impact of the transfers, as some of the transfers going to households through the Common Agricultural Policy (CAP) are devoted to farms' investment and not income support. However, in the absence of exact breakdown of CAP usage, we were not able to incorporate that feature in our calibration. Appendix Figures 3, 4 and 5 show in details the results for both the inflation targeting and fixed exchange rate regimes, broken down between the impact of private and public EU funds.

fact be invested, nor, even if they were, that all investment would be productivity raising. Yet for the sake of examining the best possible outcome of present plans, we assume that public sector use for the funds is efficient and investment oriented.

30. **Not surprisingly, broad effects of EU Fund inflows on activity variables and price variables lie between the income support and public investment scenarios** (Figure 6). The impact of the funds inflow on consumption is quite front-loaded, reflecting the presence in the combined scenario of liquidity-constrained households (assumed to comprise 45 percent of total households). As for investment, the impetus from public investment, actual and prospective productivity increases, and some increase in labor supply dominates the dampening effects of crowding out from higher non-traded goods prices. Therefore, most of the impact derives from the funds spent on public investment: EU funds channeled directly to households (a temporary demand shock) have a very limited and short-lived effect, while the financing of public investment (a relatively long-lived supply shock) generates most of the impact, fostering productivity and capital accumulation over time.²¹

31. **The trade balance deteriorates, but EU transfers more than offset it, leading to an improvement in the current account position during the period of EU inflows.** Imports immediately increase under consumption and investment demand pressures, and also because, as foreign and domestic goods are used complementarily, increased domestic production calls for higher imports of intermediary goods. Meanwhile, exports only gradually adjust upward, as it takes time for the increased installed capacity to translate into higher competitiveness. The bulk of the trade balance deterioration derives from EU-financed public investment, as capital goods is partially imported, but it also stems from households bringing forward some of their consumption, in expectation of future growth. Still, EU funds more than cover the deterioration in trade balance, so that the current account balance including transfers moderately improves.

²¹ EU-funded public investment is supposed to stop in 2015. At this date, the impact of public capital stock, and hence on the economy's overall productivity, is maximal. But with a depreciation rate of public capital of 4 percent, the impact on the stock of capital remains apparent until almost 2040 (see Appendix I for more details).

Figure 6. Actual Plans for EU Transfers
 (Results in percentage point difference to baseline, unless otherwise stated)

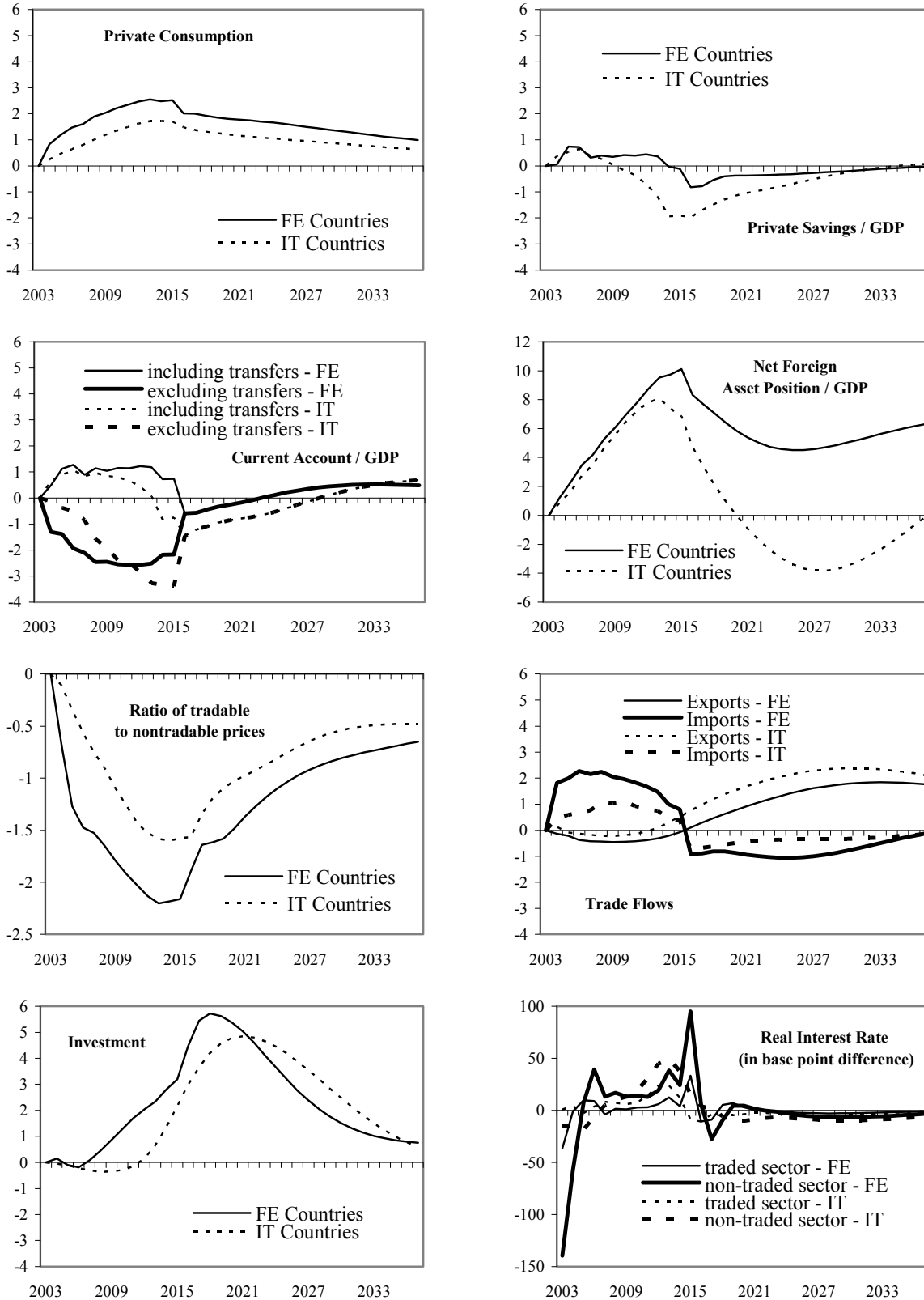
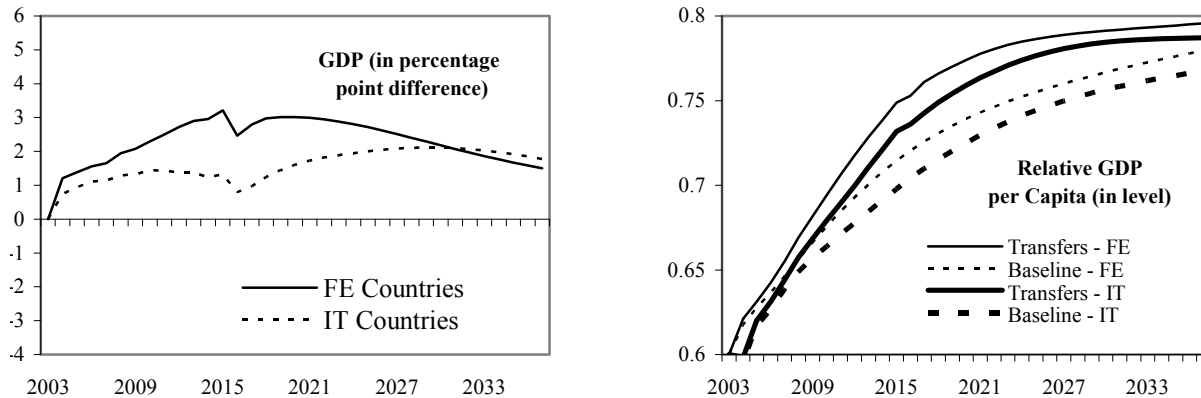


Figure 6 (Continued). Actual Plans for EU Transfers



32. **On the supply side, increased productivity translates into higher production through stronger private investment effort in both the traded and non-traded goods sectors, not through higher labor participation.** With public investment raising corporate productivity, private firms react by increasing the capital stock and their labor demand. Capital stock accumulation is initially hindered by the increase in real interest rate, but once the latter dissipates, private investment is stimulated in both the traded and non-traded goods sector (see also Appendix Figure 4c). This is not the case for labor however: with increased labor productivity, firms increase their labor demand, but households, feeling richer from the transfers, do not increase their labor supply. Wages are driven up to clear the market, and overall, labor is only marginally modified by the EU transfers. However, labor temporarily shifts away from the traded goods sector to the non-traded goods sector, to fulfill higher demand in the latter sector, while imports of traded goods compensate for temporarily lower domestic production. Of course, this result depends on the unemployment rate being close to its equilibrium level before EU fund inflows, a feature that is embedded in the model. Still, with many of the NMS economies currently nearing close to capacity limits, it is likely to be a reasonable approximation.

33. **Still, EU funds do not necessarily lead to appreciation and Dutch disease.** Initially, and throughout the period of EU inflows, production shifts to the non-traded goods sector, and the real exchange rate appreciates, as more of the domestic resources needs to be devoted to increase supply in non-traded goods. However, as the surge in public investment leads to an increase in competitiveness in the whole economy, fewer factors are needed in the non-traded goods sector to fulfill demand, and overtime, production shifts back to the traded goods sector, where the increased productivity spurs exports. Meanwhile, the real exchange rate gradually depreciates back to its value prior to the inflows. The more EU funds are devoted to public investment, the less likely the recipient country is to get trapped into a Dutch disease phenomenon.

34. **Income convergence is speeded up only because of EU-fund related public investment.** The EU fund inflows invested in public infrastructure allow for a considerable

acceleration in the catch-up process, by close to 5 percentage points of GDP in the early 2020s. Conversely, EU fund inflows supporting households' income would have virtually no impact on per capita GDP, because, as shown above, boosted consumption is offset by a deteriorated corporate profitability, an appreciated real exchange rate, and lost competitiveness (See also Appendix Figures 5b and 6b).

VI. FOUR LESSONS FOR POLICY-MAKERS

(i) Inflows of EU funds may well have little to no effect on domestic investment

35. **This somewhat counterintuitive result reflects the possibility that funds are channeled into the economy mainly through household income support or wasteful investment.** In this case, EU funds create incentives for distributional changes in investment, but not for overall increases. Even when households are able to save, additional saving from income support payments in a small open economy simply drives up non-traded goods prices, and pulls in more imports. While this creates incentives for additional investment in the non-traded goods sector, investment in the traded goods sector is actually crowded out. In order to raise investment, governments must actively channel funds into investment—either on their own account for infrastructure or by providing incentives for private firms to raise investment.

(ii) Benefits from EU funds—whether judged by a broad measure of households' welfare or a narrower measure of increased output—are greater the larger the share of EU funds going to investment.

36. **Household welfare rises regardless of the channel through which funds enter the economy, but it increases most when more funds go to investment** (Table 2).²² Welfare gains are obvious when EU funds go to household income support: households are able—albeit temporarily—to combine higher consumption with more leisure. Yet when funds go to investment, the gains are even larger. The increase in consumption allowed by increased wealth more than offsets the temporary decrease in leisure as households increase labor supply. Still, because higher investment—whether public or private—also improves the supply side of the economy, it generates a more long-lasting increase in activity and ultimately welfare. Assuming a standard weighting of consumption and leisure in households utility function, higher households' income—even if they have to surrender some leisure—raises welfare more than in the case of direct support to households.

²² Households' welfare is measured as the net present value of their utility, composed of consumption and leisure. For more details, see Kumhof and Laxton (2007).

Table 2 - Change in Welfare in Each of the Scenarios

Change in welfare compared to the exogenous catch-up baseline	EU funds disbursed to		
	Households	Private firms	Public authorities
	(in percentage change)		
Representative IT country	0.6	0.7	0.8
Representative FE country	1.0	1.3	1.6

Source: Authors' calculations based on the formula in Kumhof and Laxton (2007b)

37. **Differences in the welfare effects of income support versus investment are particularly large for FE countries.** Whereas welfare effects in IT countries are some 15-30 percent higher if funds are channeled through investment than if they go to household income support, in FE countries they are as much as 60 percent greater. This difference between IT and FE countries reflects principally the assumption that FE countries are more open and have more flexible macroeconomic conditions that allow stronger supply side responses to price signals.

38. **These relative welfare effects pose a significant challenge for policy makers seeking to garner support for channeling funds to investment.** Households, particularly interest groups standing to gain the most from income support (for example farmers) are likely to press for greater direct support to households. Indeed, if support is not identical to all households, winners are likely to gain more from household income support than from investment. A strong constituency for using funds to support income results. Yet, if income support were even across households, rational households would clearly prefer the investment channel.

39. **Similarly, using funds for investment generates the highest return in terms of additional GDP per euro disbursed.** We measure the relative return of EU funds as the aggregated net present value of the increase in GDP as a percent of EU funds disbursed. This is an alternative indicator that focuses more on income convergence, as it does not incorporate the effect on leisure and that measures more directly EU funds' return. Even more than for welfare, the maximum return on activity happens when the supply side is positively affected by the transfers, namely when funds are spent on investment (Table 3).

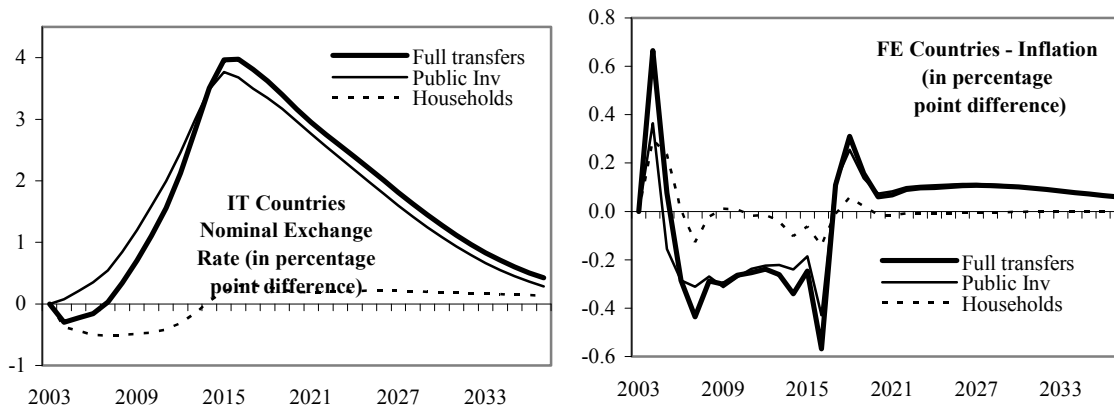
Table 3 - Ratio of Net Present Value of GDP Gains to NPV of EU Funds Disbursement

NPV of GDP gains as a ratio of NPV of EU funds disbursement	EU funds disbursed to		
	Households	Private firms	Public authorities
	(in percentage change)		
Representative IT country	-1.0	6.7	14.8
Representative FE country	-0.7	3.5	9.1

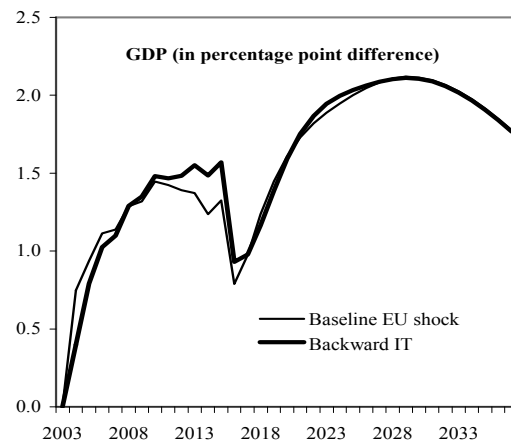
Source: Authors' calculations.

(iii) Exchange rate arrangements make little difference to the broad effects of EU funds on the economy

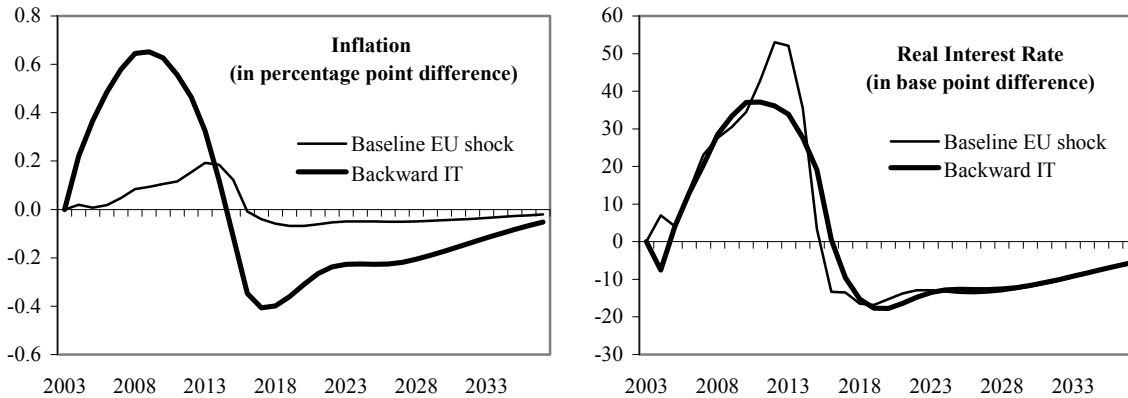
40. **Although EU fund inflows certainly affect inflation dynamics differently in IT and FE countries, developments in real variables are broadly similar.** In both the IT and FE countries, the competitive edge on foreign market provided by the positive productivity shock from EU-financed public investment leads to an improvement in competitiveness. The way this materializes, however, differs substantially across monetary regimes, depending on which parameters can move more quickly. In the IT countries, the nominal exchange rate can depreciate freely, whereas in the FE countries, prices have to bear the full adjustment, and inflation is more subdued than it would have been without EU funds inflows.



41. **One challenge facing inflation targeters, however, is to resist likely temptations to soften the inflation target in the face of EU fund inflows.** Specifically, the appreciation of the domestic currency as the central bank raises the nominal interest rate to prevent rising non-traded goods prices from feeding inflation expectations is likely to be perceived as contributing to unwanted



softening of investment in the traded goods sector and increases in investment in non-traded goods production. Yet any relaxation of the inflation target would simply worsen the unwanted trends: forward-looking households would fully anticipate the result of a shift the central bank's resolve, expected inflation would rise, and the central bank would ultimately have to increase the interest rate more sharply than otherwise to contain inflation, with no gains in the real economy.²³ Ultimately, the increase in real interest rates is mandated by the real effects of the inflow of funds on the economy.



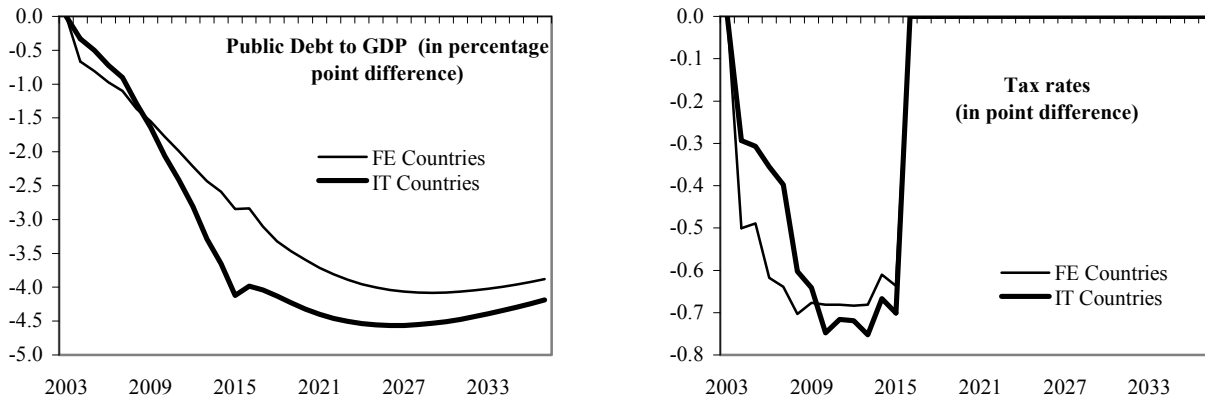
(iv) The economy's supply response to EU fund inflows would be strengthened by a strongly counter-cyclical fiscal policy

42. **A fiscal rule is a critical tool for ensuring a countercyclical fiscal policy in the face of EU inflows.** In our simulations, the rule entails the government responding to shocks by letting automatic stabilizers play for temporary shocks, while, in case of permanent shocks, to gradually adjusting taxes, given expenditure, to move toward the average fiscal position of the past ten years. In the case of a shock from the inflow of EU funds, this rule results in an immediate strengthening in the fiscal position which reduces the public debt relative to GDP. At the same time it starts a cycle of tax cuts designed to return the fiscal balance to its pre-EU fund inflow position. Three aspects of this rule-based policy strengthen the supply response of the economy.

- **Public debt relative to GDP falls.** The full play of automatic stabilizers allows for a decrease in public debt of some 5 percentage points of GDP, if all additional temporary public revenue derived from the adjustment to the EU fund shock are saved and used to reduce public debt. Moreover, in the model, the permanent impact of the EU fund on the economy, induced by higher productivity, enables a decline in tax rates of some two thirds of a percentage point

²³ In the model, the softening of the inflation targeting is modeled through a higher auto-regressive coefficient in the monetary policy reaction function, giving a larger impact to past nominal interest rate on current interest rate.

over the period 2003-15, but these cuts are reverted at the end of the EU funds inflow period.²⁴ If the authorities were to forgo this change in taxation—as reverting the policy by 2015 could be costly—the fiscal consolidation concomitant with EU fund inflows could even be larger. Such a strategy would be particularly welcome in some of the Central European countries whose public debt ratio is hovering around the Maastricht criteria, as a relatively seamless approach to reduce debt to less vulnerable levels.

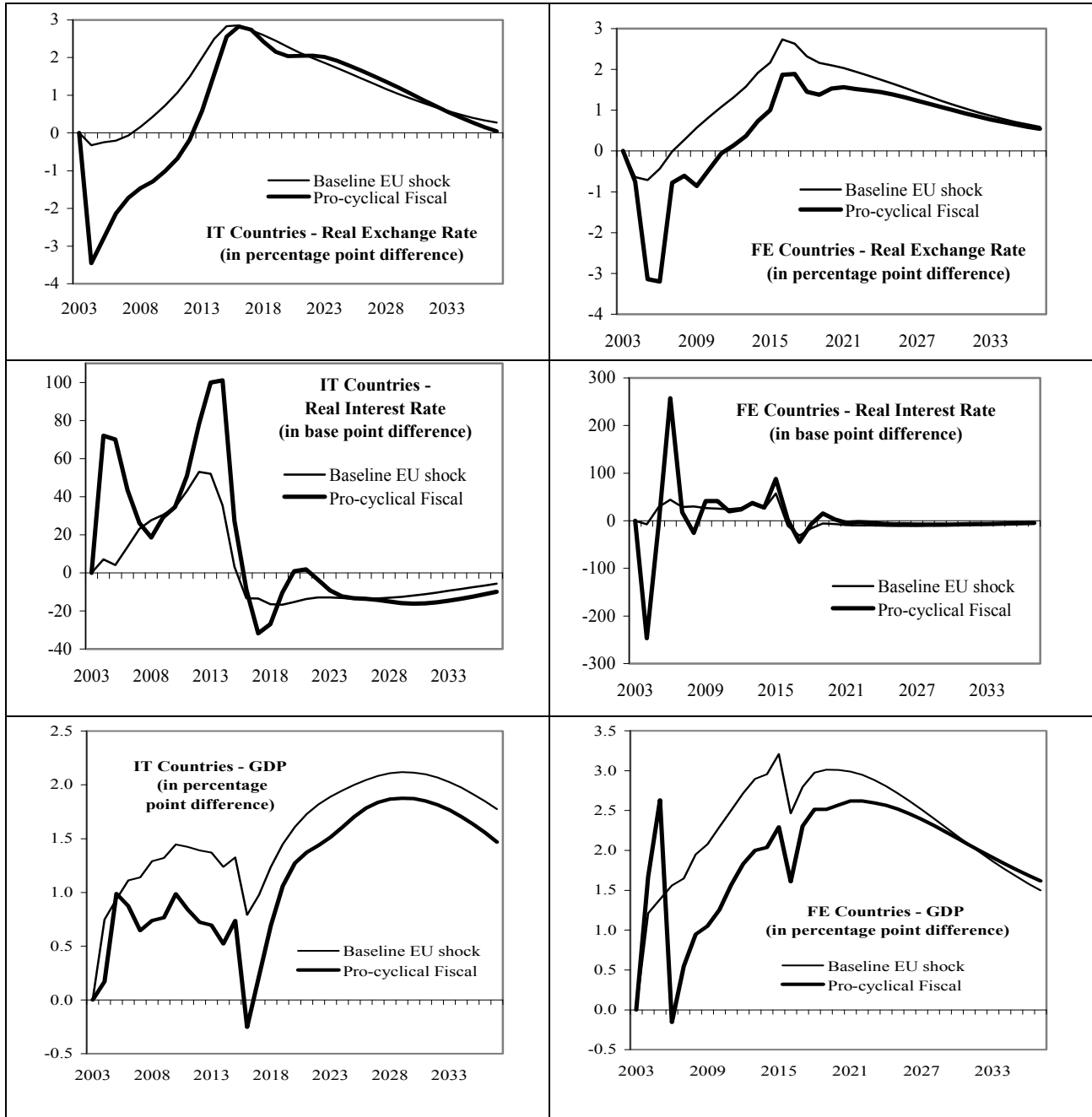


- Uncertainty about fiscal effects of EU fund.** Uncertainty about both the efficiency of public infrastructure spending and the actual split between household income support and public investment argues for caution in projecting future fiscal balances. The model simulations of course are based on the assumption of perfect knowledge about the nature of public spending, but in reality uncertainty must be substantial. Without considering the stochastic nature of fiscal outcomes, the model results are prone to predicting better fiscal outcomes than might actually materialize. In the face of large changes in the fiscal position due to revenue effects of EU Funds, therefore, caution in interpreting their duration would make sense.
- Exacerbated demand pressures under pro-cyclical fiscal policy** (Figure 7). If, instead of letting the automatic stabilizers play fully as in the baseline scenario, the authorities only target a stabilization of their debt to GDP ratio, fiscal policy, by allowing sharper and more permanent declines in tax rates, would de facto be expansionary. Such a policy would act like a demand shock, occurring along the EU funds shock. As a consequence, compared to the baseline EU funds shock scenario, the initial real appreciation would be stronger and more prolonged, as the domestic supply side would not be ready initially to serve an even larger surge in demand. The monetary reaction would also be stronger in IT countries, and inflation less subdued in FE countries. At the end, the real interest rate tightening would be

²⁴ It is not possible to simulate the impact of the EU fund inflow while leaving tax rate unchanged in GIMF, as this fiscal policy does not necessarily insure long term convergence. An anchoring fiscal target – either fiscal balances or a debt target in the pro-cyclical policy exposed later – is required in the model.

strengthened by the pro-cyclical policy. On the real front, the substantial lift in consumption compared to the counter-cyclical fiscal policy scenario would be fully (in the case of FE countries) or even more than fully (in the case of IT countries) offset by a stronger crowding out of private investment and a more appreciated currency. In both regions, the countries would be worse off in terms of convergence.

Figure 7. Role of a Pro-Cyclical Policy on the Impact of EU Funds, Comparison with the Baseline Scenario of Counter-Cyclical Fiscal Policy



VII. CONCLUSION

43. **New Member States stand to benefit greatly from EU fund inflows in the next ten years.** EU fund inflows could boost GDP per capita relative to the EU by as much as 5 percentage points, therefore substantially accelerating the ongoing convergence process. Still, such benefits should not be taken for granted, and the authorities would need to set the right institutional and policy framework to avoid potential pitfalls.

44. **This study provides four policy lessons to take full advantage of the opportunity afforded by EU funds:**

- ***The EU funds need to be directed predominantly to investment rather than to income support,*** a prerequisite for the derived lift in overall productivity to speed up the convergence process. In addition, the focus on the supply side would guarantee that this occurs without undue pressures on monetary policy or prices and avoid the risk of a Dutch disease. In sharp contrast, the effect of funds directed to income support would be short-lived and would fail to deliver benefits in terms of additional convergence.
- ***Households would benefit the most in terms of welfare when the funds are invested, rather than transferred directly to support their income.*** This poses a significant challenge for policy makers seeking to garner support for channeling funds to investment, as interest groups standing to gain the most from income support (for example farmers) are likely to press for greater direct support to households.
- ***At the end of the day, real variables would be affected similarly in both exchange rate regimes.*** In particular, the EU fund inflows would lead to a depreciation of the real equilibrium exchange rate in the medium-run, if indeed funds are used to bolster supply, and the real interest rate would increase during the period of inflows. The only differences would be in the pace of adjustment, foreseen as slightly more rapid in FE countries, and in the variables at play in the adjustment: In IT countries where the currency floats freely, the equilibrium nominal exchange rate would depreciate, while in FE countries, the real exchange rate depreciation would be achieved through lower inflation. Still, in both regimes, the larger the share of EU funds directed to income support, the greater the risks of stoking a demand boom, and thereby reinforcing overheating forces and generating real appreciation pressures.
- ***To best accompany the EU funds inflows, the policy-mix would have to combine conservative and counter-cyclical fiscal policy with a strong commitment to the existing monetary regime.*** Neither a more accommodative fiscal policy nor a softening in monetary policy commitment would provide any additional boost to the real economy. On the contrary, a more pro-cyclical policy would run the risk of boosting unduly the demand side, with a build-up in either inflationary or monetary pressures that would eventually hold convergence

back. In IT countries, a more backward-looking monetary policy would eventually result in sharper interest rate hikes to counter-act higher price pressures, with no effect on the real side.

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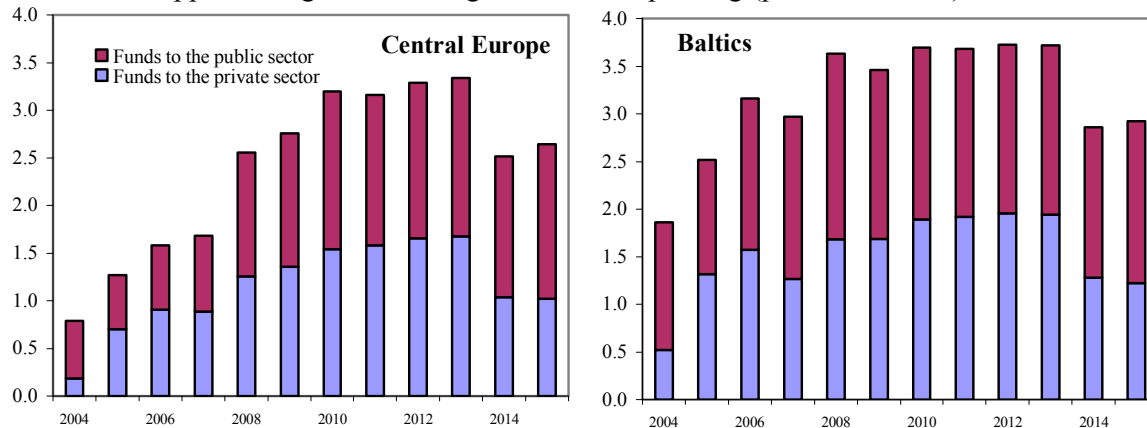
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APPENDIX I. EU FUNDS: WHAT IS IN THE OFFING?

EU funds to the NMS serve multiple purposes, ranging from income convergence to agricultural support. This is achieved by a myriad of individual programs which can be classified in three main categories (Rosenberg and Sierhej, 2007):

- *Agriculture support*: these initiatives are part of the Common Agricultural policy available to the NMS. They provide price subsidies, direct payments to farmers, and support to rural development and fisheries.
- *Structural Funds*: these aim at promoting catch-up in less developed regions, and at supporting areas with structural difficulties.
- *Cohesion Funds*: these are available to countries with GDP below 90 percent of the EU average and directly support projects in infrastructure and environment.

Appendix Figure 1. Average EU Funds Spending (percent of GDP) 1/



Source: Rosenberg and Sierhej (2007); IMF WEO.

1/ The aggregation is derived from a simple average. Countries in the Central Europe group are the Czech Republic, Hungary, Slovakia and Slovenia. Countries in the Baltics group are Estonia, Latvia and Lithuania.

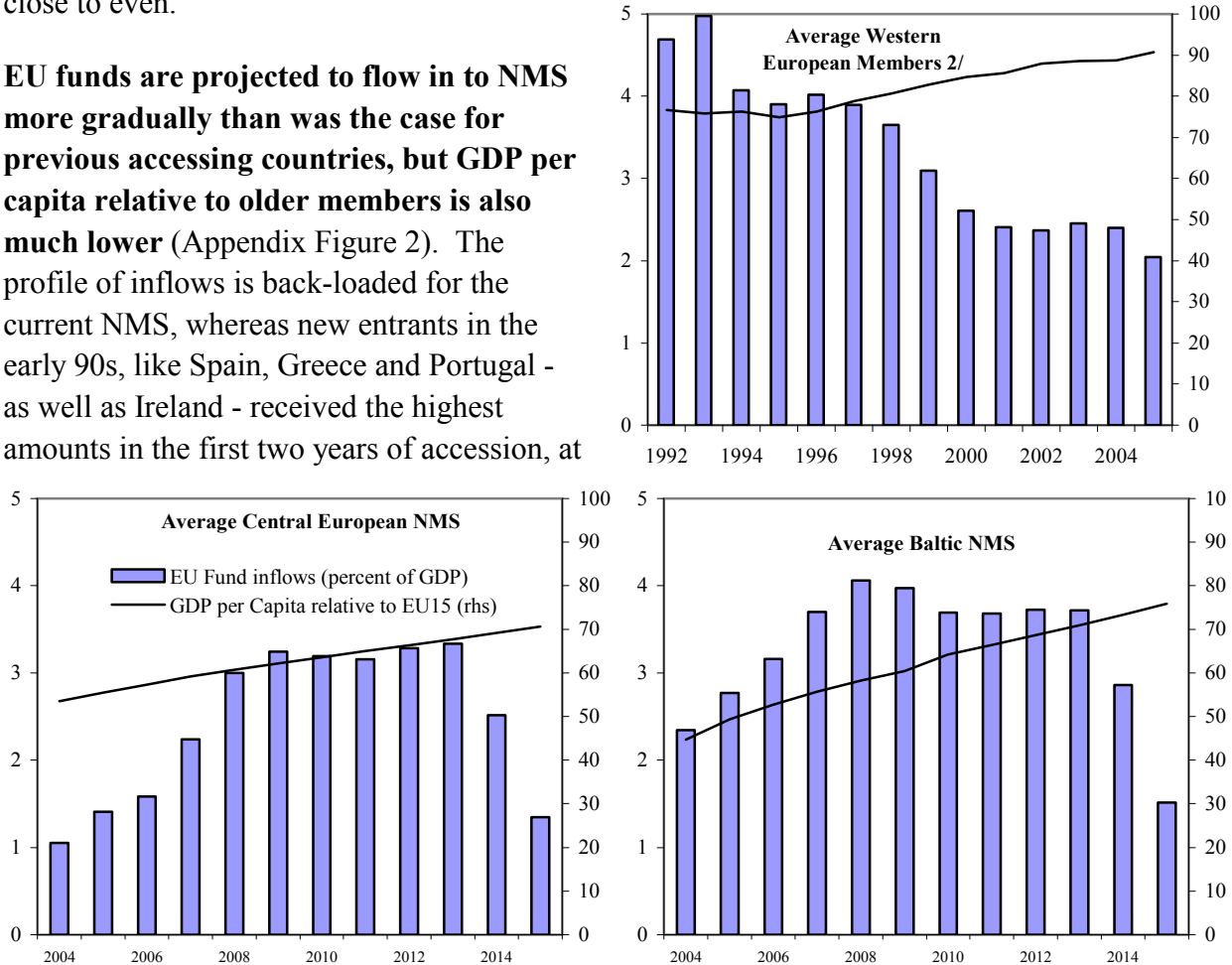
Inflows from the EU could reach 4 percent of GDP per year in the beginning of the next decade in most of the NMS (Appendix Figures 1, 3a and 3b).²⁵ Annual inflows have been gradually increasing since accession, to reach in 2006 on average 1½ percent of GDP in Central

²⁵ All EU funds-to-GDP ratios use the following data: EU fund nominal commitments are constructed using the amounts in euros in constant 2004 prices provided by the European Union and elements of national strategies for the period 2007-13, to which a 2 percent annual deflator is applied (following the practice of the EC and member countries). Future inflows are taken from Rosenberg and Sierhej (2007). Nominal GDP and bilateral exchange rates are taken from the IMF's WEO projections. The breakdown between public and private recipients is based on information from the Czech, Hungarian and Slovenian authorities. For more details, see Rosenberg and Sierhej (2007).

Europe and 3 percent of GDP in the Baltics. But with the 2004-06 plan disbursement coming to an end in 2008, inflows are expected to rise dramatically that year in Central Europe, where absorption so far has been relatively low, as the authorities will strive not to lose any amount to which they were entitled under that plan. Rosenberg and Sierhej (2007) forecast that by then EU transfers to Central Europe will average 2½ percent of GDP, and gradually rise to 3½ percent of GDP over the following five years, while they will hover around 3-3½ percent of GDP in the Baltics. The breakdown between private (largely farmers) and public recipients is close to even.

EU funds are projected to flow in to NMS more gradually than was the case for previous accessing countries, but GDP per capita relative to older members is also much lower (Appendix Figure 2). The profile of inflows is back-loaded for the current NMS, whereas new entrants in the early 90s, like Spain, Greece and Portugal - as well as Ireland - received the highest amounts in the first two years of accession, at

Appendix Figure 2. EU Funds Payments and Relative GDP per Capita 1/

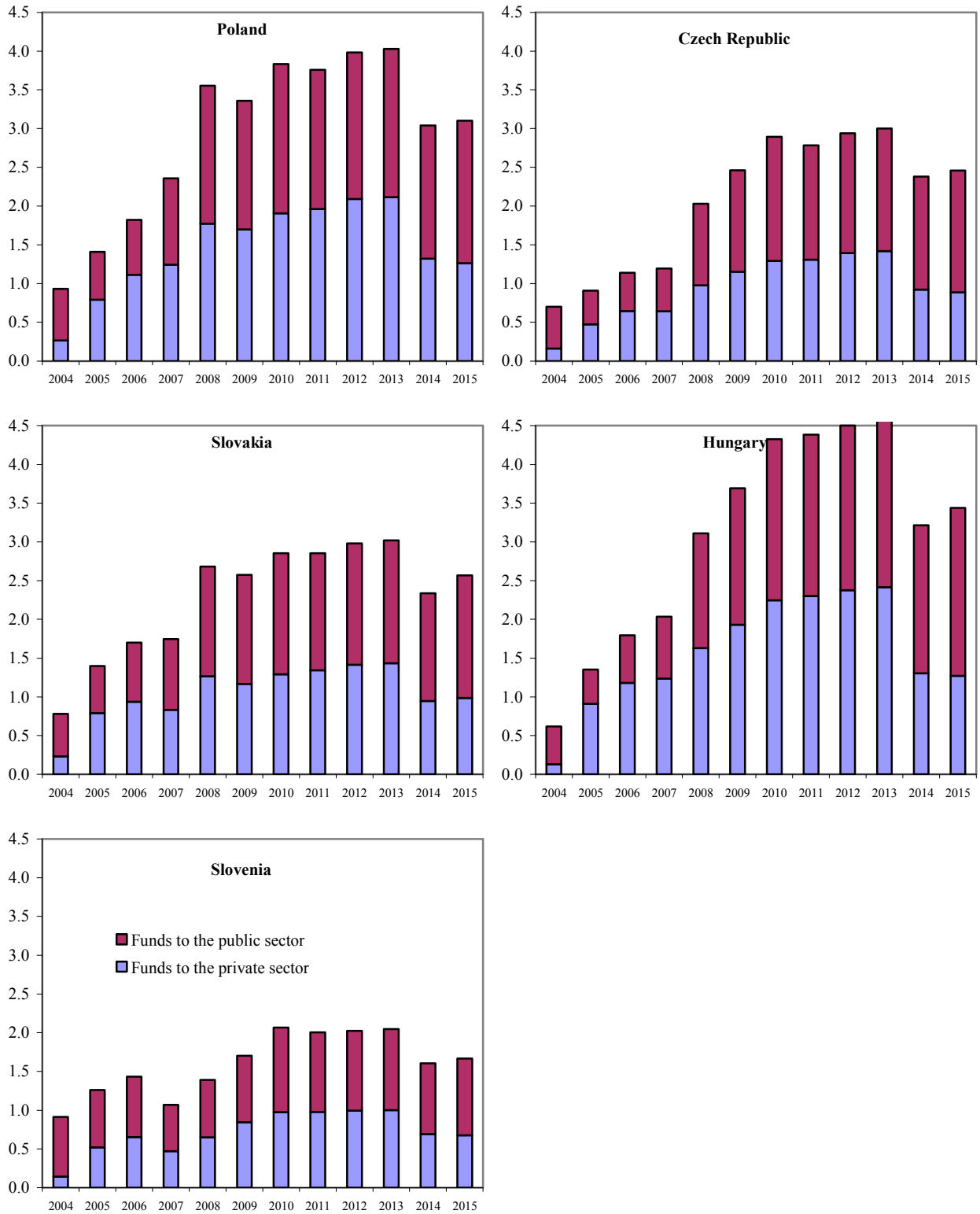


Source: European Commission (2006), Eurostat, Rosenberg and Sierhej (2007), IMF WEO.

1/ EU expenditures excluding administrative expenditures for Western European Members; EU payments including advances to Central European NMS.

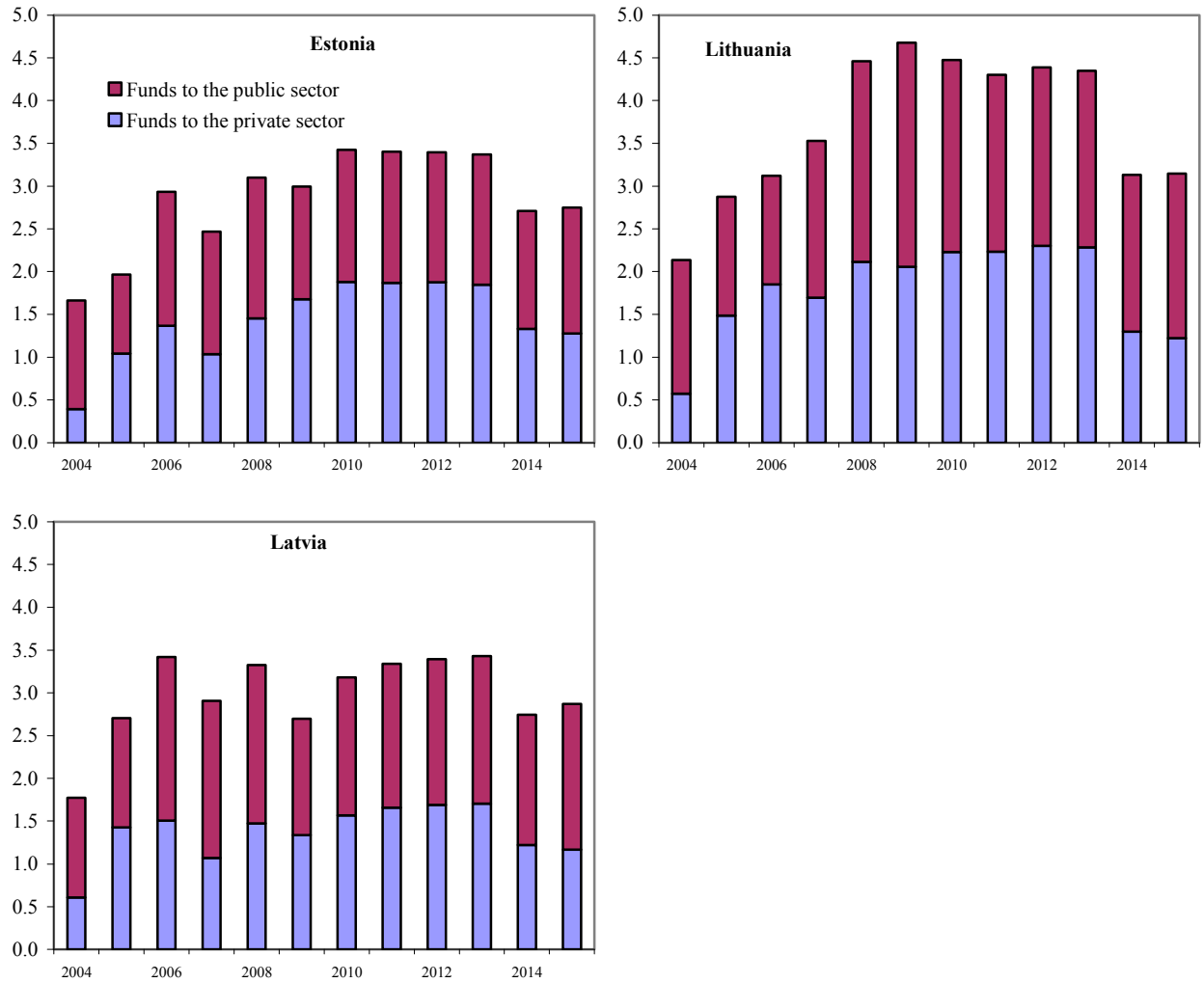
close to 5 percent of GDP. The current slow pattern in some of the NMS is at least partly related to slow absorption rates and administrative bottlenecks, itself possibly linked to the relatively low initial relative GDP per capita: while in 1992, the large EU recipient countries' GDP per capita reached on average 75 percent of the euro area, it was about 50 percent only in the Central European NMS and 45 percent in the Baltics in 2004.

Appendix Figure 3a. Central Europe: EU Funds Spending, 2004–15



Source: Rosenberg and Sierhej (2007), IMF WEO

Appendix Figure 3b. Baltics: EU Funds Spending, 2004–15



Source: Rosenberg and Sierhej (2007), IMF WEO

APPENDIX II. MODIFICATIONS TO GIMF

We are using here a version of the model that was available within the IMF in May 2007. It is derived from the version of the model used in Kumhof and Laxton (2007c), the “Chilean model” with contra-cyclical fiscal policy, in which the frequency was changed from quarterly to annual, and the raw commodity sector removed.

Introducing Convergence: Exogenous productivity shock

To generate the convergence baseline, the model is first calibrated in its steady state mode with the parameters described in Appendix III, and with the level of total factor productivity in the tradable sector in the home country (NMS potentially recipient of EU funds) at 45 percent of the one prevailing in the rest of the world (taken as the EU15).

The shock generating the convergence path that serves at the baseline for the EU fund shock consists of the following:

- The long-term total factor productivity in the tradable sector of the home country ($A_T_HO_SS$) is risen from 45 percent to 80 percent of the level of the rest of the world.
- Trade elasticities for both the home country (XI_D_HO and XI_T_HO) and the rest of the world (XI_D_RW and XI_T_RW) are gradually risen from 1.5 to 3.5. This change captures the increasing trade as the NMS converge towards average old EU members.

Modeling EU Funds Transfers

Home country external balance as well as households’ and government’s budgetary constraints were modified to reflect the inflows of EU funds. In addition, since the EU funds are defined in euros, namely the currency of the rest of the world, the impact of potential exchange rate evolution once the EU funds flow in was embedded, as EU funds were expressed in the national currency (value in euros multiplied by the nominal exchange rate):

- The home country’s external balance was improved by the full amount of the EU transfers.
- The households’ budgetary constraint was improved by the amount of EU funds devoted to the private sector. It was assumed that optimizing households and liquidity-constrained households would each receive a share of the funds proportionate to their share in overall population.
- The government’s budgetary constraint was improved by the amount of EU funds devoted to the public sector, but with the rule that this amount is fully and immediately spent on public investment. None of the other expenditures are modified, and tax rates are only modified for the part of the fiscal improvement that is permanent (contra-cyclical fiscal rule). In addition, the overall increase in public investment also include a 15 percent co-payment paid by the government.

APPENDIX III. LIST OF PARAMETERS USED FOR THE CALIBRATION OF THE MODEL

	CEEs	Baltics	EU15
Ratios to GDP			
Labor Income Share			
In Total Economy	54.0	51.5	60.3
In Non Tradable Sector	58.6	56.4	65.9
Investment Share	25.0	28.7	18.4
Exports of Final Goods	21.5	15.9	-
Exports of Intermediate Goods	26.4	21.7	-
Imports of Final Goods	19.9	25.5	-
Non Tradable Production	61.2	61.4	71.9
Net Financial Asset Position	-40.7	-66.7	-
Fiscal And Monetary Parameters			
		(in percent of GDP)	
Government Expenditures	21.6	19.2	22.0
Government Consumption	17.8	15.4	19.7
Government Investment	3.8	3.8	2.3
Government Social Transfers	21.6	14.0	23.5
Government Debt	37	32	66
		(in percent)	
Share In Total Revenue of ...			
Consumption Tax	36	38	28
Capital Tax	4	4	7
Labor Tax	25	25	25
Lump-Sum Transfers	35	33	40
Share of Cyclical Revenue Saved 1/	100	100	100
Inflation Target (annual)	2.5	-	2.0
		(in level)	
Coefficients In The Monetary Policy Reaction Function			
Lagged Nominal Interest Rate	0.0	0.0	0.0
Inflation	2.5	0.0	2.5
GDP Growth	0.1	0.0	0.1
Output-Gap	0.0	0.0	0.0
Exchange Rate	0.0	1000000	0.0

1/ This corresponds to a fiscal rule that stabilizes the structural fiscal balance.

	CEEs	Baltics	EU15
Households' parameters			
Share of Liquidity Constrained Consumers	0.45	0.45	0.25
Population Growth Rate (annual)	0.75	0.75	0.75
Population Ratio	1/29.5	1/161.7	1
Habit Persistence	0.4	0.4	0.4
Probability of Surviving (quarterly) 1/	0.98125	0.98125	0.98125
Income Decline Rate (quarterly) 2/	0.95	0.95	0.95
Coefficient of Relative Risk Aversion	4	4	4
Rigidities And Competition Parameters			
Price Adjustment Costs (annually)			
Unions	13	1.3	13
Distributors	13	1.3	13
Non Tradable Sector	13	1.3	13
Tradable Sector	13	1.3	13
Imported Final Goods	10	1.0	10
Imports Intermediary Goods	10	1.0	10
Quantity Adjustment Costs			
Retail Sector	7	0.7	7
Trade Flows of Final Goods	7	0.7	7
Trade Flows of Intermediary Goods	7	0.7	7
Capital Stock	0	0	0
Investment	9	4	9
Elasticities Of substitution Between Varieties 3/			
Non tradable Sector	8	8	8
Tradable Sector	8	8	8
Retail Sector	21	21	21
Distribution Sector	21	21	21
Unions	8	8	8
Importers of Final Goods	41	41	41
Importers of intermediary Goods	41	41	41

1/ corresponds to a 75 percent probability of surviving 15 years

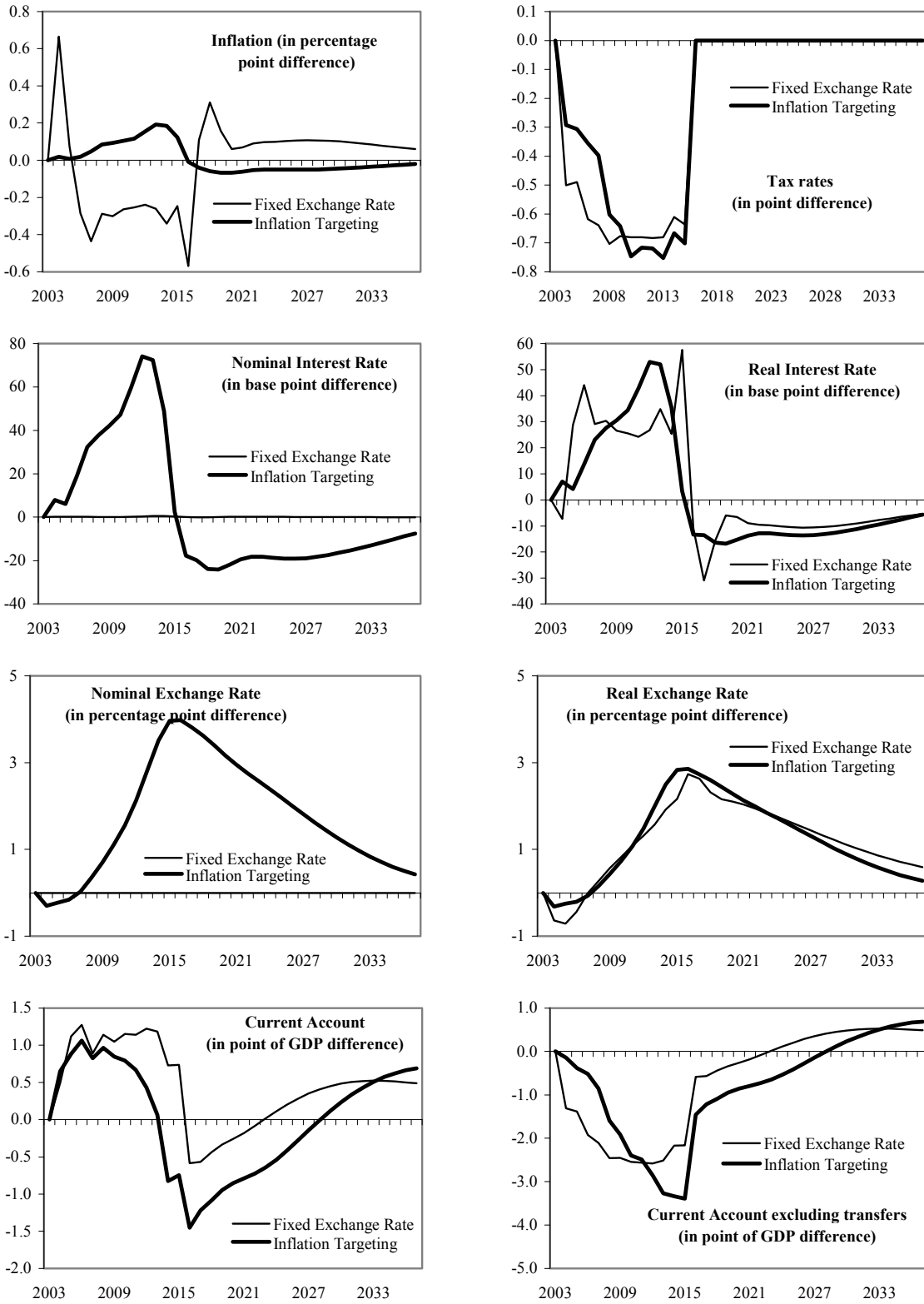
2/ This parameter captures the decline in revenue at the end of the life cycle

3/ The larger the elasticity (σ) the smaller the market power of agents, and the lower the mark-up of prices charged over marginal costs ($\sigma/(\sigma-1)$). An elasticity of 21 corresponds to a mark-up of 5 percent, an elasticity of 41 to a mark-up of 2.5 percent.

	CEEs	Baltics	EU15
Production parameters			
		(in percent)	
Real World Growth Rate (annual)	1.5	1.5	1.5
Real World Interest Rate (annual)	-	-	2.5
Depreciation Rates of... (annual, in percent)			
Private Capital Stock	10	10	10
Public Capital Stock	4	4	4
Public Consumption Stock	4	4	4
		(in level)	
Elasticity of GDP to ...			
Public Capital Stock 1/	0.1	0.1	0.1
Public Consumption Stock 1/	0.01	0.01	0.01
Elasticity of Substitution Between ...			
Private Output and Public Capital	1.5	1.5	1.5
Domestic and Foreign Goods	1.5	1.5	1.5
Labor and Capital in the Tradable Sector	0.99	0.99	0.99
Labor and Capital in the Non Tradable Sector	0.99	0.99	0.99
Domestic Tradable and Non Tradable Goods	0.5	0.5	0.5
Foreign Intermediary Goods from Different Countries	0.75	0.75	0.75
Foreign Final Goods from Different Countries	0.75	0.75	0.75

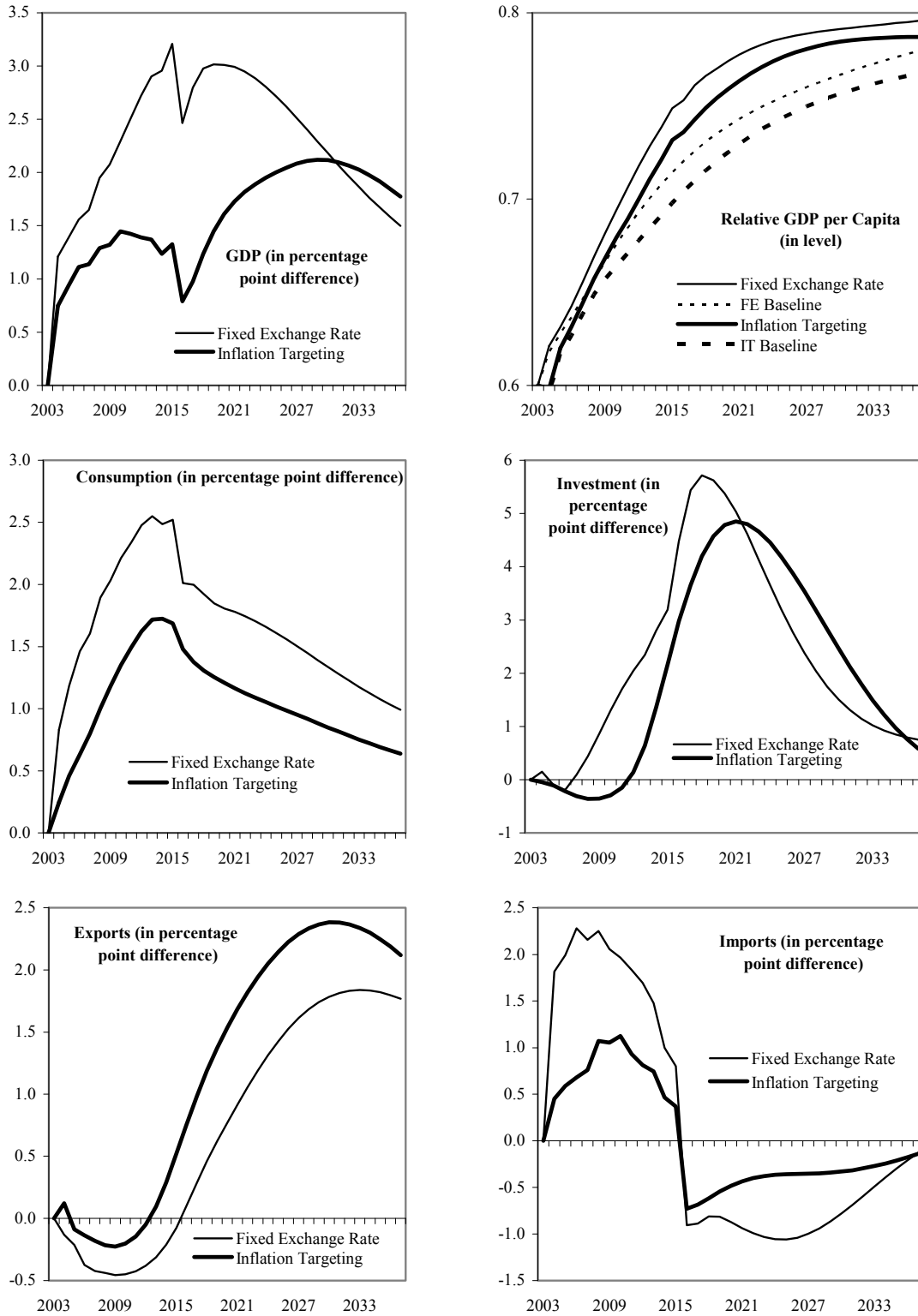
1/ A 10 percent rise in public capital (resp. consumption) stock would increase GDP by 1 (resp. 0.1) percent.

Appendix Figure 4a. EU Fund Transfer Shock, 2003–40



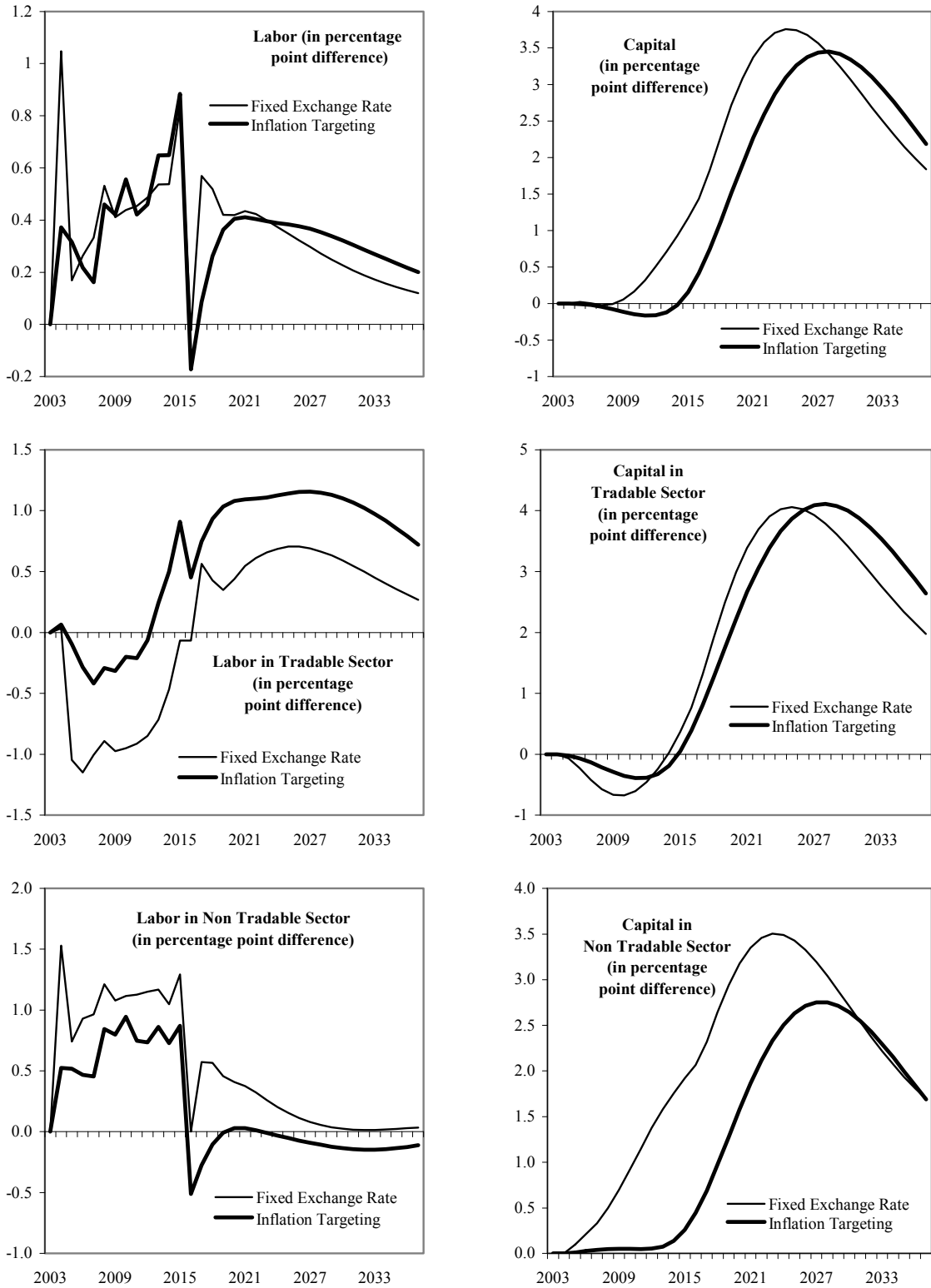
Source: IMF Staff estimates

Appendix Figure 4b. EU Fund Transfer Shock, 2003–40



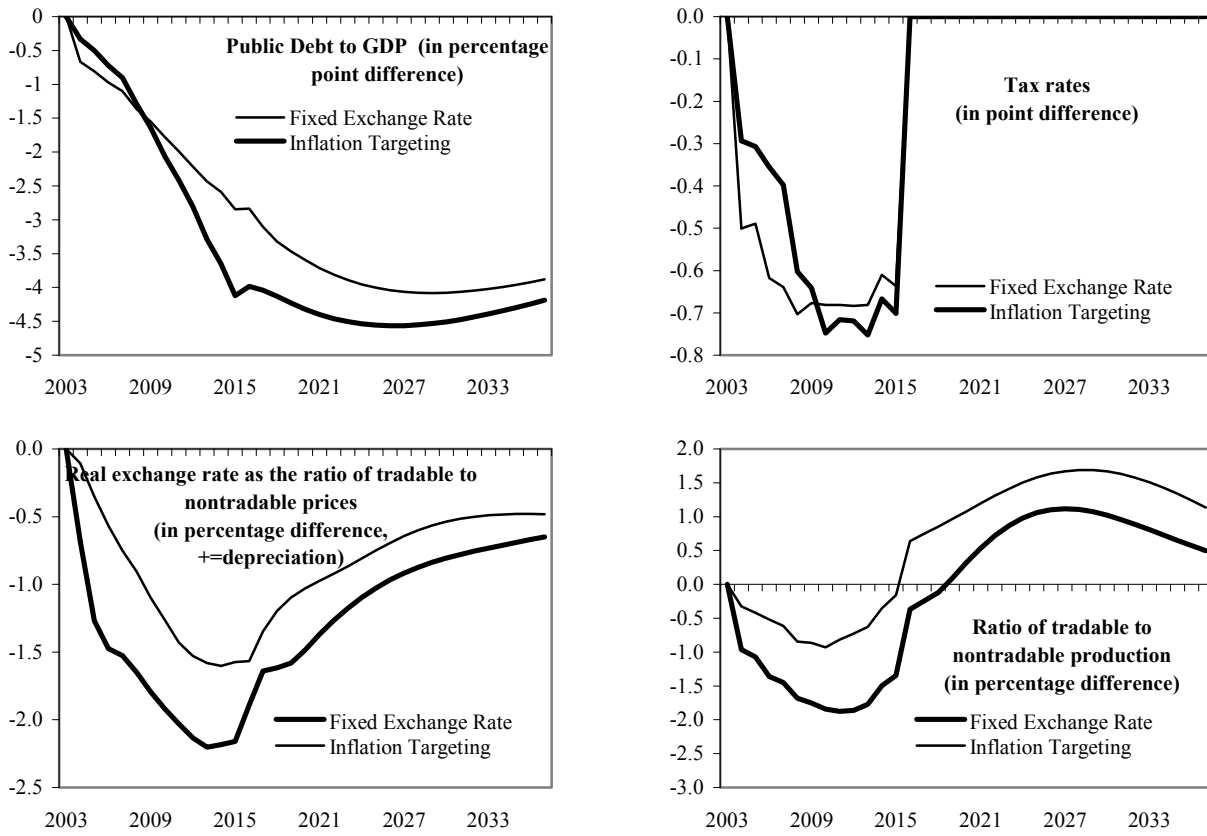
Source: IMF Staff estimates

Appendix Figure 4c. EU Fund Transfer Shock, 2003–40



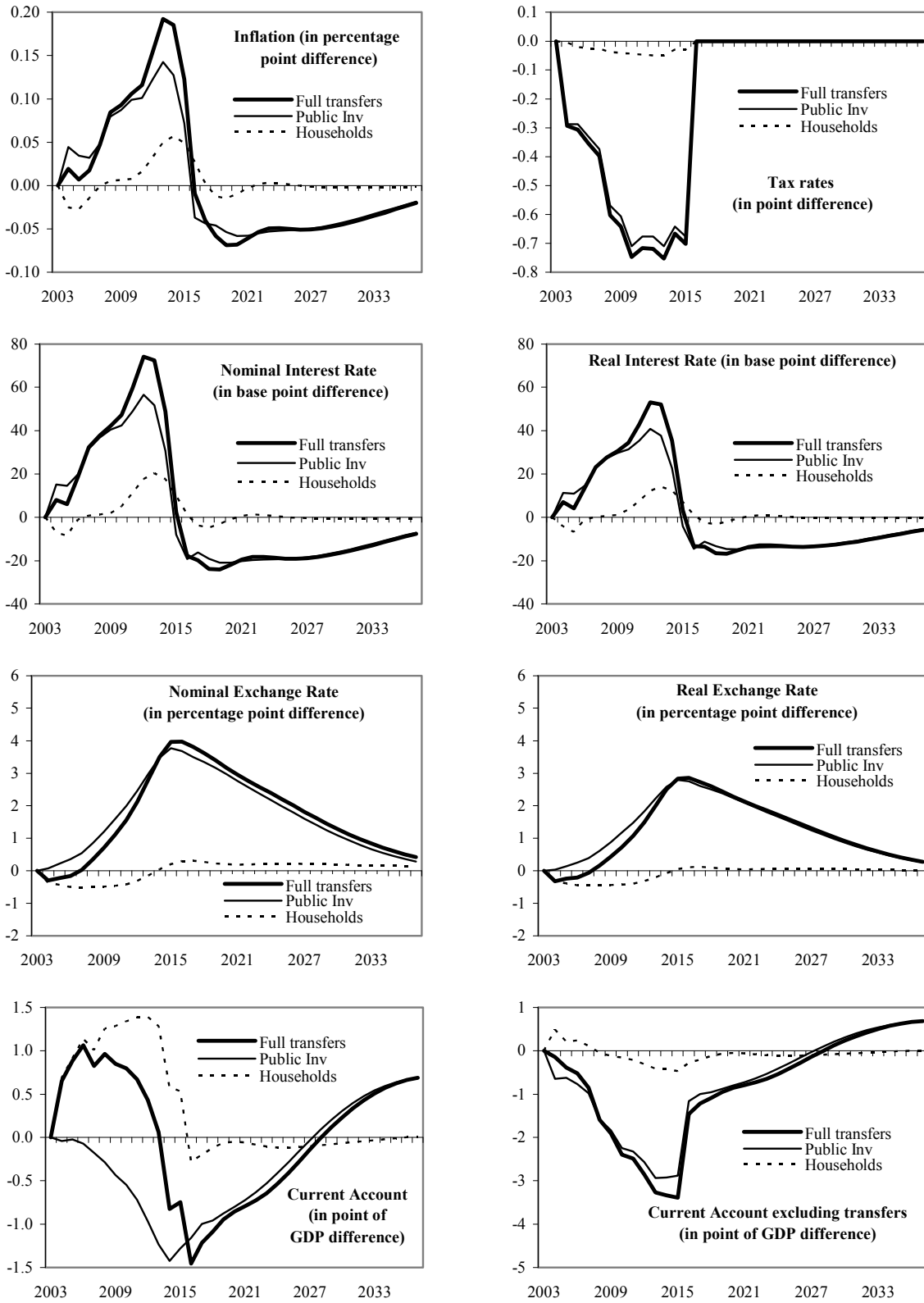
Source: IMF Staff estimates

Appendix Figure 4d. EU Fund Transfer Shock, 2003–40



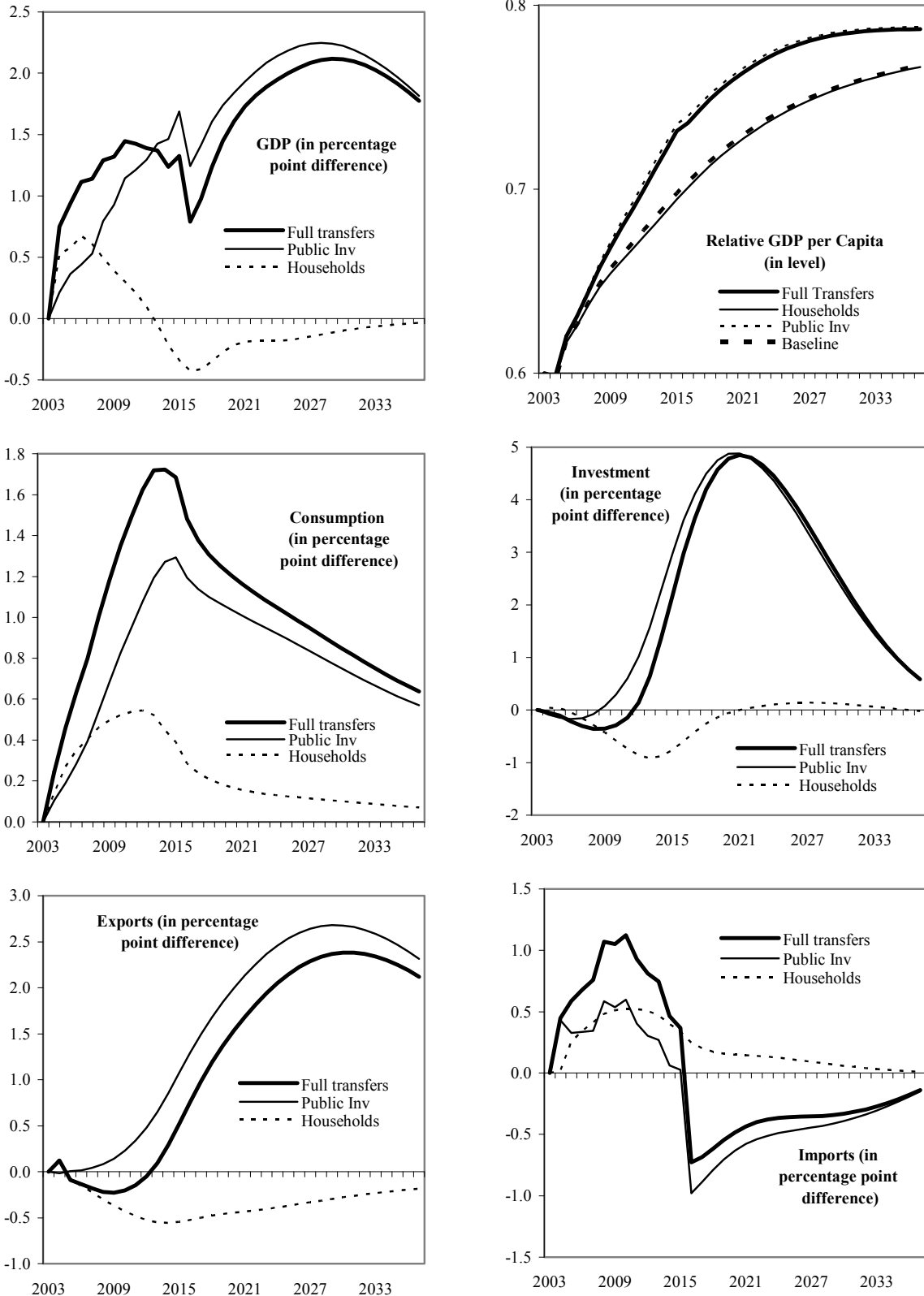
Source: IMF Staff estimates

Appendix Figure 5a. IT Countries: EU Fund Transfer Shock, 2003–40



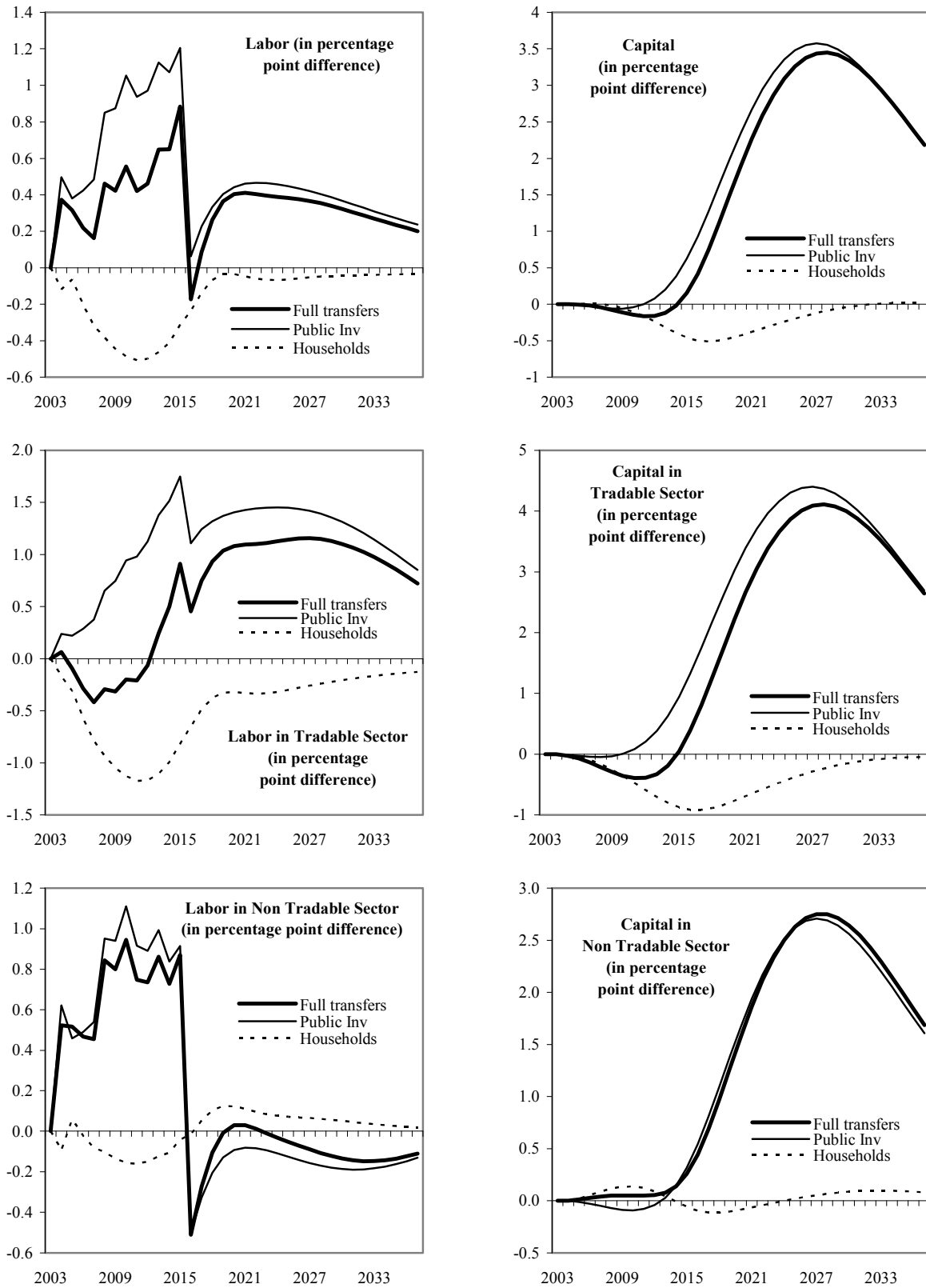
Source: IMF Staff estimates

Appendix Figure 5b. IT Countries: EU Fund Transfer Shock, 2003–40



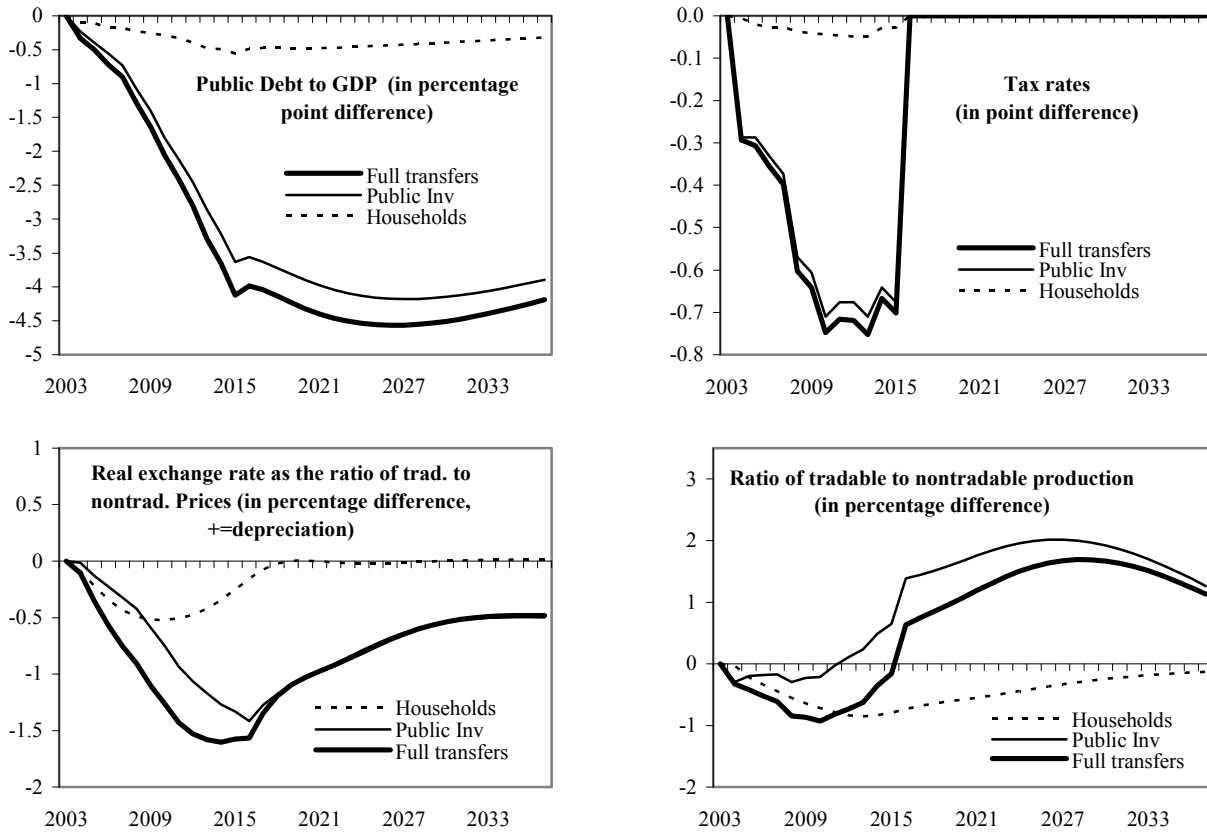
Source: IMF Staff estimates

Appendix Figure 5c. IT Countries: EU Fund Transfer Shock, 2003–40



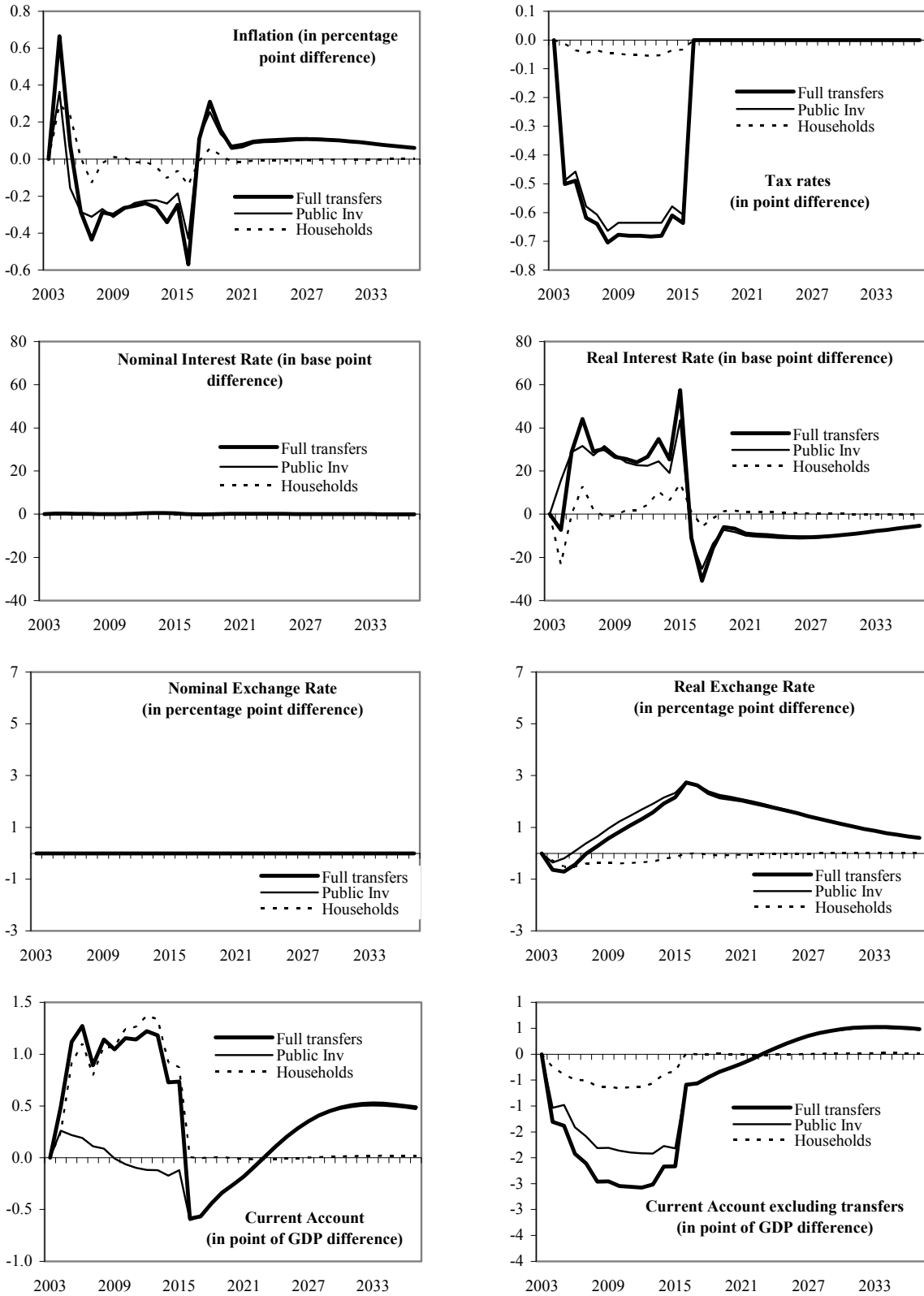
Source: IMF Staff estimates

Appendix Figure 5d. IT Countries: EU Fund Transfer Shock, 2003–40



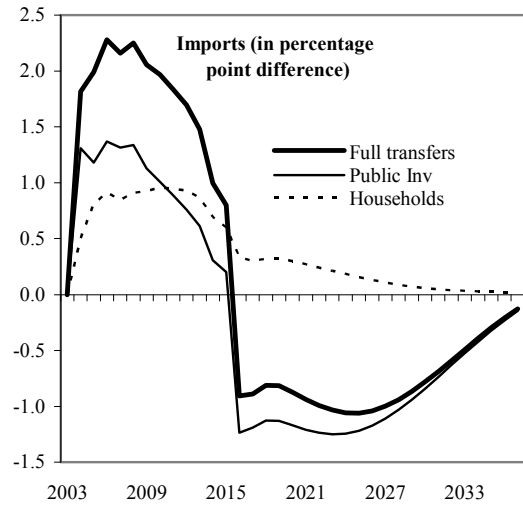
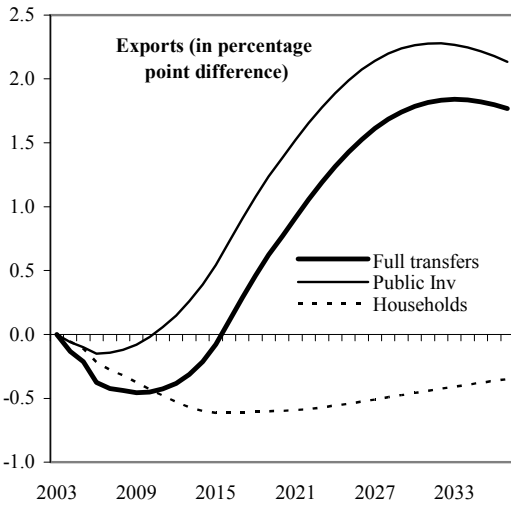
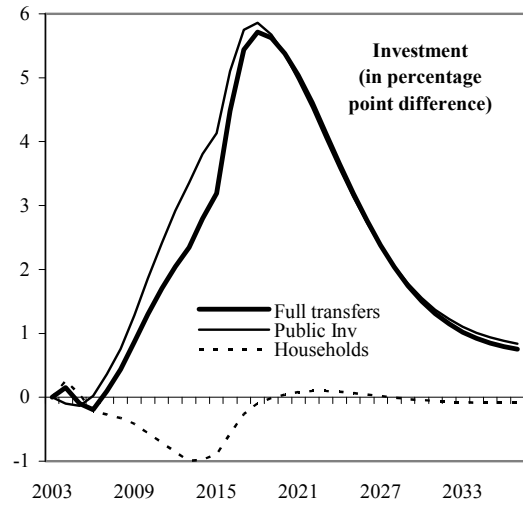
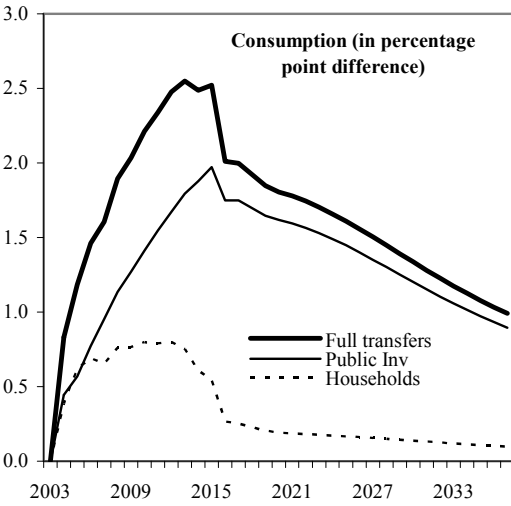
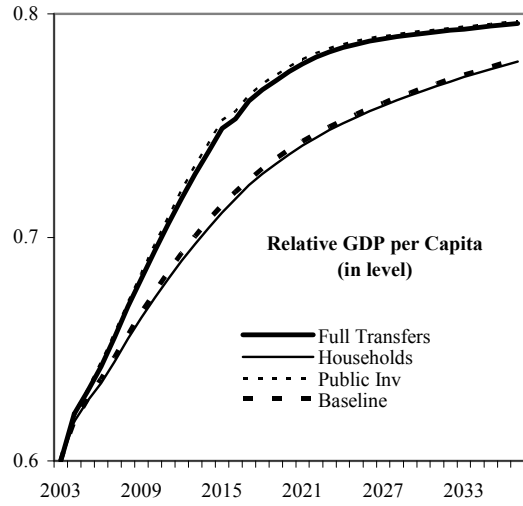
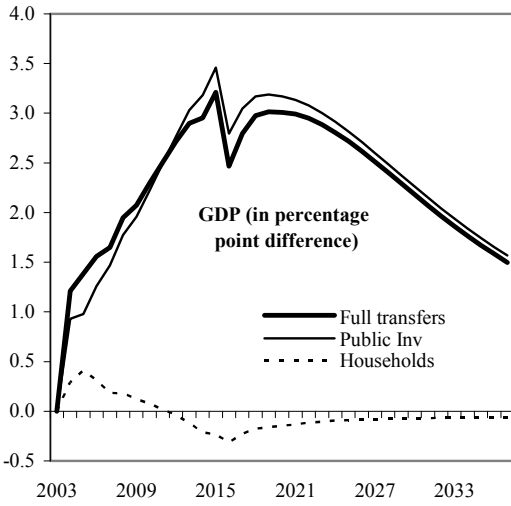
Source: IMF Staff estimates

Appendix Figure 6a. FE Countries: EU Fund Transfer Shock, 2003–40



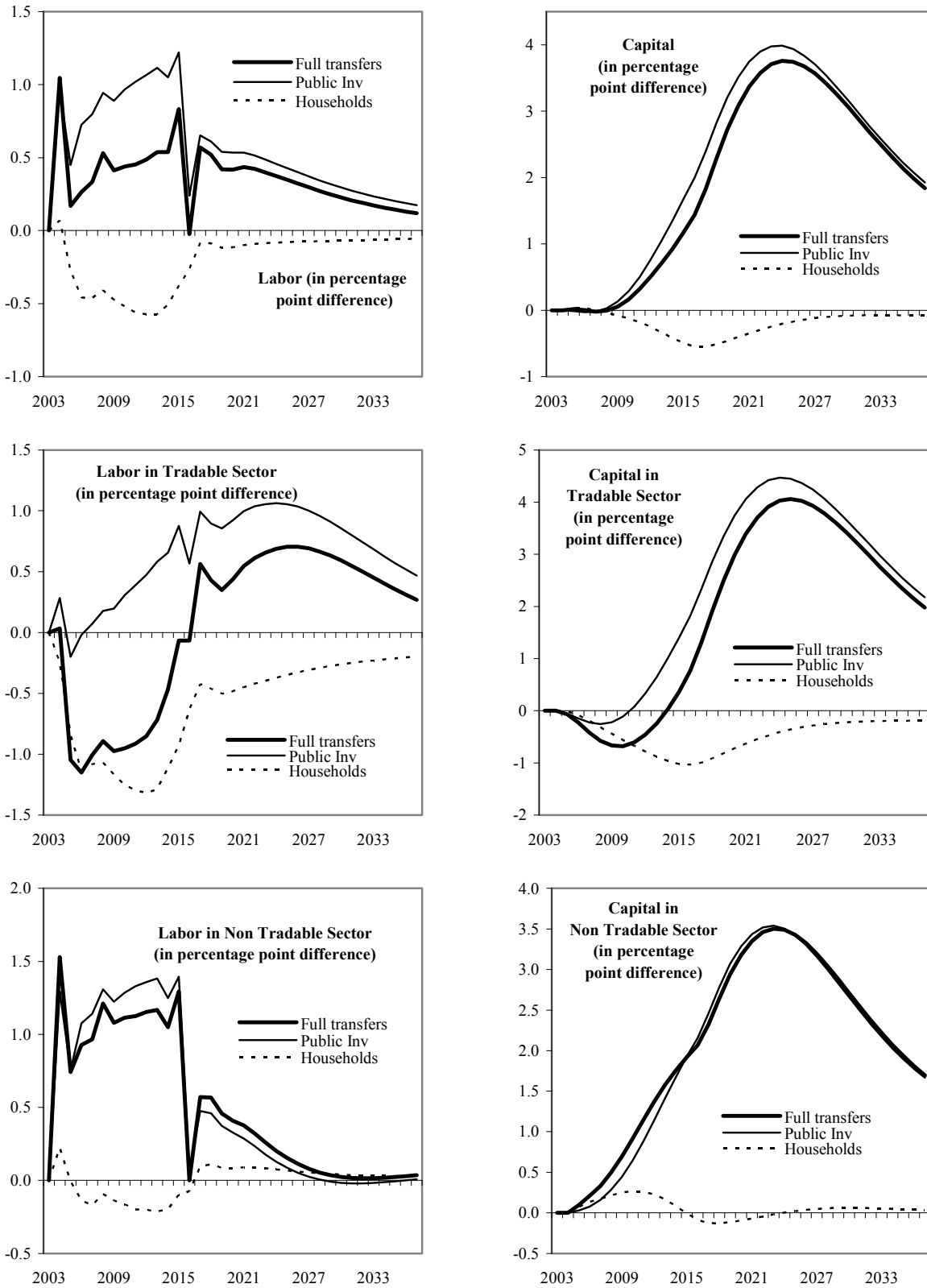
Source: IMF Staff estimates

Appendix Figure 6b. FE Countries: EU Fund Transfer Shock, 2003–40



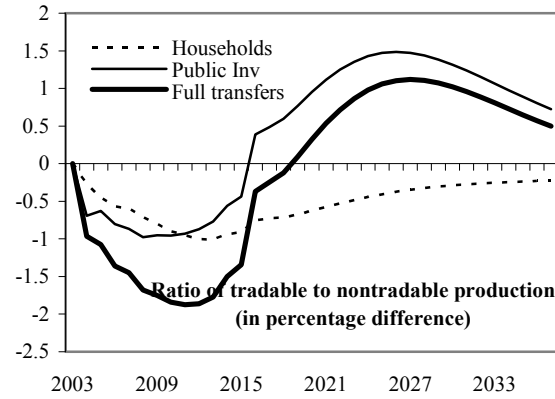
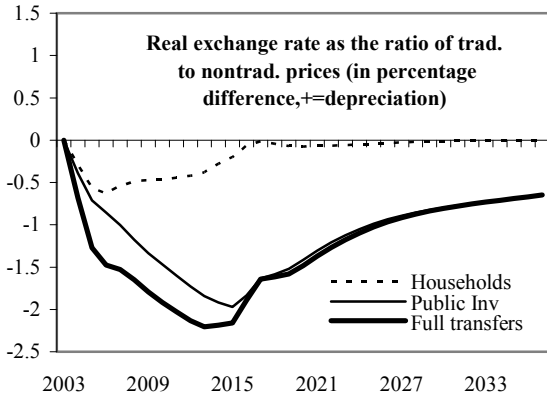
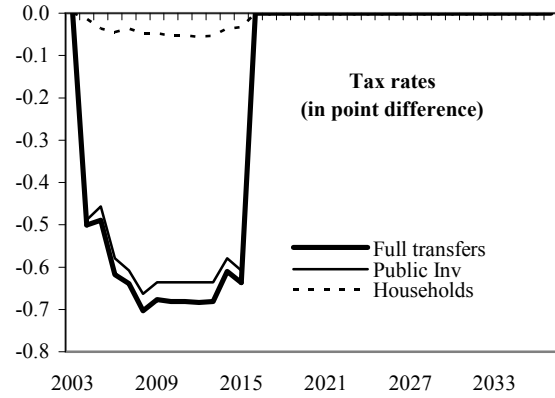
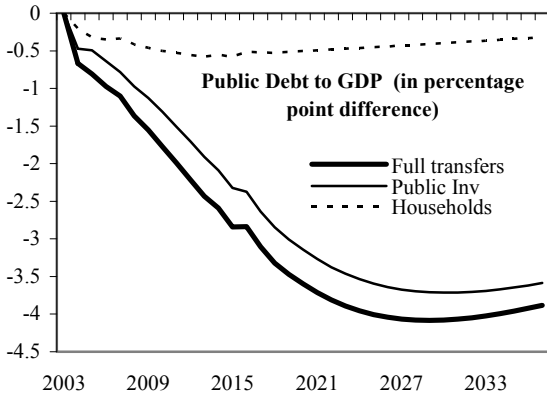
Source: IMF Staff estimates

Appendix Figure 6c. FE Countries: EU Fund Transfer Shock, 2003–40



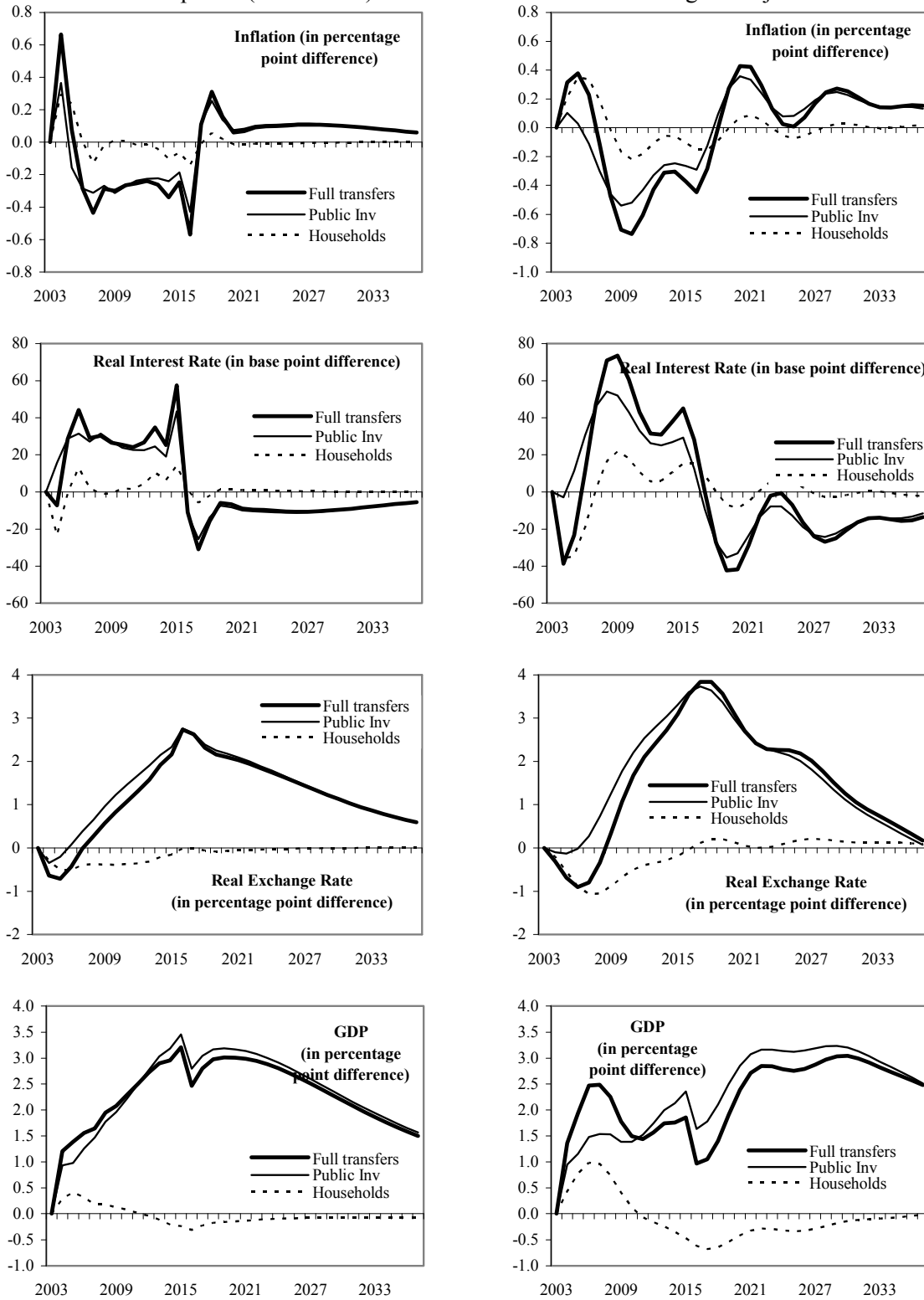
Source: IMF Staff estimates

Appendix Figure 6d. FE Countries: EU Fund Transfer Shock, 2003–40



Source: IMF Staff estimates

Appendix Figure 7. FE Countries: EU Fund Transfer Shock, 2003–40
 Sensitivity Analysis with Price and Quantity Adj. Costs of a Flexible Exchange Rate Regime
 Baseline assumptions (lower costs) Higher Adjustment Costs



Source: IMF Staff estimates