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Republic of Poland: Selected Issues

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REPUBLIC OF POLAND

Selected Issues

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Approved by European Department

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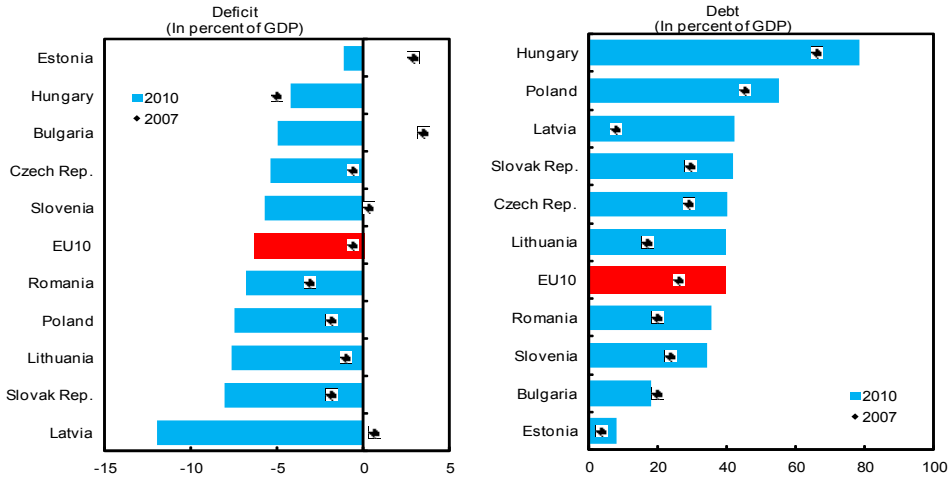
I. Private Pension Systems in Emerging Europe: The Uncertain Road Ahead[1]

A. Introduction

1. **Comprehensive pension reforms have been a cornerstone of fiscal policies in Central and Eastern Europe (CEE).** In response to population aging pressures, a number of Emerging European economies reformed their pension systems in the late 1990s and early 2000s by adopting multi-pillar pension frameworks. Pension reforms were anticipated to improve long-run fiscal sustainability and lead to better macroeconomic outcomes, including higher national saving rates and increased labor participation. An important part of the reforms was the introduction of a private, in most cases mandatory, pre-funded, defined-contribution second pillar pension systems. This private component, in conjunction with the public first pillar, was expected to help diversify risks, supplement old-age income for pensioners that was being tightened under the public pension schemes, and help with the development of capital markets.

2. **Nevertheless, since the onset of the global crisis in late 2008, several countries have been backtracking on the funding of their private pension systems to help lower their fiscal deficits.** The global downturn led to a significant deterioration in countries' public finances, with the average deficit of the EU10 rising from about 1 to an estimated 6 percent of GDP between 2007 and 2010. In an effort to helping to bridge the shortfall in their fiscal revenues, six CEE countries decided to reduce pre-funding of pensions by diverting pension contributions from their private to the public pension systems. Some countries did so on a temporary basis, while experiencing deep recessions and as a complement to significant fiscal consolidation. Others, however, have sought to permanently reduce and even eliminate contributions to the private pension system well into the recovery, and in one case, in conjunction with other expansionary fiscal measures.



Source: IMF Fall 2010 WEO.

[1] Prepared by Delia Velculescu.

3. **These actions reflect the individual countries' recognition of the large fiscal costs associated with pre-funding of future pension liabilities.** The pension reforms kept overall individual pension contribution rates the same (or even lowered them), while redirecting a part of the contributions to the pillar II, where they accumulated in individual accounts managed by the private pension funds. In the meantime, the public pay-as-you-go (PAYG) pillar I systems were faced with lower contribution rates but unchanged benefit payments for current pensioners (even as some countries also introduced parametric reforms aimed at lowering benefits under the first pillar over the long run). In the absence of additional fiscal consolidation measures, governments issued debt to cover the contribution-benefit gap in the pillar I system, leading to higher government deficits and explicit public debt. Moreover, pension assets accumulated in the private pension funds could not be counted as part of the government accounts.

4. **Pre-funding costs make it more difficult for pension reformers to comply with the EU's Stability and Growth Pact (SGP) rules.** With fiscal deficits already swollen as a result of the global crisis, countries that have pre-funded their future pension liabilities and hence bear an additional fiscal cost will find it harder to comply with the Maastricht limits of 3 percent of GDP for deficits and 60 percent of GDP for public debt. This is in contrast with countries that have not reformed their pension systems, including by pre-funding pension liabilities, whose deficit and explicit debt may be currently low, but projected to rise only later due to large implicit pension liabilities. By maintaining uniform debt and deficit limits under the SGP, in effect, some countries are being penalized for pre-funding pension liabilities and may even be subject to financial sanctions under "strengthened" SGP rules once they become members of the euro area.

5. **This paper takes stock of the pension reforms introduced by CEE countries with focus on the private second pillars, discusses their fiscal cost implications, and outlines some forward-looking policy options.** Section II presents a retrospective on the pension reforms in the CEE, including the motivation for the multi-pillar partially pre-funded approach undertaken in the region, and a preliminary assessment of their benefits to date. Section III analyzes the fiscal cost implications of pre-funding pensions via private second pillar systems, with focus on Poland as a case study. Section IV highlights the tensions with the SGP rules, summarizes the recent reform reversals, and discusses policy options both for individual countries and at the EU level. Section V presents the main conclusions of the paper.

B. A retrospective on Eastern Europe's pension Reforms

In the late 1990s, it became widely recognized that pension systems in CEE countries were unsustainable.[2] First, these countries expected significant population aging caused by falls in fertility rates, increases in life expectancy, and the post-war demographic boom. The demographic dependency ratio (pensioners to working population) of the EU10 was around 17 percent in 1990, relative to a projected 63 percent by 2060, compared to an average projected increase in dependency ratios of 30 percentage points for the Euro Area during this

[2] See, for example, Fox and Palmer (2000) and Muhler (2008).

period. Second, these countries inherited PAYG pension systems from socialist times that were especially susceptible to political pressures and influence groups. Third, a number of countries had generous early retirement provisions, lax legislation on disability eligibility, and generous pensions and pension indexation. At the same time, they were experiencing a decline in employment following the fall of socialist regimes, which led to rising system dependency ratios (number of persons receiving social insurance divided by number of contributors) that exceeded demographic dependency ratios (in Poland, this excess was close to 40 percent in 1995). As a result of these factors, public pension systems were unsustainable, with the size of implicit pension debt estimated at over 200 percent of GDP in many of the CEE countries (Table 1).[3]

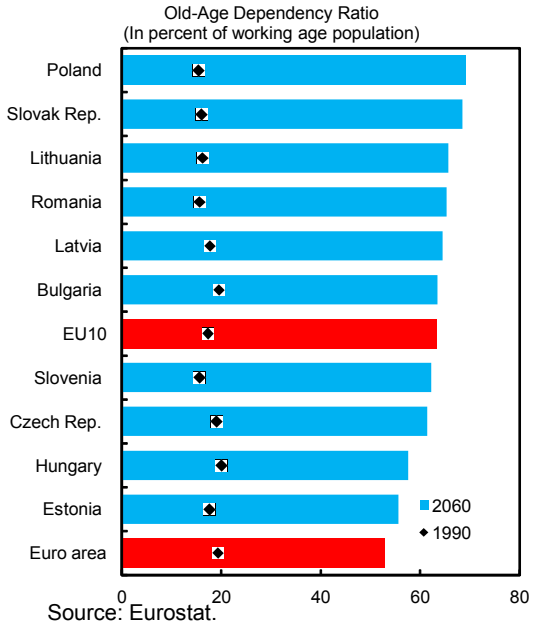


Table 1: Implicit Pension Debt in the CEE, 2000
(in percent of GDP)

Country	Public debt	Pension Spending	Implicit Pension Debt
Slovenia	25	11	298
Poland	43	12	261
Romania	18	6	256
Slovakia	31	8	210
Hungary	59	9	203
Croatia	33	11	201
Estonia	7	9	189
Lithuania	28	7	15

Source: Holzmann, Palacios, and Zviniene (2004)

6. **In response, several CEE countries reformed their pension systems, adopting multi-pillar systems.**[4] These systems are comprised of a pillar I pay-as-you-go public defined-benefit pillar I system (or, in a few countries, a notional defined contribution system), and a private, mostly mandatory, defined contribution, fully-funded pillar II system (Table 2). In some countries, a voluntary (though typically small) pillar III private system was also established and complemented with tax incentives. Contribution rates in the private pension pillar have generally been up to 10 percent of wages, while participation has varied between 50 percent of total persons employed (Lithuania) to 95 percent in Poland.

[3] Implicit pension debt is defined as accrued obligations to current pensioners and contributors in the system (so called "closed-group" pension liabilities), accounting for expected contributions, under current policies. Obligations to new entrants into the labor force are not included (see Holzmann et. al, 2004).

[4] Also see James (1998), Cangiano et. al. (1998).

Table 2: Pension Systems after Reform in the CEE

	Hungary	Poland	Latvia	Bulgaria	Estonia	Lithuania	Slovakia	Romania
Pension reform date	1998	1999	2001	2000	2002	2004	2005	2008
Public pillar I	DB, PAYG	NDC, PAYG	NDC, PAYG	Pension points	DB, PAYG	DB, PAYG	Pension points	Pension points
	Prefunded	Prefunded	Prefunded	Prefunded	Prefunded	Prefunded	Prefunded	Prefunded
Private pillar II								
Mandatory/optional	Mandatory for new entrants	Mandatory up to age 29, optional ages 30-49	Mandatory up to age 29, optional ages 30-49	Mandatory up to age 40	Mandatory up to age 18, optional for others	Optional	Mandatory for new entrants	Mandatory up to age 35, optional ages 35-44
Individual Contribution Rate	8	7.3	10	5 (incl. employer's	6.5(incl. employer's	6	9 employers' contribution	2, planned to increase to 6
Contributors as share of employed	69	95	82	73 (as of 2006)	80	52	72	N/A
Assets in percent of GDP, end-2006	6.3	11.1	3.9	1.9	3.6	4.0	1.7	N/A

Source: Muller (2008).

7. **The reforms were expected to improve long-run fiscal sustainability, provide risk diversification, and lead to additional macroeconomic benefits**. Specifically:

- While the introduction of private pension systems was not expected to improve fiscal sustainability itself, it was thought to help to facilitate reforms in the first pillar aimed at reducing the generosity of pensions in light of expected population aging, which, in turn, would lead to a an improvement in long-run fiscal positions.
- Private management of pillar II was expected to lead to better risk diversification by linking benefits not only to the return on labor (as under pillar I), but also on capital (these returns have been shown to be imperfectly correlated—see Bohn, 1998), as well as through investments abroad. This was also expected to lead to an increase in returns (as the return on capital is generally higher than that on labor over the long run), which would provide additional income support in old age, especially as benefits under the pillar I system were already tightened or expected to decline. On the downside, administrative costs and fees associated with private management of pension funds was expected to offset part of the extra gains due to diversification.
- Private management of pillar II was intended to avoid political manipulation that could arise with public management of pension assets. It was also expected to mitigate the political risk associated with frequent legislation changes regarding contribution and benefit rates, as politicians tended to promise short-run generous benefits while passing the costs to future generations.
- Establishment of actual individual saving accounts under pillar II increased transparency by allowing individuals to see the value of their accumulated contributions at any point in time and make judgments as to its adequacy. It also provided a sense of "ownership" (which may have been particularly important in post-socialist CEE countries) compared to only a promise of future benefits under the pillar I system.
- The defined-contribution characteristic of Pillar II (and in a few cased reformed pillar I systems) aimed to better link contributions to benefits, which was expected to lower

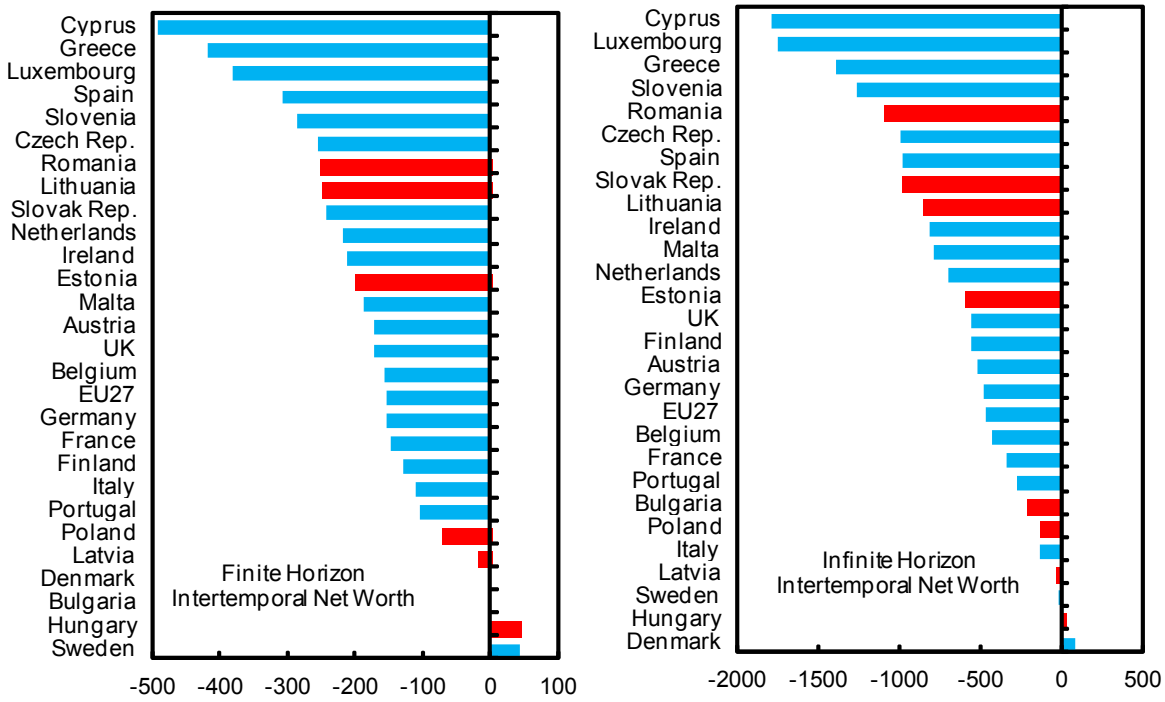
evasion from the formal sector and remove incentives for early retirement, with positive effects on labor supply, labor earnings, and the saving rate (see Lindbeck and Persson, 2002).

- Pre-funding of future liabilities in pillar II was thought to lead to higher private and national saving (and hence reduce reliance on foreign capital flows), provided that liquidity-constrained individuals did not offset such saving, and the transition toward the new system were not fully financed by debt issuance.
- Pillar II systems were also expected to help with the development of capital markets.
- The Pillar I system was maintained to preserve a redistributive element (in the case of defined-benefit systems) and protect individuals against the risk of return inherent in private systems (see Heller, 1998).

8. **Ex post, reforms—mainly relating to the public first pillar—have helped to improve CEE countries' long-run sustainability positions**. The reforming countries fare better relative to peers on long-run sustainability measures, such as intertemporal net worth indicators, which reflect the total current and projected future net liabilities of the public sector under unchanged policies (text figure).[5] These indicators capture three main elements: a measure of current financial net worth, which quantifies the effects of past policies on countries' current fiscal positions; a component reflecting medium-term changes in the primary balance, given current policies; and a measure of long-run changes in primary balances, which takes into account the effects of population aging under current pension frameworks. CEE countries, among others, benefitted from relatively lower aging costs due to pension reforms, which translate into a relatively low long-run component in the overall measures of intertemporal net worth (Figure 1). This, however, is mainly attributable to measures that were taken to lower benefits under the pillar I system, with the introduction of the private pillar II system being beneficial only to the extent that it had facilitated such changes.

[5] See Velculescu (2010). The figures presented are based on IMF macroeconomic data as of April 2010, and baseline long-term aging data(including pensions, health, etc.) from the EC's 2009 Sustainability Report, and do not include measures taken since then. Sustainability gaps represent "open group" liabilities, in that they take into account aging-related liabilities of both current and future generations.

EU27 Intertemporal Net Worth Derived from the Balance Sheet Approach
(In percent of GDP)

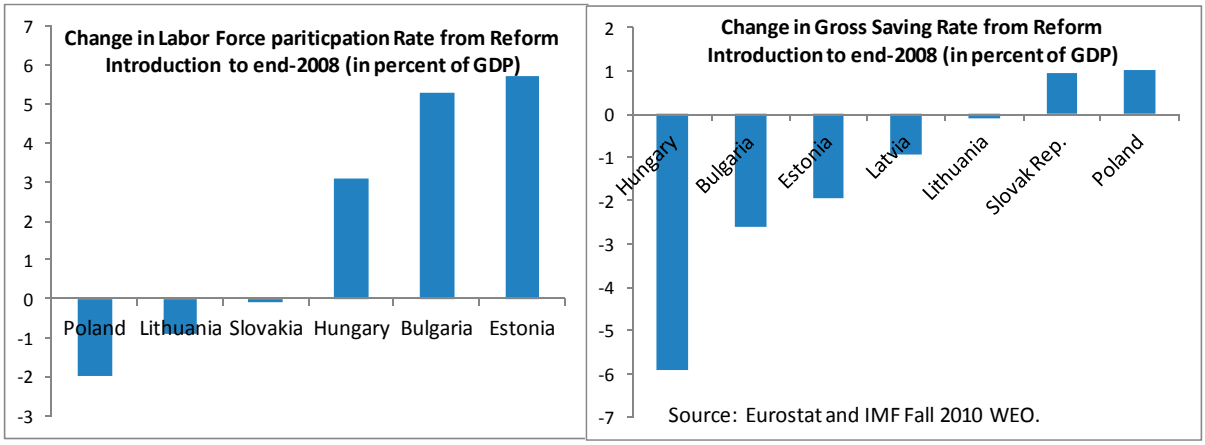


Select CEE Countries: Contributions to Finite-Horizon Intertemporal Net Worth
(In percent of GDP)

	Finite-Horizon Intertemporal Net Worth	Current Net Worth Contribution	MT Primary Adjustment Contribution	LT Aging Costs Contribution
Hungary	43	-59	153	-51
Bulgaria	0	8	54	-62
Latvia	-20	-7	38	-50
Poland	-72	-22	-44	-5
Estonia	-200	29	-226	-3
Slovak Rep.	-243	-1	-109	-133
Lithuania	-250	0	-156	-94
Romania	-252	-11	-51	-190
Euro Area avg.	-233	-33	-57	-143

Source: Velculescu (2010), and IMF staff estimates. Data from Spring 2010 IMF WEO.

9. **As to the expected benefits of introducing private second pillar systems, the CEE countries have yet to fully experience them.** Labor force participation rates appear to have improved in most countries (except for Poland and Lithuania) since the introduction of private defined-contribution pension systems, though it is difficult to establish direct causality. At the same time, saving rates in most countries did not increase, except for Slovak Republic and Poland, with a large decline observed in Hungary. These mixed results reflects a still recent reform track record (with benefits expected to take decades to materialize), the relatively limited size of the pillar II (which limits incentives for greater labor force participation), and countries' choice to finance resulting gaps by debt issuance (which largely offsets the rise in private savings associated with private pre-funding). Furthermore, in the CEE, the rapid expansion of the banking sector concurrently with the private pension sector may have partially obscured the effects of pension funds on financial markets, which may become clearer looking forward, as bank activity is expected to moderate. Still, a more recent paper (Hryckiewicz, 2009) finds some supporting evidence for positive effects of pension reform in CEE countries on stock market capitalization and activity.



Sources: Eurostat; and Fall 2010 IMF WEO.

10. **Nevertheless, such benefits could be important, provided that other policies appropriately support the functioning of the private pension system**. The international cross-country evidence on the macroeconomic benefits of private pensions is mixed (a World Bank study, 2006, concludes that such benefits "remain largely unrealized"). But this should not be interpreted as definite evidence against private pension systems, given the inherent limitations of such cross-country studies, which often rely on relatively short time series, include a wide variety of reform types and initial conditions, and are subject to econometric difficulties with separating the effects of pension reforms from other factors. Moreover, reform implementation, including design issues and supporting policies (such as fiscal policies, but also regulatory and supervisory frameworks), are key in influencing the effects of pension systems, though they are difficult to capture in such studies. In contrast, several case studies on Chile—which represents the longest reform implementation, also complemented by fiscal consolidation and an appropriate regulatory framework—document empirically significant and positive effects of the introduction of the private pension system on growth through higher saving and effects on capital markets. Moreover, additional studies provide some support for the microeconomic benefits of private pension systems for capital market development (see Box 1). This evidence suggests that, if accompanied by supportive fiscal and regulatory policies, pension reforms can have important long-run benefits.

Box 1. Private Pillar II Systems and Capital Market Development

Private, fully-funded pillar II pension systems have been expected to improve the efficiency of saving and investment decisions, including through deepening capital markets. Several main outcomes have been identified in the theoretical literature (see Davis, 1998 and Iglesias, 2007). While the cross-country empirical evidence on overall effects remains mixed, some studies provide support in favor of specific outcomes:

- ***A larger size of the capital market***: Funded pension systems may lead to an increase in personal savings, especially if there are liquidity constraints that do not allow individuals to borrow against future pensions (Corsetti and Schmidt-Hebbel, 1997, Poterba et al 1996, World Bank, 1993). This has an impact on the volume of savings intermediated through capital markets—even in the absence of an increase in national saving—leading to higher trading and demand for long-term financial instruments (for empirical evidence, see Impavido and Musalem, 2000; Hryckiewicz, 2009). If not offset by larger fiscal deficits, national saving and investment could also rise, with beneficial effects on growth, as documented empirically for Chile (Holzmann, 1997, and Corbo and Schmidt-Hebbel, 2003).

- ***Improvements in regulation and transparency of capital markets***: Pension funds' demand for financial instruments can help drive investor protection regulations. Moreover, the quality and timeliness of information available to investors is likely to improve as demand from pension funds rises and as requirements imposed by pension funds are higher; the creation of risk-rating systems also improves transparency (see empirical evidence provided in Walker and Lefort, 2002).

- ***Better corporate governance practices***: Higher demand and more stringent requirements by pension funds may serve to improve regulations aimed at minimizing conflict on interest risk and strengthening rights of minority shareholders (see Blake and Orszag, 1998, Iglesias 2000, del Guercio and Hawkins, 1999).

- ***Improvements in financial innovation:*** The significant size of investments by pension funds could lead to the development of institutions, such as custodians, clearing mechanisms, electronic trading platforms. Moreover, risk diversification and hedging requirements by pension funds could lead to the development of junior markets, corporate bonds, indexed instruments, and index futures (see Bodie, 1990).

- ***Lower cost of capital and security-price volatility***: The higher risk tolerance and longer investment horizon of pension funds (relative to individual investors or banks) implies that, even if total savings do not increase, term and risk premia would fall, lowering the cost of capital (Walker and Lefort 2002).

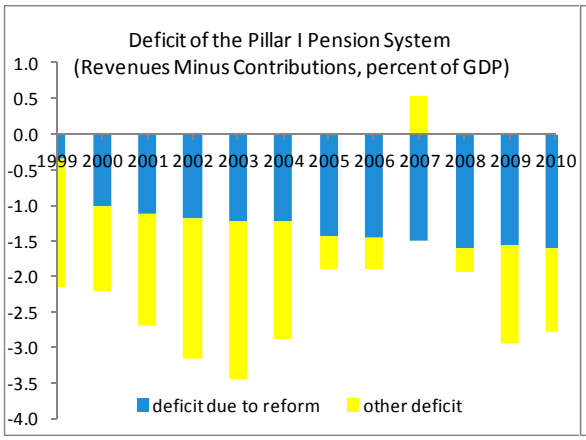
- ***Higher quality of investment decisions and increased financial integration***: As private pension funds hold a greater proportion of longer-term assets, they can better pool and diversify risks across assets, have access to better information relative to individuals, and could diversify portfolios internationally, leading to greater financial market integration.

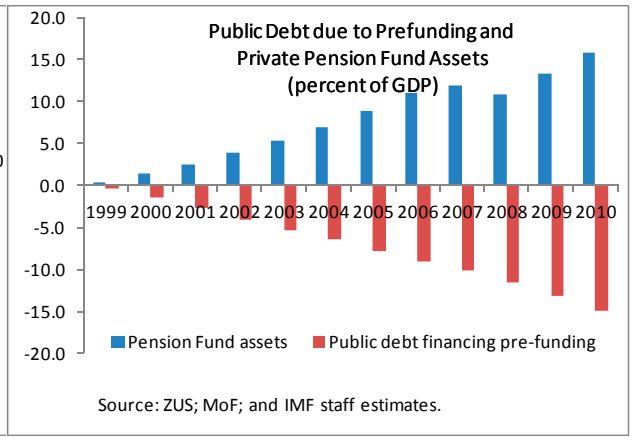
Nevertheless, private pension funds may also have side effects, including disintermediation that could lead to more risk-taking by banks, short-term and herding behavior that may exacerbate volatility at times of high financial stress, and neglect of small firms in favor of investments in large companies. There are also important preconditions for pension reform—such as a strong regulatory framework, a sound banking sector, a strong insurance sector, and sound macroeconomic policies—which, together with flexibility of investment decisions, are crucial in reinforcing the pension funds' beneficial effects on capital market development.

C. Fiscal Implications of Pre-Funding Future Liabilities: The Case of Poland

11. **At the time of the implementation of private pension systems in the CEE, reform costs were expected to be significant but manageable.** Lindeman et. al. (2000) estimated that in European and Central Asian reform countries, a second pillar financed by a contribution rate of 8 percent of gross wage would require resources equal to around 1–3 percent of GDP during the initial years of reform, depending on workforce coverage. Given that amounts of this magnitude were unlikely to be fully covered with offsetting adjustments in the PAYG pension system, some debt financing, additional fiscal consolidation, and recourse to privatization were considered to be required during the transition. Raising contribution rates was not advised, given the potentially negative consequences on labor markets. Still, expected benefits of reform were thought to outweigh the costs over the long run, with projected improvements in the labor market thought to be key in helping to bridge the temporary gap resulting from pre-funding of future liabilities.

12. **Looking at the case of Poland, pre-funding of future liabilities has had a fiscal cost of 1-2 percent of GDP per year over the past decade.** Information on actual and projected reform costs for individual countries in not readily available. Nevertheless, looking at Poland, which has one of the longest and most comprehensive reform records in the CEE, provides a useful benchmark. In Poland, the overall pension contribution rate remained unchanged at 19.5 percent of wages after the reform, of which 7.3 percent of wages was diverted to the private pillar II system. The gap arising from lower contributions available to finance an unchanged level of current benefits in the public pay-as-you-go system amounted to about 1.5–2 percent of GDP between 2000 and 2010. In 2009 and 2010, it accounted for about half of the yearly gap between social revenues and expenditures of the public pension system.



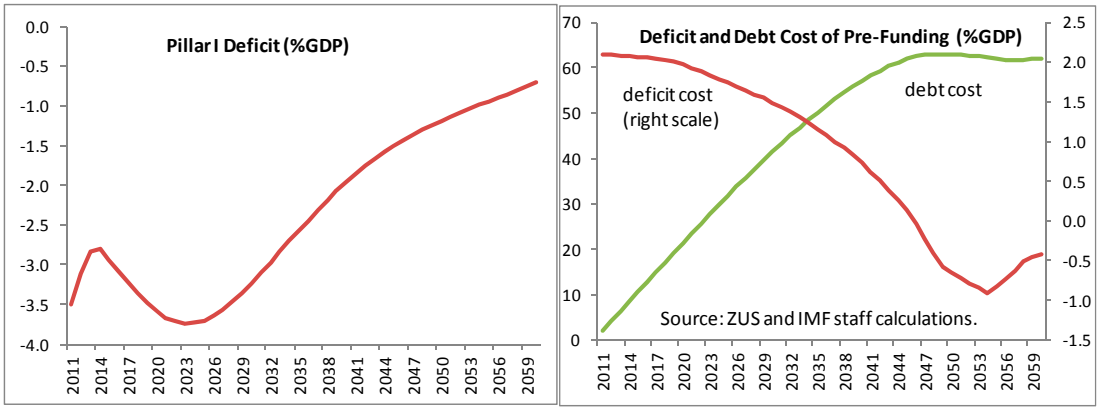


Source: Poland Ministry of Finance.

13. **Financing the pre-funding of future liabilities by debt accumulation implied an accrued total cost of about 15 percent of GDP at end-2010.** Despite original intentions to use privatization receipts and other fiscal measures, as needed, the cost of pre-funding future liabilities in the private pillar II pension system was entirely financed through the issuance of public debt. Such debt was largely bought by the pension funds themselves. As result, the true cost of prefunding is comprised not only of the yearly loss in revenue discussed above,

but also of the interest paid on the debt issued to finance it. Compounding these yearly costs (at an average interest rate on 2 and 5 year treasury bonds) implies that the total pension debt accumulated as a result of debt-financed prefunding amounted to about 15 percent of GDP at end-2010, or almost 1/3rd of Poland' total public debt. At the same time, the assets accumulated in the private pension funds amounted to around 16 percent of GDP by end-2010, suggesting that, on net, private saving has been roughly offset by public dis-saving.

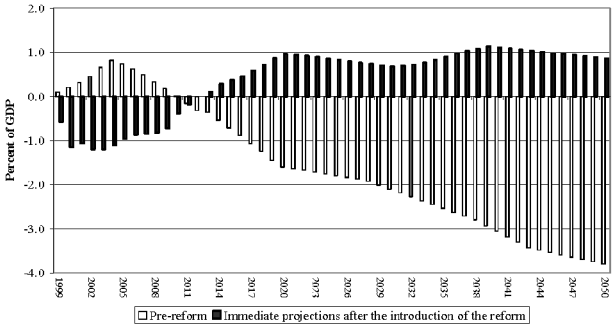
14. **Looking forward, debt-financed pre-funding is expected to continue to add about 1.5-2 percent of GDP per year to the deficit over the next two decades and about 60 percent of GDP to debt by 2060.** Official projections by the state management agency of the public pension system (ZUS) show that the pillar I system is expected to remain in deficit until 2060 (these projections do not include the recently introduced changes to the pension system). As explained earlier, part of this deficit is due to the loss of the contributions that now pre-fund future pensions under pillar II. Simulating a full elimination of pre-funding as of 2011 results in a significant deficit reduction over the next two decades compared to no change to the original system, as more contribution revenues come in while benefit payments initially remain unchanged, though they eventually rise (see Box 2). This exercise illustrates that the costs of pre-funding can be significant and long lasting. Moreover, these costs add not only to the deficit, but, to the extent that they are debt-financed, also to debt and interest payments. The total cost of debt-financed pre-funding for Poland projected to amount to about 60 percent of GDP during 2011–60 (a 1 percent interest-growth differential is assumed over the projection horizon). In a similar vein, Kempa (2010) finds a total cost of pre-funding of about 75 percent of GDP for 2011–60. These cost estimates constitute an upper bound, as they assume full debt financing going forward and abstract from potentially beneficial effects of the prefunding on labor markets and growth.



Sources: Poland MoF, ZUZ; and IMF staff calculations

Figure 1. Poland: The Fiscal Impact of the 1999 Pension Reform:
(The balance of the state-managed part of the pension system relative to GDP)

15. **These costs are much larger than anticipated by the authorities at the time of the implementation of the pension reform in Poland.** Projections done at that time of the reform showed a relatively small and transitory deficit in the state-managed pillar I system of



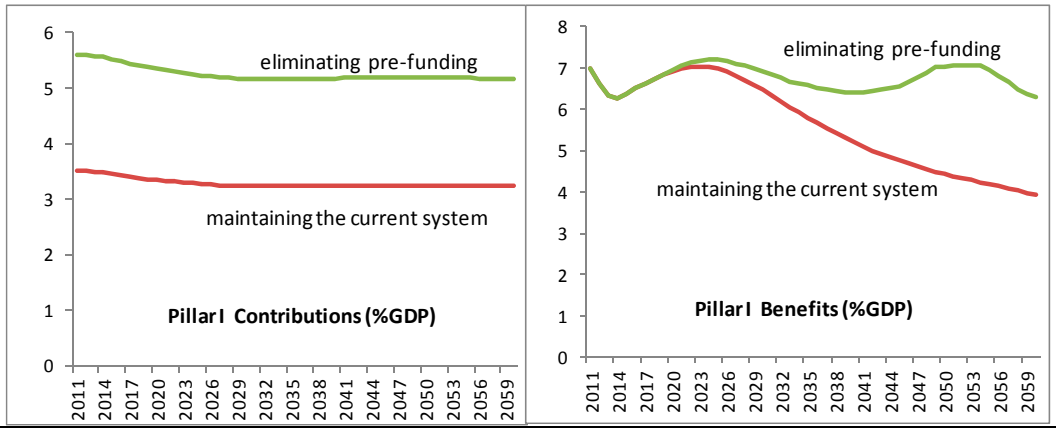
0–1 percent of GDP between 1999 and 2012, turning into a surplus thereafter. This gap was expected to be covered by using privatization revenues and, if needed, other fiscal measures that would be required to maintain the general government deficit below the Maastricht limit of 3 percent of GDP. These projections were based on optimistic macroeconomic assumptions and somewhat lower enrollment in the 2nd pillar compared to the actual outcome. Moreover, long-run projections assumed an increase in labor force participation of some 20 percent and an average long-run real growth rate of 3.5 percent, despite a significant aging of the population by 2060.[6] In contrast, long-run growth estimated by the European Commission (2009 Sustainability Report) is projected to gradually fall to 0.5 percent by 2060.

Box 2. Estimating the Future Fiscal Costs of Pre-Funding Pension Liabilities in Poland

Estimating the future cost of prefunding pension liabilities in Poland requires conducting a counterfactual thought experiment whereby prefunding is stopped starting with 2011. This experiment abstracts from any macroeconomic effects on labor and capital markets, and can be thought of as a partial equilibrium analysis focusing solely on the pension system (official baseline ZUS projections on the pillar I pension system are used). Under this scenario:

- **Contribution revenues would rise immediately and permanently** by an amount proportional to the ratio of the contribution rates in the two systems. Official ZUS projections (baseline scenario) for the number of contributors and amount of contributions are used. The contribution rate is 12.2 percent to pillar I and 7.3 percent to pillar II.

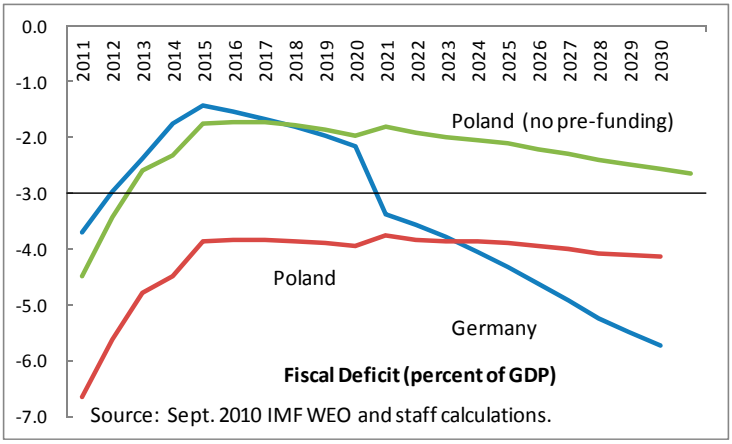
- **Benefit payments would rise later**, once the oldest cohorts that are now covered by the pillar II system reach the legal retirement age (currently 65 for men and 60 for women in Poland). Estimating the extra benefit payments depends on a number of assumptions: notional accounts are assumed to grow at the growth rate of the tax base and indexed at the inflation rate once retirement age is reached; individuals are assumed to enter the system at age 20, retire at age 65, and die at age 80; official ZUS projections are used for the rate of growth of nominal wages, inflation, and the growth rate of the contributor base; the age structure of contributors under pillar II is taken from reports by KNF.



[6] See Chlon et. al. (1999), and Góra and Rutkowski (2000), Hausner (2000), Szekeli (2006).

D. Tensions Between Reforms and SGP Rules, and Possible Ways Forward

16. **Pre-funding costs will make it more difficult for pension reformers to comply with existing SGP rules.** As shown in the previous section, pre-funding future liabilities financed through debt issuance has a significant cost that is expected to add to the deficit for decades. With public finances already weakened as a result of the global crisis, countries that have pre-funded their future pension liabilities and hence bear an additional fiscal cost, will find it increasingly hard to comply with the Maastricht limits. This is in contrast with countries that have not pre-funded pension liabilities, whose deficit and/or explicit debt are currently manageable, though projected to deteriorate significantly on current policies in the long run, as a result of aging pressures.



17. **This problem was recognized in the early 2000s, when a temporary attempt was made to reconcile pension reforms and SGP rules.** An early literature pointed to tensions between pension pre-funding and SGP rules, noting that the SGP fiscal limits stand in the way of welfare-improving shifts to private prefunding (Tabellini, 2002, Razin and Sadka, 2002, Jaeger, 2003). At that time, the European Commission allowed countries that implemented second-pillar pension reforms to adapt their fiscal policies to national accounting rules on a sliding scale for the first five years after the reforms. This implied a gradual recognition of reform costs over time, with full exclusion of costs from deficits and debt in the first year, and full inclusion in the 5th year. Moreover, flexibility was allowed in defining MTOs to take into account country-specific circumstances, including differences in aging costs are a result of pension reforms.

18. **But past temporary fixes were not sufficient: SGP rules still don't provide a level-playing field between reformers and non-reformers.** The Maastricht limits for debt and deficits continue to be applied uniformly. As such, they do not adequately reflect the prolonged costs of reform, which, as shown earlier, last for decades rather than just a few years, effectively creating a non-level playing field between reformers and non-reformers. Moreover, while MTOs are allowed to take into account long-run aging costs, they are not fully aligned with such costs and, more importantly, are not binding.

19. **As a result, CEE reform countries have recently petitioned the EC for a more permanent and comprehensive solution.** In mid-2010, eight CEE reforming countries and Sweden signed a petition requesting a full adjustment of the SGP limits to account for the impact of pension reforms. This solution was thought to be fairly easy to implement and to result in a level playing field between reformers and non-reformers. In response, the European Council indicated its willingness to allow for limited flexibility when assessing the

case for an EDP for reforming countries under strengthened SGP rules. In particular, if the deficit does not significantly exceed the 3 percent-of-GDP limit (and the excess is due entirely to pension reform costs), and debt is below 60 percent of GDP, an EDP would not be initiated.

20. **In this context, CEE countries have stopped or reduced contributions to their pillar II pension systems in an effort to reign in fiscal deficits.** So far, six New Member States decided to reduce pre-funding by diverting pension contributions from their private to the public pension system to help bridge the shortfall in their fiscal revenues. Among these were Lithuania, Latvia, Romania, and Estonia, which temporarily lowered their contributions to their private pillar pension systems in 2008–09 mainly in response to sharp recessions, and in conjunction with significant fiscal consolidation. Some of these countries have indicated that pillar II systems will be compensated for the temporary loss of resources. At the other extreme, at end-2010 and well into the recovery, Hungary diverted all contributions to the pillar I pension system providing strong incentives for pensioners to also move their pension assets to the public system (lest they would be taxed at a significantly higher rate compared to others), in an effort to increase its fiscal space and in conjunction with other expansionary fiscal measures. More recently, Poland followed suit with a permanent reduction in contributions to its private pension system starting in May 2011, aiming to help lower its fiscal deficit—which rose to 8 percent of GDP at end-2010—toward the Maastricht limit agreed with European partners.

Recent Measures Affecting the Private Pillar II Pension System

Hungary	Diverted all contributions to pillar I and made pillar II system voluntary. Provided incentives for contributors to switch accumulated assets to the first pillar.
Poland	Reduced contributions from 7.3 to 2.3 percent of wages starting in May 2011, to be gradually raised to 3.5 percent by 2017.
Latvia	Reduced contribution rates from 10 to 2 percent of wages temporarily.
Bulgaria	Frozen contribution rate for the II pension pillar at 5 percent for the period 2007-2014. In 2017, an increase to 7 percent is planned.
Estonia	Suspended contribution rates (4 percent) temporarily.
Lithuania	Reduced contribution rates from 5.5 to 2 percent temporarily.
Slovakia	N/A
Romania	Froze contribution rates to pillar II at 2 percent temporarily.

Source: IMF Reports and National Authorities.

21. **If made permanent, these actions could entail risks.** Temporary freezes in contributions to the private pillar, combined with significant fiscal consolidation, have proven to be a pragmatic solution for a number of Baltic countries, which were facing deep recessions in 2009.[7] However, permanent changes could be risky, to the extent that they postpone needed fiscal adjustment and weaken credibility in fiscal policies. In Hungary, for instance, the pension "reform" created a false sense of additional fiscal space, which allowed the implementation of tax cuts that are undesirable and could have otherwise been avoided. In Poland, risks relate to potentially reduced incentives to undertake other reforms required to strengthen public finances, as well as to weakened credibility in fiscal policies. Finally, if pillar II systems are permanently dismantled or significantly diminished, their potentially important benefits in terms of labor market incentives, risk diversification, capital market development, and ultimately growth, would be forgone.

22. **As such, countries would be well advised to preserve their private pension systems and support them with appropriate policies**.[8] Such private systems are by design fiscally sustainable, expected to help to diversify risks and increase income support in old age, and potentially lead to other macroeconomic benefits, as noted earlier in the paper. Consequently, countries should strive to maintain them, while strengthening and complementing them with policies that improve their efficiency and allow their long-run benefits to fully materialize:

- ***Pre-funding future liabilities will need to shift from full debt financing to a combination of fiscal consolidation measures and debt issuance***, with the share of the two depending on available fiscal space. This will be essential to contain reform costs going forward, which will otherwise put increasing pressure on deficits and explicit debt, even as implicit liabilities are reduced over the long run.[9] As Cuevas et. al (2008) document empirically, markets do not give much weight to implicit liabilities, and hence full debt financing of reform costs can adversely affect a sovereign's perceived creditworthiness, increasing its risk premium. As such, also accompanying pension reform with efforts to offset its transition cost through fiscal adjustment would help preserve credit ratings. In addition, such a strategy would also help achieve inter-generational burden sharing of reform costs and facilitate an eventual increase in the national saving rate. But pillar II pension systems would need to receive a sufficient share of contributions to ensure that they can deliver expected benefits while maintaining long-run viability.

- ***Pension fund regulations and supervision need to be strengthened*** to ensure that fees and administrative costs are contained, while investments can be diversified and life-cycle portfolios developed. Moreover, countries should develop solutions for the decumulation phase and improve risk sharing arrangements for longevity and

[7] Orszag and Orszag (2000) note that prefunding is similar to an investment that entails some cost, while offering a long-run benefit. Given uncertainty surrounding estimates of pension costs and the reforms' long-run benefits, flexibility in funding would be preferable.

[8] Also see Antolin and Steward (2009).

[9] Other options to offset transition costs include use of privatization receipts.

inflation risk (see, for example, Impavido et al, 2008).

23. **At the same time, policies at the EU level would need to be revisited, including by putting more emphasis on comprehensive forward-looking fiscal indicators**. Traditional fiscal indicators focusing on deficits and explicit debt—on which Maastricht limits are currently based—offer only a partial picture of public finances at a particular point in time and do not take into account future fiscal developments. As a result, they do not distinguish between countries whose long-run positions have been made more sustainable by pension reforms and others. In contrast, already existing but still largely unexploited forward-looking comprehensive indicators reflect not only the effects of part and current policies on countries' current fiscal positions, but also the implications of such policies for future public finances. Such future considerations can be important, especially in the context of large fiscal costs associated with expected population aging. Examples of forward-looking indicators include the EC's S1 and S2 sustainability indicators, which quantify the required permanent fiscal adjustment needed to restore fiscal sustainability, and the measures of intertemporal net worth developed at the Fund, which measure the sustainability gaps faced by countries under unchanged policies.[10]

24. **Use of long-run fiscal indicators would enhance transparency, strengthen SGP rules, and improve policy-making decisions.** The proposal to adjust deficits and debt to account for reform costs for EDP purposes further limits fiscal transparency by excluding certain elements from already myopic fiscal measures, thus weakening fiscal standards. In contrast, using comprehensive forward-looking fiscal indicators within the SGP framework enhances fiscal transparency by providing additional information on future implicit pension liabilities. Moreover, this approach would also strengthen the framework by adding a dimension of theoretically-grounded limits that are based on sustainability concepts. On the downside, this may be somewhat complicated to implement in practice, as such measures are based on assumptions and projections of uncertain future aging costs.[11] Moreover, there is a debate on how to treat future pension liabilities, which do not constitute legal contractual obligations. Still, providing information on both current and future obligations for policymakers, the public, and markets, would clearly help with formulating and gathering support for policies that have long-run benefits.[12]

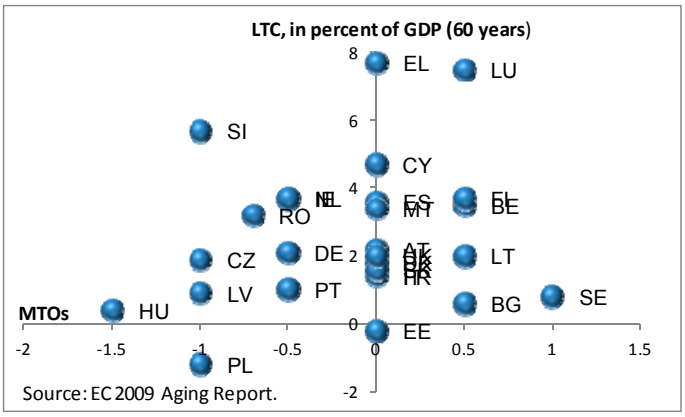
25. **How could such an approach be operationalized?** This could be done by building on the existing SGP framework, but re-focusing it on countries' Medium-Term Objectives (MTOs). These objectives have the advantage that they are forward looking, targeting the fiscal structural balance over the medium term. They are also country-specific and designed to take into account, to a certain extent, individual countries' differing long-run aging costs. However, they are not strictly aligned with comprehensive fiscal indicators and remain non-binding under the current framework (text chart). Hence, in a first step, MTOs should be

[10] See European Commission (2009) and Velculescu (2010).

[11] Also see Franco et. al. (2005).

[12] Perhaps a reason why Cuevas et. al (2008) did not find evidence that implicit liabilities affect sovereign credit ratings is precisely because such forward-looking fiscal indicators that include implicit liabilities have not been widely published and discussed.

more closely aligned with long-term aging costs, such as the "LTC" component of the S1 and S2 indicators, which, under a finite horizon, currently ranges between -1 percent of GDP (Poland) and close to 8 percent of GDP (for Greece and Luxembourg).[13] Second, the Maastricht deficit (and debt) limits could still be maintained as triggers for entry into and exit from the EDP. But once in the EDP, countries would need to prepare five-year ahead fiscal plans aiming to attain their strengthened MTOs. This will help to level the playing field between reformers and non-reformers, as medium-term adjustment needs will reflect differing long-run requirements. The speed of adjustment would need to be agreed with EU partners based on cyclical conditions and debt dynamics. Adjustment progress would continue to be reviewed yearly, and fiscal projections and adjustment needs would also need to be updated on a yearly basis to take into account new information.



E. Conclusions

26. **Several CEE countries have been backtracking on the funding of their private second pillar pension systems in an effort to curtail fiscal deficits.** In the early 2000s, in response to expected aging pressures, eight CEE countries reformed their pension systems by introducing a private pre-funded pension pillar as a complement to their public pension system. But, as public finances deteriorated during the recent economic downturn, six of the eight reforming countries decided to reduce or suspend pre-funding by diverting pension contributions from their private to the public pension system to help bridge the shortfall in their fiscal revenues. Some countries did so early during the crisis and in conjunction with significant fiscal consolidation. Others, however, have sought to permanently reduce or eliminate contributions to the private pension system well into the recovery. Among the latter, Poland implemented a permanent reduction in contributions to the private pension system as a complement to its fiscal consolidation plan. Hungary, however, eliminated mandatory contributions to the private system, as well as introduced incentives for individuals to transfer their private pension assets into the public system while cutting taxes.

27. **These actions are in part a response to the large fiscal costs of prefunding pension liabilities.** The introduction of a private pillar II pension system that pre-funded future pension liabilities using part of total pension contributions led to a deficit in the public pay-as-you go first pillar, which was financed by debt issuance. As a result of these reforms, and in the absence of offsetting fiscal consolidation measures, overall deficits rose—to the

[13] These estimates are as of 2009 and do not include pension measures undertaken since then, such as the pension reforms recently taken in Greece.

tune of an additional 1.5–2 percent of GDP per year in Poland—leading to significant increases in public debt (of about 15 percent of GDP for Poland). With public finances already weakened due to the economic downturn, reform costs are now perceived as an unduly high burden to bear, given that debt and deficit limits are approaching, and in some cases exceeding, Maastricht limits. Furthermore, such costs are likely to continue to add to deficits and public debt for decades, making it harder for countries that have pre-funded their future pension liabilities to stay within the limits agreed with EU partners relative to countries that have not pre-funded pension liabilities. In effect, the current SGP framework is seen as "punishing" reformers relative to non-reformers, and potential financial sanctions now under consideration at the EU level will only exacerbate this problem for euro-area countries.

28. **At the same time, countries have not yet fully experienced the benefits of introducing private pre-funded pension systems.** When pension reforms were first introduced, countries expected significant benefits in terms of increased labor participation, higher saving rates, and faster capital market development. However, these anticipated improvements have not yet fully materialized. In part, this outcome reflects a still recent reform track record (with benefits expected to take decades to materialize), the relatively limited size of the pillar II (which limits incentives for greater labor force participation), and the choice to finance resulting gaps by debt issuance (which largely offset the rise in private savings). This suggests that more time will be needed to assess the full impact of the reforms. Indeed, the literature focusing on individual case studies such as Chile—where reforms have lasted longer and have been implemented more extensively and in conjunction with other supporting policies—demonstrates that private pension systems can have significant and positive benefits, albeit several years after implementation and in conjunction with fiscal adjustment.

29. **While temporary changes to pre-funding of pension liabilities may be justified on crisis-related grounds, permanent actions entail risks.** Temporary freezes in contributions to the private pillar, combined with significant fiscal consolidation, have proven to be a pragmatic solution for a number of Baltic countries, which were facing deep recessions in 2009. However, permanent changes could be risky, to the extent that they postpone needed fiscal adjustment and affect credibility in fiscal policies. In Hungary, for instance, the recent pension "un-reform" created a false sense of additional fiscal space, which allowed the implementation of tax cuts that could have otherwise been avoided. In Poland, risks relate to reduced incentives to undertake other reforms required to strengthen public finances, as illustrated by the decision to postpone limiting uniformed personnel and disability benefits, two important long-run measures.

30. **Consequently, CEE countries would be better served by preserving their private pension systems while aiming to enhance their benefits.** Given that such private systems are by design fiscally sustainable and expected to help to diversify risks and increase income support in old age, they need to be strengthened and supported with appropriate policies. First, prefunding future liabilities will need to shift from full debt financing to a combination of fiscal consolidation measures and debt issuance, with the share of the two depending on available fiscal space. This will contain reform costs going forward, help achieve inter-generational burden sharing, and facilitate an increase in the national saving rate. But pillar II

pension systems would need to receive a sufficient share of contributions to ensure that they can deliver expected benefits while maintaining long-run viability. Third, pension fund regulations and supervision need to be revisited in a number of countries, to ensure that fees and administrative costs are contained, while investments can be diversified and life-cycle portfolios developed.

31. **At the same time, EU rules need to be revisited to ensure a level playing field.** Policy-making decisions under existing national and international frameworks, including at the EU level, continue to be based on traditional indicators of deficit and debt. These are becoming inadequate, as they offer only a partial picture of public finances at a particular point in time and do not take into account the implications of current policies for future public finances. As a result, they do not distinguish between countries whose long-run positions are sustainable due to pension reforms, and others. Solutions that focus on temporarily adjusting these indicators to exclude pension reform costs for EDP purposes only serve to further lower fiscal standards. Instead, a more appropriate solution would be to aim to increase transparency, while maintaining fiscal standards that are grounded in fiscal sustainability concepts. This could be achieved by building on the country-specific MTOs already defined under the SGP framework and linking them more directly with long-run forward-looking indicators that reflect aging costs.

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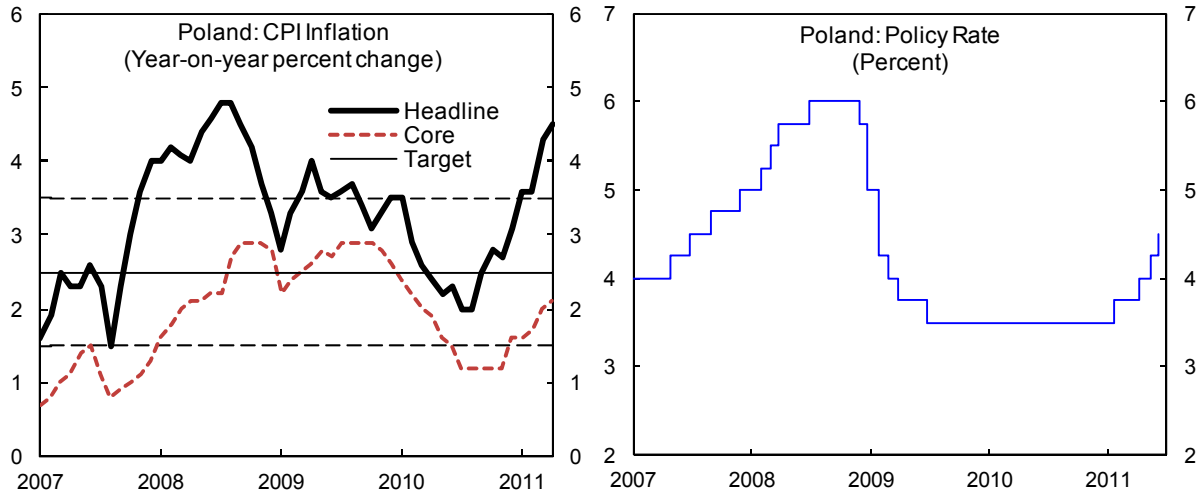
II. Inflation Forecasting in Poland: A Global Projection Model Approach[1]

A. Introduction

1. **Poland's inflation rate is on the rise.** Since hitting a low of 2 percent in mid-2010, Poland's headline CPI inflation has steadily increased, reaching 4.5 percent in April-2011, well above the National Bank of Poland's (NBP) 2½ percent target and higher than the upper bound of its 1½-3½ percent tolerance range. Inflation has been driven primarily by higher commodity prices, albeit core inflation (excluding food and energy) has been rising in recent months. In response to higher inflationary pressures, and following an 18-month period of unchanged policy rate, the NBP has hiked the policy rate since January-2011 by a cumulative 1 percentage point to 4½ percent.



2. **Inflation is expected to remain above its target over the next 18–24 months, but large uncertainty surrounds the outlook.** Improving labor market conditions and tightening capacity constraints are expected to boost core inflation in the coming months. Still, as Poland's domestic-demand led recovery remains solid, downside external risks loom large, not least because of lingering vulnerabilities in the Euro Zone. According to the latest NBP's Inflation Report (March 2011), the central bank expects headline inflation to remain above its target in 2011–12.[2] The authorities are watching developments in inflation expectations, core inflation, the exchange rate, and the possibility of second round effects from higher commodity prices to help determine the appropriate pace and size of interest rate tightening.

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[1] Prepared by Natan Epstein, with research assistance from David Velazquez-Romero.

[2] The central bank's baseline forecast is primarily based on the NBP's NECMOD model, a traditional large macroeconomic model. The published baseline projection assumes either unchanged policy interest rate, or a path for the policy rate implicit in the term structure of market interest rates (e.g., forward rates). While the NBP has recently begun to work with a DSGE model, the predominant input to the discussion over the policy rate comes from the NECMOD model.

3. **How much tightening will be required to bring Poland's inflation back to target?** To answer this question, we seek a simple projection model where key forecast variables—e.g., output, inflation, and the policy rate—are jointly determined. This endogenous interaction can help gauge the extent to which the NBP would need to raise the policy rate in order to bring inflation back to target over the policy horizon (1824 months). Given the uncertain outlook, it is important that the model is sufficiently small so as to enable a coherent assessment of risks around the central scenario. Indeed, central banks around the world, particularly with inflation targeting mandates, are increasingly seeking a consistent approach to forecasting and policy analysis. By virtue of their relatively simple and readily understandable structure, small quarterly projection models have become an integral part of the toolkit of models used for forecasting and policy analysis in a number of advanced and emerging markets central banks. Today, six in ten inflation-targeting central banks employ such models in preparing baseline forecasts.

4. **This paper applies the Global Projection Model (GPM) to prepare baseline inflation forecast and risk assessment for Poland.** As a small quarterly projection model, the GPM has two key advantages: (i) it produces an endogenous path for the policy rate and (ii) it is built on a multi-country structure, which makes it particularly suitable for analysis of global shocks. Moreover, the GPM is both relatively easy to implement for modelers and comprehensible to policy makers. The model has been found to be very useful in supporting policy analysis for inflation-targeting regimes like Poland's, where the principal objective is to provide anchors for inflation and inflation expectations.

5. **The paper is organized as follows.** Section B describes the key features of the GPM framework. Section C discusses the model estimation results. Section D presents the baseline forecast for headline inflation and other key aggregates of the Polish economy and depicts an illustrative risk assessment on sources of uncertainty underlying the baseline forecast. Section E concludes**.**

B. The Model

6. **Similar to the IMF's Forecasting and Policy Analysis System (FPAS),[3] the GPM is a small open-economy projection model.** However, while the FPAS is based on a two-country model, the GPM is a multi-country framework, where the domestic economy is modeled together with much of the entire global economy. As with the FPAS, the key forecast variables in the GPM are endogenously determined. The model is fundamentally a gap model, in which deviations of variables from their equilibrium values play a critical role in the functioning of the system. Thus, the model itself does not attempt to explain movements in equilibrium real output, real exchange rate, or the real interest rate; rather, these are taken as given. The model's parameters are fully estimated with Bayesian methods.

[3] See Berg, Karam, and Laxton (2006) for an overview of the FPAS, and Epstein and others (2006) for an application of the FPAS to inflation forecasting in Israel.

In addition to the behavioral equations underlying the model (see below), a number of definitions and identities are used to complete the framework (see Appendix I).[4]

7. **Poland is modeled together with a large group of advanced and emerging market countries (GPM6).** This group of economies represents the external sector for Poland and includes the U.S., Euro Zone, Japan, Emerging Asia, Latin America, and a sub-group of other advanced and emerging market countries (see Appendix II for the full list of GPM6 countries). GPM6 accounts for about 85 percent of world GDP and roughly 95 percent of Poland's exports. In the model specification below, Poland is labeled as country$i$, while its foreign counterpart (within GPM6) as country$j$.

The model has five core behavioral equations that are endogenously determined

8. **Equation 1 is an aggregate demand equation,** which relates the domestic output gap with its own lead and lagged values; the lagged value of the gap in the short-term real interest rate (i.e. the difference between short-term real interest rate and its equilibrium value); the output gaps in the rest of the world (GPM6), weighted by trade shares; the real effective exchange rate gap; and a disturbance term; i.e.,

$$y_{i,t} = \beta_{i,1} y_{i,t-1} + \beta_{i,2} y_{i,t+1} - \beta_{i,3} r_{i,t-1} + \beta_{i,4} \sum_j \omega_{i,j} z_{i,j,t-1} + \beta_{i,5} \sum_j \omega_{i,j,5} y_j + \varepsilon_{i,t}^{y} \qquad (1)$$

where y is output gap, r is the short-term real interest rate gap, z is the real exchange rate gap, $w_{i,j}$ are the share of exports of country$i$ to country$j$ in total exports of country i (to GPM6), and ε^{y} is a disturbance term. The own-lag term allows for inertia in the system and permits shock to have persistent effects. The lead term takes account of forward-looking dynamics in aggregate demand. The real interest rate and exchange rate terms provide the crucial links between monetary policy actions and the real economy. The foreign output gap term captures the direct trade links between Poland and GPM6.

9. **Equation 2 is an inflation equation,** which relates inflation to its past and future values; the lagged output gap; the change in the exchange rate (so as to capture the exchange rate pass-through); and a disturbance term; i.e.,

$$\pi_{i,t} = \lambda_{i,1} \pi 4_{i,t+4} + (1 - \lambda_{i,1}) \pi 4_{i,t-1} + \lambda_{i,2} y_{i,t-1} + \lambda_{i,3} \sum_j \omega_{i,j} \Delta Z_{i,j,t} - \varepsilon_{i,t}^{\pi} \qquad (2)$$

where $\pi 4$ is the annual, four quarter inflation rate, λ_1 is the relative weight on forward and backward looking elements of inflation, and ΔZ is defined as the change in the bilateral real exchange rate of currency i relative to currency$j$.

10. **Equation 3 is a policy rate reaction function,** a Taylor-type rule that sets the policy interest rate as a function of its own lag (a smoothing device for movements in short term interest rates); the central bank's responses to movements in the output gap and to deviations of the expected inflation rate from its target; and a disturbance term; i.e.,

[4] See also Kriljenko and others (2009), and Carabenciov and others (2008) for further discussion of these definitions and identities.

$$I_{i,t} = (1-\gamma_{i,1})\left[\bar{R}_{i,t} + \pi 4_{i,t+4} + \gamma_{i,2}\left(\pi 4_{i,t+3} - \pi^{tar}_{i,t+3}\right) + \gamma_{i,4} y_{i,t}\right] + \gamma_{i,1} I_{i,t-1} + \varepsilon^{I}_{i,t} \quad (3)$$

where I is the policy rate, $\bar{R}$ is the equilibrium short-term real interest rate, and π^{tar} is the inflation target, which enters the model endogenously.[5]

11. **Equation 4 is a version of the Uncovered Interest Parity (UIP) condition,** in which the difference between the real exchange rate of country i and its expected value one period ahead is equal to the difference between the real interest rate in country i and its counterpart in country f (U.S. in this model[6]) minus the corresponding difference in the equilibrium real interest rate; i.e.,

$$4\left(Z^{e}_{i,t+1} - Z_{i,t}\right) = \left(R_{i,t} - R_{f,t}\right) - \left(\bar{R}_{i,t} - \bar{R}_{f,t}\right) + \varepsilon^{Z-Z^{e}}_{i,t} \quad (4)$$

where Z is defined as the bilateral real exchange rate (zloty/USD in this model), and R and $\bar{R}$ are the short term real interest rate and equilibrium short term real interest rate, respectively. In this model, the UIP condition implies that if the real interest rate in Poland is greater than that in the U.S., it would reflect one of two possibilities (or a combination of the two): (a) either the zloty real exchange rate is expected to depreciate over the coming period (Z^{e} is higher than Z), or (b) the equilibrium real interest rates differ because of a risk premium on zloty denominated assets.

12. **Equation 5 is an unemployment gap equation.** It provides a dynamic version of the Okun's law, where the unemployment gap is a function of its lagged value; the contemporaneous output gap; and a disturbance term; i.e.,

$$u_{i,t} = \alpha_{i,1} u_{i,t-1} + \alpha_{i,2} y_{i,t} + \varepsilon^{u}_{i,t} \quad (5)$$

where u is the unemployment gap, defined as the difference between the unemployment rate and its equilibrium level (or NAIRU). Equation (5) does not play an important role in this model, as the unemployment gap does not feed directly into the other equations. The sole purpose of the unemployment gap equation in this model is to be able to say something about the unemployment rate conditional on the rest of the system, i.e., the output gap, and which allows the model to estimate an Okun's coefficient.[7]

13. **The model's parameters are estimated with Bayesian techniques.** Bayesian estimation provides a useful middle ground between classical empirical estimation, which tends to suffer from small sample size and simultaneity problems, and the calibration of

[5] Once the model is estimated, we enter the inflation target exogenously for forecasting purposes.

[6] In this model, exchange rates are based on cross rates vis-à-vis the US dollar. However, the model can be designed such that the cross-rates are based on the euro and, hence, the counterpart in the UIP condition would be the euro zone.

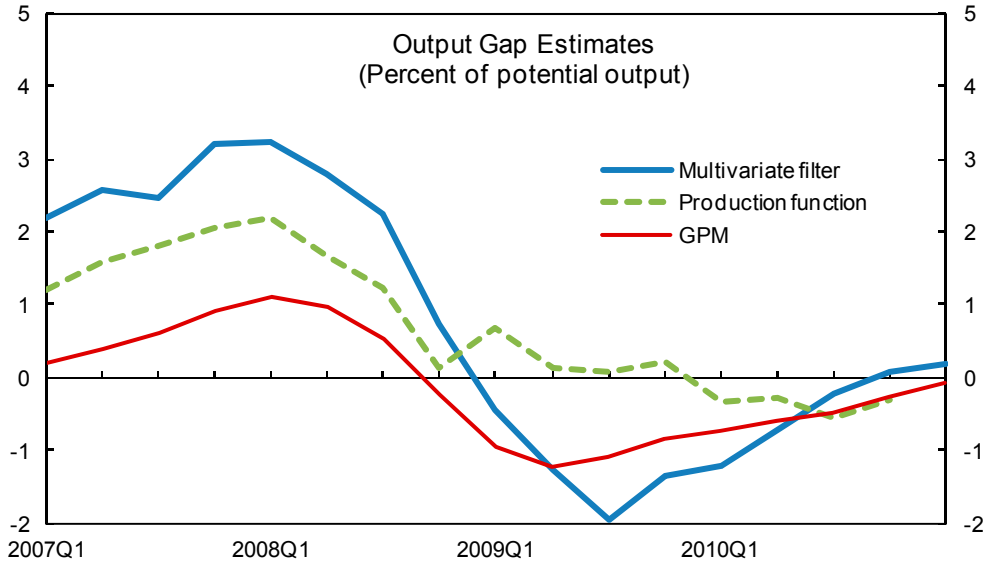
[7] Adding unemployment in DSGE models has been an area of difficulty, as there is no Phillips curve or IS curve type equation for unemployment which can be imported into GPM.

macro models, which are often criticized as representing no more than the modeler's judgment. Moreover, while theoretical underpinnings and expert knowledge of the functioning of the economy can help avoid incorrect empirical results, calibrated parameters may be inconsistent with the data. The Bayesian approach has the benefit of putting some weight on the priors of the researcher's judgment and some weight on the data over the sample period. In addition, by changing the specification of the tightness around the priors, e.g., by altering the assumed standard deviation, the researcher can change the relative weights on the priors vs. the data in determining the parameters' posterior distribution.[8]

C. Estimation Results

14. **The estimated parameters are presented in Appendix III.** These include the longer-run estimated steady-state values of output growth, real interest rate and the unemployment rate. For Poland, the steady-state priors are 4.0 percent for growth, 2.25 percent for the real interest rate, and 8.0 percent for the unemployment rate. The Bayesian estimation yielded very similar posterior modes.

15. **The model performs well against observed data of key aggregates.** For example, Figure 1 depicts Poland's model-estimated headline inflation rate, which closely tracks the actual headline inflation rate observed over the past decade. The estimated output gap and policy rate variables exhibit even stronger fit. The model-estimated output gap also tracks well other output gap estimates for Poland, including with a production function methodology and a multivariate filter approach.[9]



[8] See also Kriljenko and others (2009), and Carabenciov and others (2008).

[9] See Epstein and Macchiarelli (2010) for an application of the production function to estimating Poland's potential output, and Benes and N'Diaye (2004) for an application of the multivariate filter to the Czech Republic.

16. **The endogenous nature of the GPM allows for an examination of impulse response functions.** Given a large array of disturbance terms, the model generates a number of impulse response functions (IRFs), all of which demonstrate reasonable and expected patters. Figures 2 and 3 depict a sample of IRFs, reflecting one-period shocks to Poland's output gap and the policy interest rate, respectively. For example, a 1 percentage point positive shock to Poland's output gap would increase inflation by about 0.8 percent over the next 4 quarters, while the policy rate would be tightened by about 75 basis points over the same period (Figure 2). Similarly, a one-time increase in the policy rate by about 1 percentage point would lower inflation by 0.5 percent and the output gap by 0.3 percent over the next 4 quarters (Figure 3).

D. Baseline Forecast, Risk Assessment and Policy Communication

Baseline Projections

17. **Under an endogenous interest rate path, NBP's policy rate is projected to gradually increase.** We use the estimated model to conduct quarterly baseline projections for Poland's inflation, growth, output gap, unemployment rate, and the NBP's policy rate. Under the baseline scenario, the policy rate is expected to increase by about 50 basis points over the next 12 months. This would put the policy rate in the neutral range (based on an estimated equilibrium real rate of 2¼ percent plus the inflation target). Headline inflation is projected to continue to rise in the near term, peaking at close to 5 percent during the third quarter of 2011, and then declining back to within the tolerance range by the second quarter of next year. The output gap is expected to remain above zero over the next two years, while the unemployment rate is projected to decline to around 9 percent by end-2012. The appropriate magnitude and pace of tightening will depend on the evidence on capacity constraints, as well as developments in inflation expectations, labor markets, the exchange rate, and possible second-round effects from higher commodity prices.

Risk Assessment

18. **By conducting risk assessment on the central scenario, the model can serve to frame the policy discussion around the baseline forecast.** To ensure a coherent story, the model is particularly useful in evaluating risks to the baseline forecast and appropriate responses to a variety of shocks. A number of techniques are available to enable the model solution to be tuned to shocks so as to examine their impact on the baseline path. For illustration, below we apply two separate shocks: (i) a global output gap shock and (ii) a risk premium shock.

19. **If external demand from Poland's trading partners were to surprise on the downside, inflationary pressures in Poland would ease and the need for increases in the policy rate would diminish.** For illustration, we assume that, during the second quarter of 2011, the global (GPM6) output gap widens from the current minus 1½ percent to minus 2½ percent, and stays around that level over the next four quarters. As a result of this shock,

Figure 1. Poland: Estimated Inflation, Output Gap and Policy Rate 2004-11
(Percent)

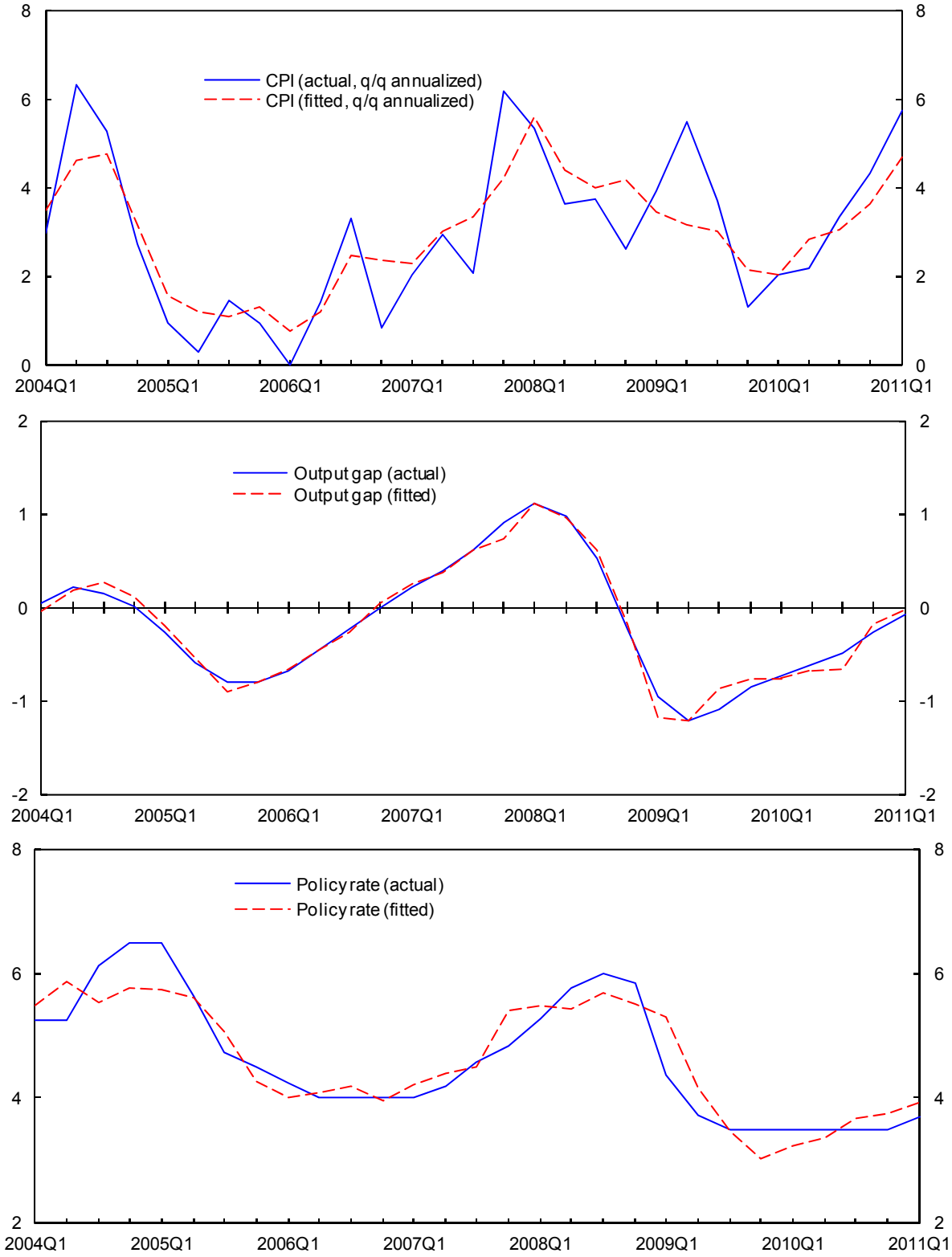
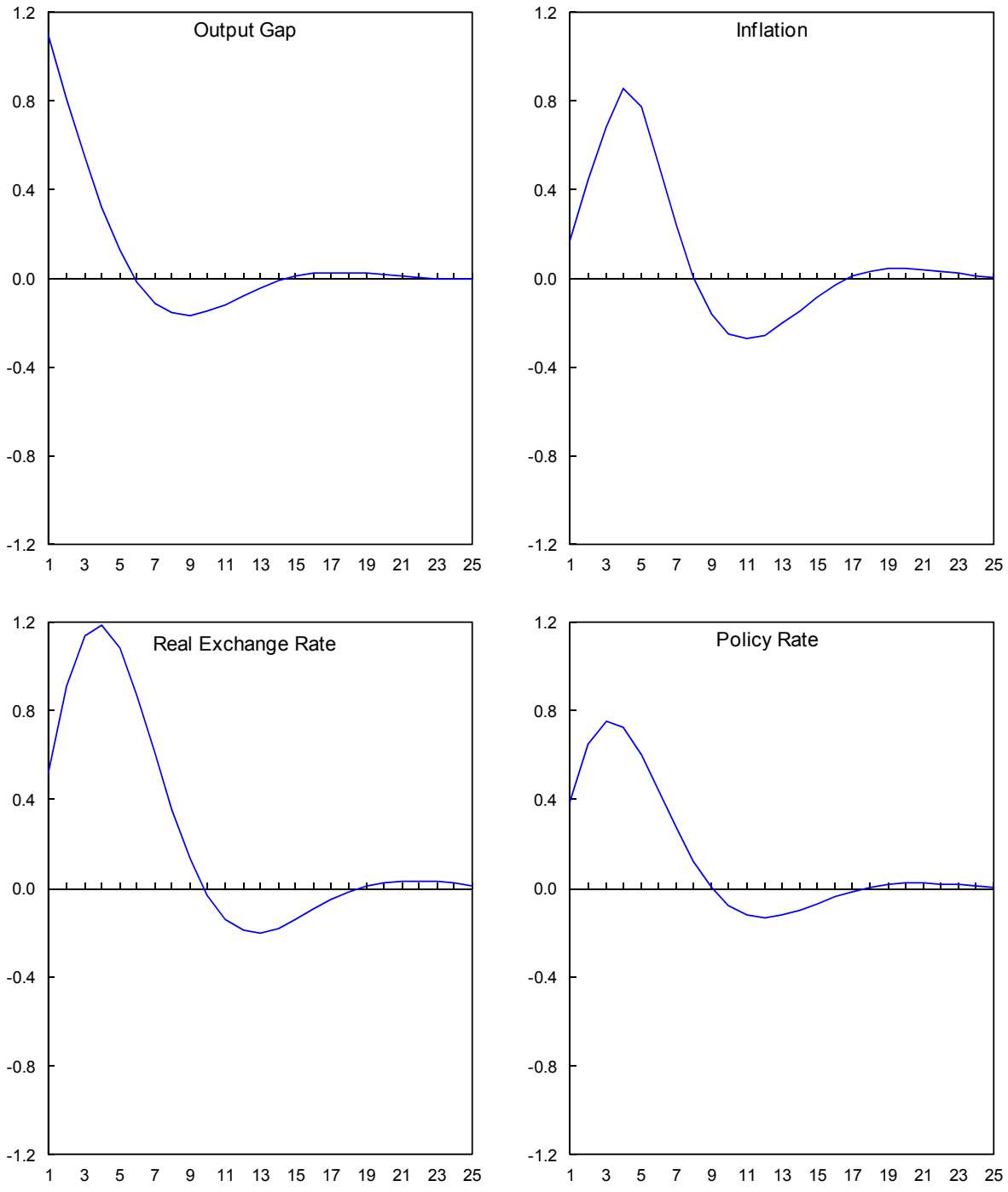
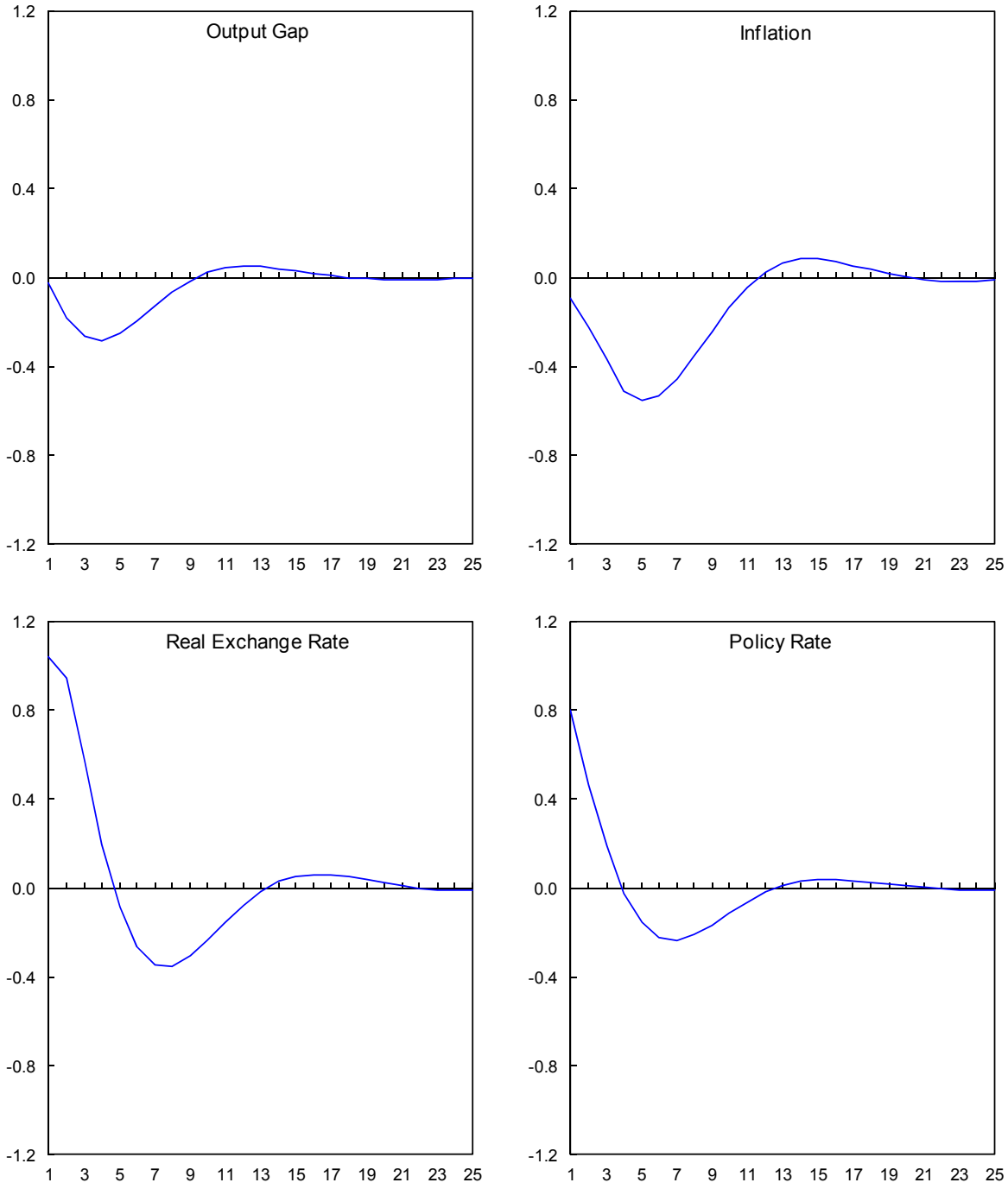


Figure 2. Poland: One-Period Domestic Output Gap Shock 1/
(Percent)



1/ In this impulse response function, the output gap shock is set at 1. The simulated output gap value in the first period will deviate from 1 by the corresponding fitted value of the forward-looking term in the output gap equation.

Figure 3. Poland: One-Period Policy Rate Shock 1/
(Percent)



1/ In this impulse response function, the policy rate shock is set at 1. The simulated policy rate value in the first period will deviate from 1 by the corresponding fitted value of the forward-looking term in the policy rate reaction equation.

a new projection emerges for Poland, in which both growth and inflation decelerate from their baseline path, while the policy rate could fall slightly from the current level (Figure 4).

20. **On the other hand, a near-term shock to Poland's risk premium would raise the inflation rate further and accelerate the tightening cycle.** Under this shock scenario, Poland's risk premium rises by 1 percentage point during the second quarter of 2011. In turn, the exchange rate depreciates by about 5 percent relative to baseline, and, consequently, headline inflation increases further, while the policy rate is hiked by about 75 bps (cumulative) more than the baseline path (Figure 5).

Preparing and Communicating the Baseline Forecast

21. **A majority of inflation-targeting central banks prepare baseline inflation forecasts with endogenous policy interest rates.** Among the 26 inflation-targeting central banks, 10 (including Poland) prepare their published inflation forecast on an exogenous policy rate, which is assumed to be either unchanged over the policy horizon, or extracted from the term structure of market interest rates. The other 16 central banks prepare inflation forecasts in which the policy rate is endogenous. The endogenous interest rate will be determined by the requirement that inflation returns to its target over the policy horizon. Within the family of paths that satisfy this condition, policy makers will tend to choose a baseline path that is most likely to result in stable output growth *and* inflation approaching its target. Of the sixteen central banks who prepare such baseline forecasts, six central banks (New Zealand, Norway, Sweden, Czech Republic, Israel and Hungary) publish an explicit projected baseline path for the policy rate.

22. **There are pros and cons to publishing the baseline endogenous policy rate path.**[10] Given that central banks try to manage expectations of future interest rate movements in order to influence interest rates beyond the short term, publication of an explicit interest rate scenario can be helpful in this regard. However, the main risk in publishing an explicit endogenous path is that at least some market participants might believe that the central bank is making a commitment to implement the projected policy rates regardless of changing economic conditions. Indeed, one of the key messages that the central bank needs to consistently deliver is that (i) its baseline forecast is conditional on information available at the time of making the forecast and (ii) the forecast will likely change once new information about inflation and the economy becomes available.

23. **The effectiveness of the communication strategy can be enhanced by discussions of risks around the baseline forecast.** As monetary policy has become more forward-looking and more preemptive in its actions, the central bank's view about how future output and inflation will be affected by global and domestic shocks has become a fundamental element in its decision making and in its communication. This is a key challenge for

[10]See Freedman and Laxton (2009) for a review of transparency and communication issues in inflation targeting central banks.

Figure 4. Poland: Global Output Gap Shock

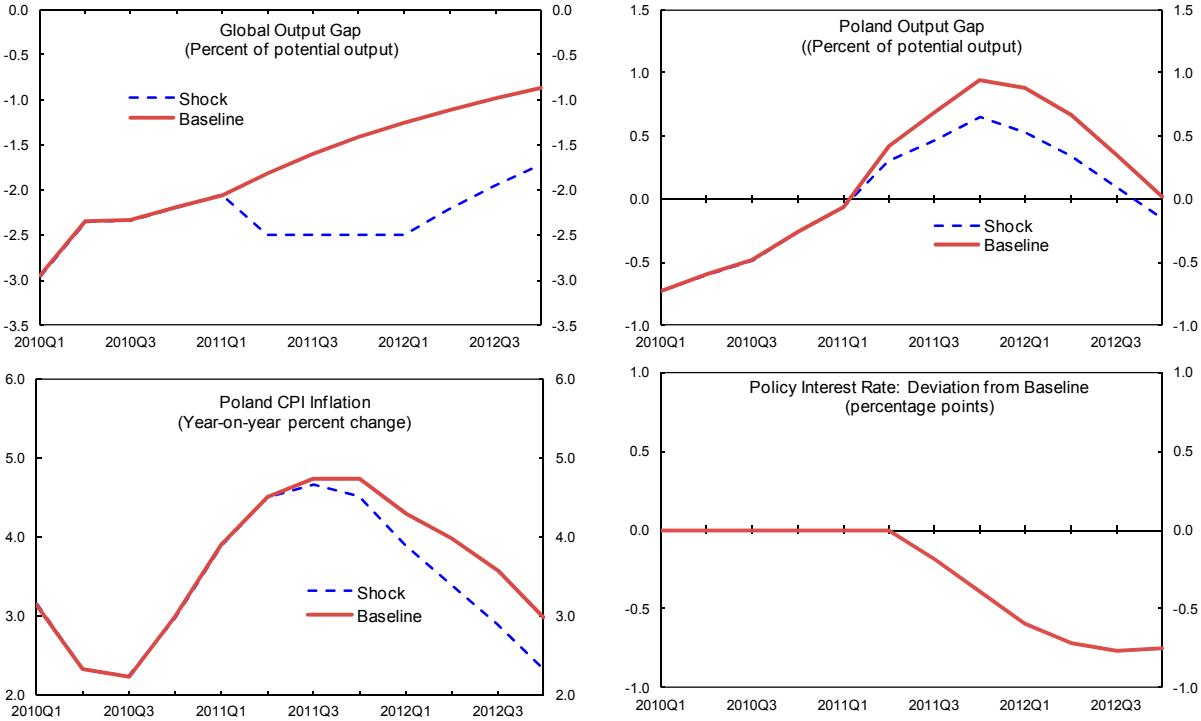
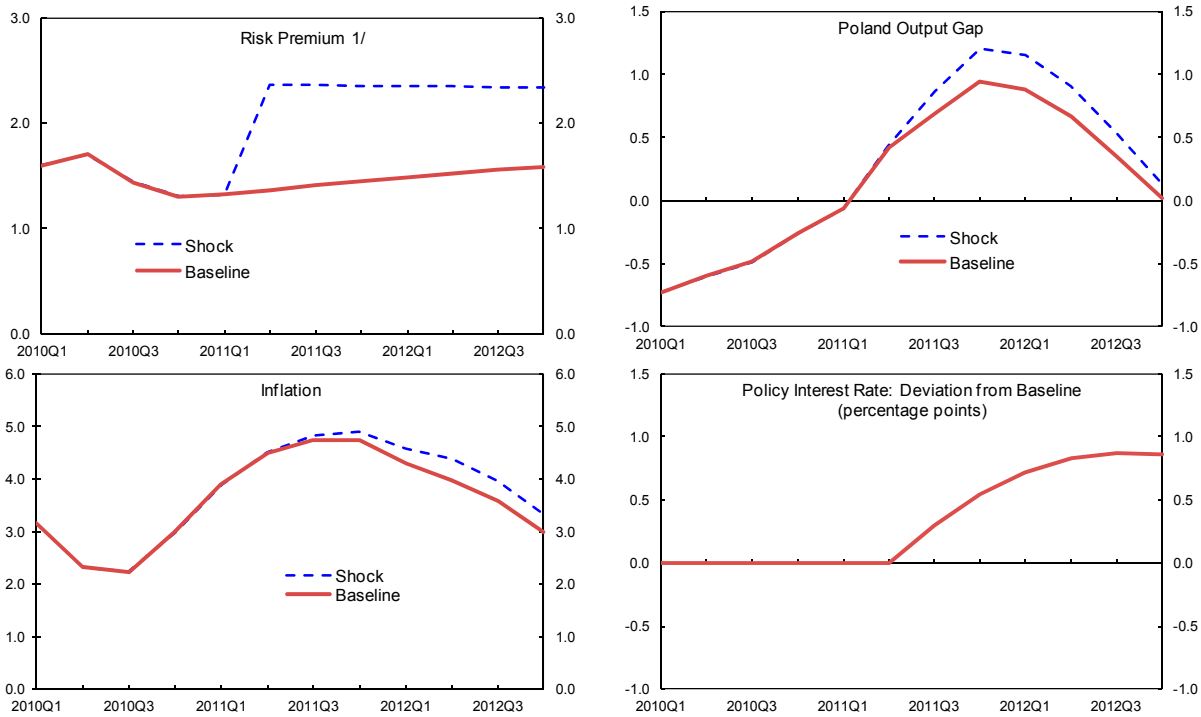


Figure 5. Poland: Risk Premium Shock



1/ Measured as Poland's equilibrium real interest rate.

central banks, although a number of them (including Poland) have began to publish fan charts with a probability distribution that is intended to indicate the variance around the central scenario. Other central banks (e.g., the Bank of Canada) are more qualitative in their presentation of the balance of risks. Either way, signaling a direction of the balance of risks with respect to the monetary policy stance, and/or the inflation outlook, can help enhance the communication of risks around the baseline forecast.

E. Conclusion

24. **Small projection models have become integral to inflation forecasting and policy analysis in both advanced and emerging economies central banks**. Small models are relatively easy to implement for modelers and comprehensible to policy makers. The Fund's GPM is one such model. Two key advantages of the GPM are that it produces an endogenous path for the policy interest rate and is built on a multi-country structure, which makes it particularly suitable for analysis of global shocks. The model has been found to be very useful in supporting policy analysis for inflation-targeting regimes like Poland's, where the principal objective is to provide anchors for inflation and inflation expectations.

25. **In this paper, we apply the GPM to inflation forecasting in Poland.** Under the baseline scenario, the policy interest rate is expected to increase by roughly 50 basis points over the next 12 months, more or less in line with market expectations. At the same time, inflation is projected to continue to rise through the third quarter of this year and then decline back toward the target next year. Risk assessments on a couple of key sources of uncertainty underlying the baseline forecast yield intuitive results; for example, a negative shock to global output would lower domestic output in Poland, while inflationary pressures recede, which would diminish the need for further policy rate hikes in the current tightening cycle.

26. **The NBP could benefit from a GPM type model to support its existing forecasting framework.** While the NBP periodically has worked with a small-scale small-open-economy model to help support the policy discussion, its NECMOD model continues to be the primary input for presentation of the inflation outlook and discussion over the policy rate. By developing a small model with an endogenous policy rate, built on a multicounty structure, the NBP would further strengthen its existing suite of models. Moreover, by allowing such a model to play a more prominent role in the overall forecasting framework, the NBP could further enhance its discussions of the inflation outlook and the balance of risks around the baseline forecast.

APPENDIX I. MODEL DEFINITIONS AND IDENTITIES

The model allows for shocks to both the level and growth rate of potential output. Shocks to the former can be permanent, while shocks to the latter can result on persistent deviations in potential growth from its long run steady-state value. In equation A1, potential output, $\bar{Y}$, is equal to its own lagged value plus the quarterly growth rate in potential output and a disturbance term.

$$\bar{Y}_{i,t} = \bar{Y}_{i,t-1} + \frac{g^{\bar{Y}}_{i,t}}{4} + \varepsilon^{\bar{Y}}_{i,t} \tag{A1}$$

As shown in equation A2, in the long run the growth rate of potential output is equal to its steady-state rate of growth, $g^{\bar{Y}_{ss}}$, but it can diverge from this steady-state growth rate following a shock. The speed in which it returns to the stead-state depends on the value of τ.

$$g^{\bar{Y}}_{i,t} = \tau_i g_i^{\bar{Y}_{ss}} + (1-\tau_i) g^{\bar{Y}}_{i,t-1} + \varepsilon^{g^{\bar{Y}}}_{i,t} \tag{A2}$$

A similar set of relationships holds for the equilibrium rate of unemployment, or the NAIRU, defined as $\bar{U}$ in equations A3 and A4.

$$\bar{U}_{i,t} = \bar{U}_{i,t-1} + g^{\bar{U}}_{i,t} + \varepsilon^{\bar{U}}_{i,t} \tag{A3}$$

$$g^{\bar{U}}_{i,t} = \left(1-\alpha_{i,3}\right) g^{\bar{U}}_{i,t-1} + \varepsilon^{g^{\bar{U}}}_{i,t} \tag{A4}$$

Equation A5 defines the real interest rate, R, as the difference between the nominal interest rate, I, and the expected inflation in the subsequent quarter.

$$R_{i,t} = I_{i,t} - \pi_{i,t+1} \tag{A5}$$

Equation A6 defines the real interest rate gap, r, as the difference between R and its equilibrium value $\bar{R}$.

$$r_{i,t} = R_{i,t} - \bar{R}_{i,t} \tag{A6}$$

Equation A7 defines the equilibrium real interest rate ($\bar{R}$) as a function of the assumed steady-state real interest rate ($\bar{R}^{ss}$). The equilibrium real interest rate is allowed to diverge from its steady-state in response to a stochastic shock ($\varepsilon^{\bar{R}}_{i,t}$).

$$\bar{R}_{i,t} = \rho_i \bar{R}_i^{ss} + (1-\rho_i) \bar{R}_{i,t-1} + \varepsilon^{\bar{R}}_{i,t} \tag{A7}$$

Equation A8 defines Z_i (the log of the real exchange rate in country i) as equal to 100 times the log of the nominal exchange rate, S_i, times the U.S. CPI, divided by the country i's CPI.

$$Z_{i,t} = 100 * \log\left(\frac{S_{i,t} P_{us,t}}{P_{i,t}}\right) \tag{A8}$$

The change in the log of the real exchange rate is shown in equation A9 as 100 times the change in the log of the nominal exchange rate less the difference between the quarterly inflation rates in country i and the U.S.

$$\Delta Z_{i,t} = 100\Delta \log\left(S_{i,t}\right) - (\pi_{i,t} - \pi_{us,t})/4 \tag{A9}$$

Equation A10 expresses the expected real exchange rate for the next period (Z^e) as the weighted average of the lagged real exchange rate and the one-period model consistent solution of the real exchange rate.

$$Z^e_{i,t+1} = \phi_i Z_{i,t+1} + (1 - \phi_i) Z_{i,t-1} \tag{A10}$$

Equation A11 defines the real exchange rate gap (z) as equal to the log of the real exchange rate (Z) minus the log of the equilibrium real exchange rate ($\bar{Z}$).

$$z_{i,t} = Z_{i,t} - \bar{Z}_{i,t} \tag{A11}$$

Equation A12 defines the equilibrium real exchange rate as equal to its lagged value plus a disturbance term.

$$\bar{Z}_{i,t} = \bar{Z}i, t-1 \quad + \varepsilon^{\bar{z}}_{i,t} \tag{A12}$$

APPENDIX II. GPM6 GROUPINGS
(As of March, 2011)

GPM6

Country	Share of World GDP, PPP (in percent)
GPM6	**85.6**
USA	**20.0**
Euro area	**15.1**
Japan	**6.2**
Emerging Asia (EA6)	**23.4**
China	12.0
India	4.9
South Korea	1.8
Indonesia	1.3
Taiwan	1.0
Thailand	0.8
Malaysia	0.5
Hong Kong	0.4
Philippines	0.4
Singapore	0.3
Latin America (LAS)	**6.1**
Brazil	2.8
Mexico	2.2
Colombia	0.5
Chile	0.3
Peru	0.3
Other countries	**14.8**
Russia	3.3
UK	3.1
Canada	1.8
Turkey	1.3
Australia	1.1
Argentina	0.8
South Africa	0.7
Venezuela	0.5
Sweden	0.4
Switzerland	0.4
Czech Republic	0.3
Denmark	0.3
Norway	0.3
Israel	0.2
Bulgaria	0.1
New Zealand	0.1
Estonia	0.04

APPENDIX III. ESTIMATED MODEL PARAMETERS

Parameter	Prior Mode	Posterior Mode
α_1	0.800	0.797
α_2	0.300	0.312
β_1	0.500	0.643
β_2	0.150	0.121
β_3	0.120	0.061
β_4	0.050	0.048
β_5	0.100	0.138
γ_1	0.750	0.859
γ_2	1.700	1.630
γ_4	0.500	0.496
λ_1	0.550	0.652
λ_2	0.250	0.215
λ_3	0.100	0.036
ϕ	0.600	0.768
ρ	0.050	0.046
τ	0.100	0.102
β_f	0.500	0.883
$\bar{\rho}_f$	0.500	0.224
ρ_f	0.500	0.132
α_3	0.600	0.624
α_4	0.300	0.152
Steady state real GDP growth	4.000	4.051
Steady state equilibrium real interest rate	2.250	2.269
Steady state foreign real interest rate	1.800	1.406
Steady state unemployment rate	8.000	8.284

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