



REPUBLIC OF POLAND

SELECTED ISSUES

July 2016

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SELECTED ISSUES

June 10, 2016

Approved By
European Department

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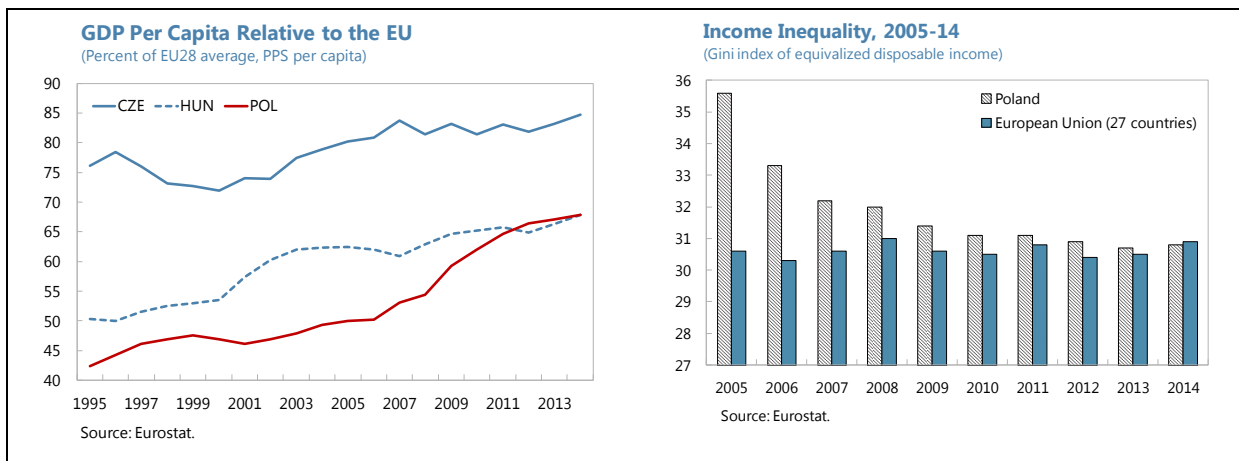
THE ROLE OF PRODUCTIVITY GROWTH IN REDUCING REGIONAL ECONOMIC DISPARITIES IN POLAND¹

Although Poland has enjoyed strong growth and steady income convergence with the EU over the last two decades, important disparities persist at the regional level. Per-capita income is higher in the west—which is integrated into the German supply chain and enjoys higher levels of FDI—than in the east—where the economy depends more on less productive agriculture. Despite strong overall economic growth, the east has not been catching up to the west. This chapter identifies policies to increase productivity in the east, reduce regional income disparities, and promote overall income convergence. This would require improving educational attainment and reducing skill mismatches in the east, scaling up public infrastructure to attract investment to less productive regions, and facilitating labor mobility.

A. Regional Disparities and Income Convergence

1. Poland has enjoyed strong economic performance over the last two decades.

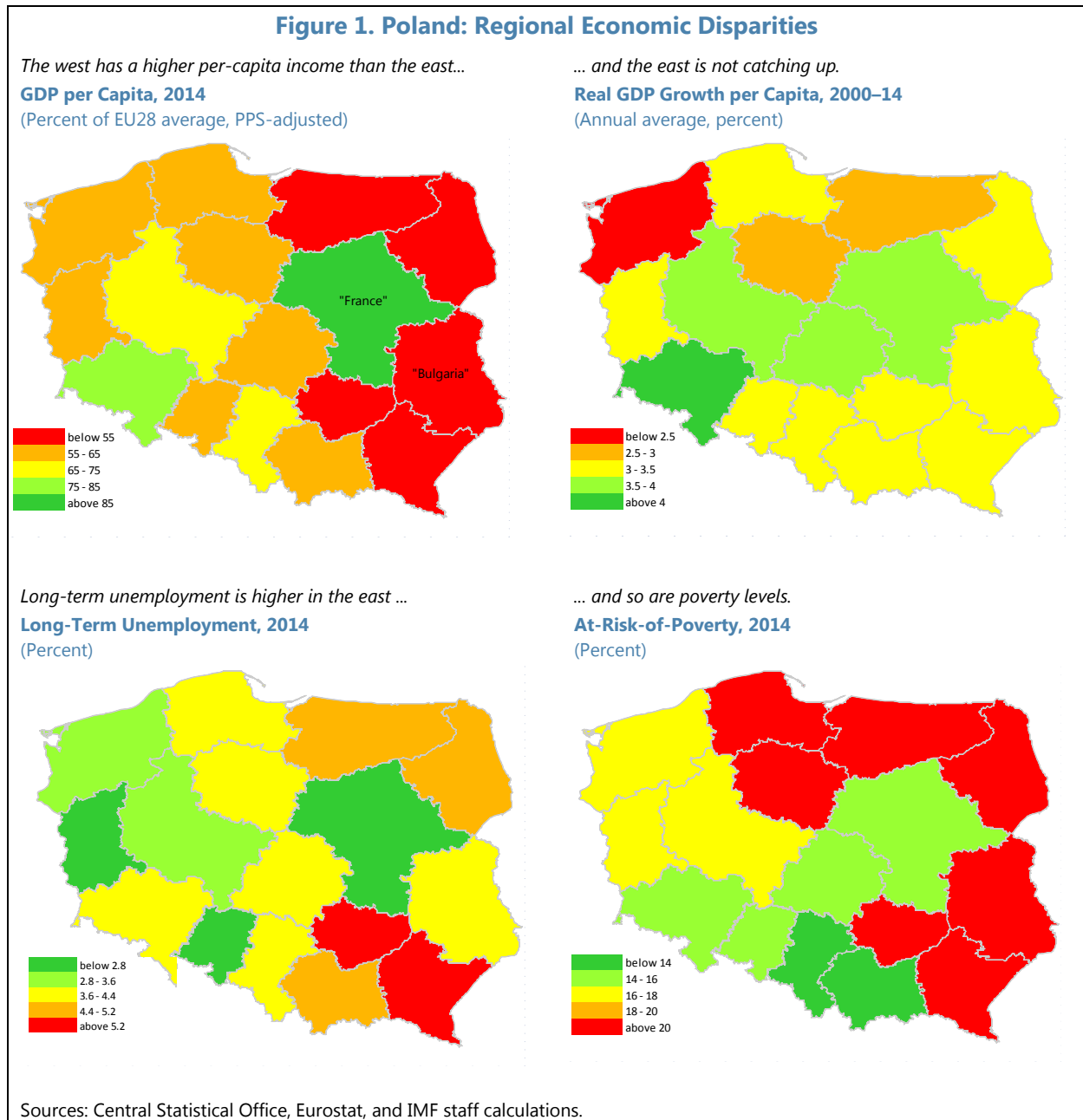
Economic convergence to the EU has progressed steadily, with Poland closing over a quarter of its per capita income gap with the EU28 average during 1995–2014. Prudent economic policies that had prevented the build-up of imbalances in the run-up to the global financial crisis helped Poland avoid an outright recession during the crisis; GDP growth has averaged around 3 percent since 2008. At the same time, overall income inequality has declined to the EU average.



2. However, this strong overall performance masks important economic disparities at the regional level. Western regions of the country are wealthier than eastern regions: on average GDP per capita is about 30 percent higher in regions bordering Germany in the west, than in regions bordering Belarus and Ukraine in the east. The wealthiest region, Mazowieckie (which includes the capital city Warsaw), has a per capita income comparable to France—the third largest economy in

¹ Prepared by Krzysztof Krogulski, Robert Sierhej, and Aaron Thegeya.

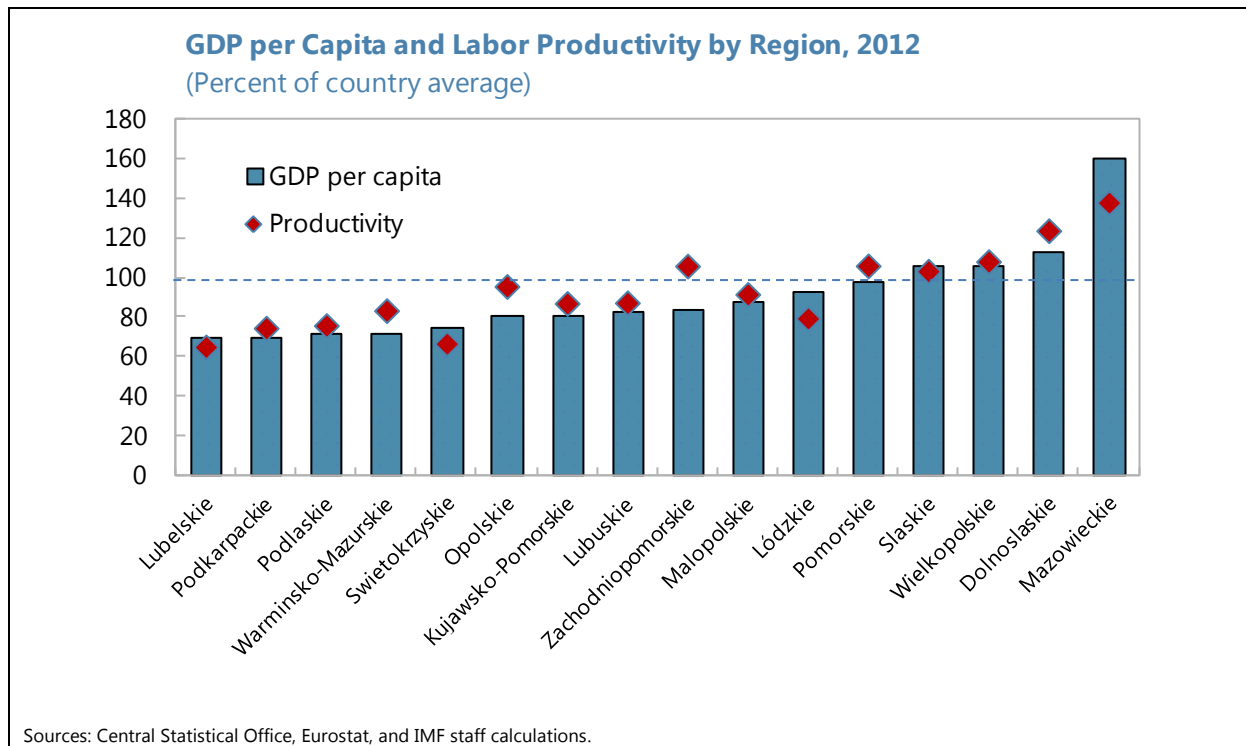
the EU, while the poorest regions on the eastern border have per capita incomes comparable to Bulgaria—the poorest in the EU by income level. Poverty rates and long-term unemployment are also higher in the east.



3. These disparities have been persistent. Poland’s regions have been growing at about the same rate during the past decade, making it difficult for poorer regions to catch up with wealthier regions (Figure 1).²

4. Reducing regional disparities by boosting economic performance in lagging regions would promote faster and more inclusive growth. Estimates suggest that Poland’s GDP per capita could be increased by 7 percent if one-third of the gap between regions with GDP per capita below average and the four regions which are above average was closed. This would imply an additional 5 percentage point convergence to the EU28 average income level.

5. Boosting labor productivity growth in lagging regions is key to reducing regional disparities. There is a strong association between income per capita and labor productivity levels: wealthier regions in Poland also tend to have higher levels of productivity.³



6. This chapter looks at determinants of regional productivity growth in Poland. Section B establishes stylized facts about potential drivers of regional productivity differences.

² Evidence of overall convergence is inconclusive: panel unit root tests do not show convergence, and there is no evidence of sigma convergence. Additionally, evidence does not show convergence between eastern and western regions. However, there is some evidence of within-region beta convergence, with eastern and western regions converging to different steady states.

³ Labor productivity is calculated as gross value added per person employed (including self-employed). Labor productivity is a more meaningful measure of regional economic performance as GDP per capita is based on population statistics that may not reflect the actual place of residence and work.

Section C describes the empirical model and discusses the key statistical determinants of labor productivity growth. Section D summarizes the findings and sets out policy recommendations.

B. Regional Productivity in Poland: Stylized Facts

7. **Certain economic variables appear correlated with regional productivity levels.** These factors are highlighted below and illustrated in Figure 2:

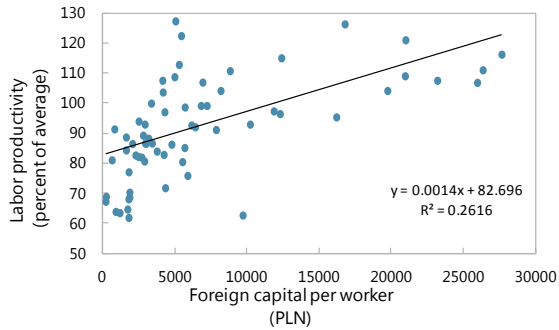
- **Regions with higher foreign direct investment (FDI) have higher productivity.** A higher intensity of FDI in more productive regions suggests that foreign investment has boosted productivity by bringing in technological and organizational know-how. Poland's integration into the German supply chain explains a higher share of FDI in the western regions bordering Germany.
- **Educational attainment is correlated with regional productivity.** Skilled labor is likely to be more productive, and regions with easier access to skilled workers may attract more technologically advanced, productive businesses.
- **Regions with low productivity have a higher share of agriculture.** Agriculture is the least productive sector of the economy, contributing to the negative correlation between regional productivity and employment in agriculture. Regions in the west on average have larger farms and a lower share of employment in agriculture than regions in the east. As discussed later, there is potential to boost productivity by reallocating labor from agriculture to other sectors.
- **EU funds support less productive regions.** Funds available under the EU cohesion policy are aimed at helping the development of poorer regions. Spending of such funds in Poland is either decided centrally (for example on highways) or locally under regional programs. The latter have been directed more to less productive regions in eastern Poland.
- **More productive regions have a better transportation network.** Transportation network is an important factor affecting location of business, especially in exporting industries that are part of international supply chains. The current network of highways is more likely to attract business to the more productive western regions. The transportation network in Figure 2 shows that major highways link Poland's western, central, and southern regions to Germany. The density of railroads is also higher in western regions, facilitating the movement of goods and improving labor mobility.
- **Unemployment is higher in less productive regions.** While unemployment rates vary a lot among regions, higher unemployment rates are observed in less productive regions of Poland. Since unemployment incidence is higher among less educated persons, in some regions there may be a vicious circle of weak regional educational attainment, high unemployment, and low productivity.

8. **Wealthier regions have higher productivity across all sectors.** Data on regional productivity by economic sector suggest that the comparative advantage of richer regions is not

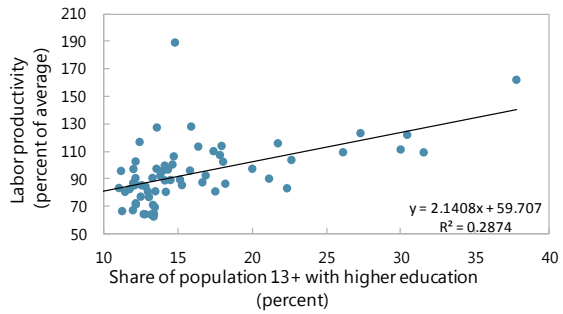
due to a particular type of economic activity. In general, wealthier regions tend to display higher productivity across most sectors.

Figure 2. Poland: Structural Indicators and Labor Productivity

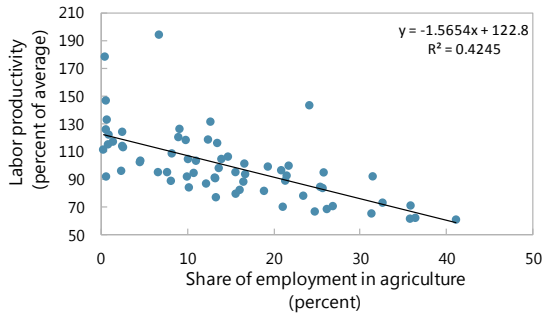
Foreign Capital per Worker and Productivity



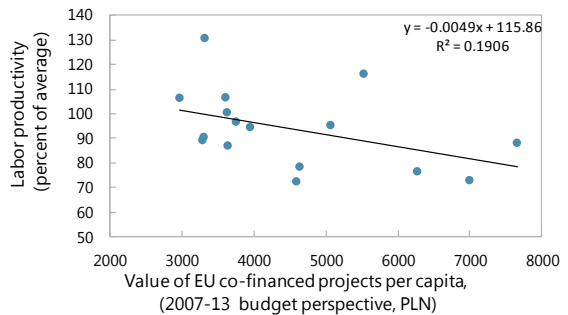
Educational Attainment and Productivity



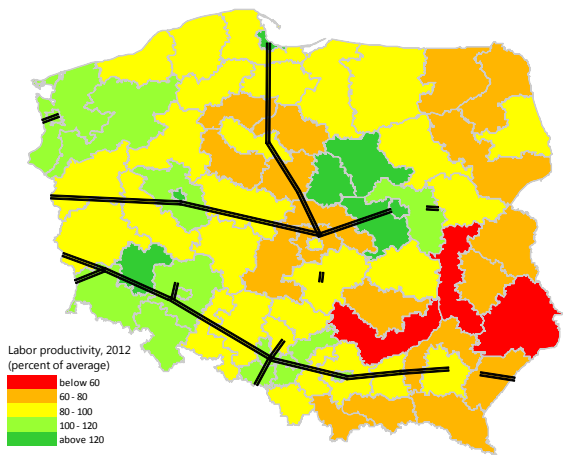
Employment Structure and Productivity



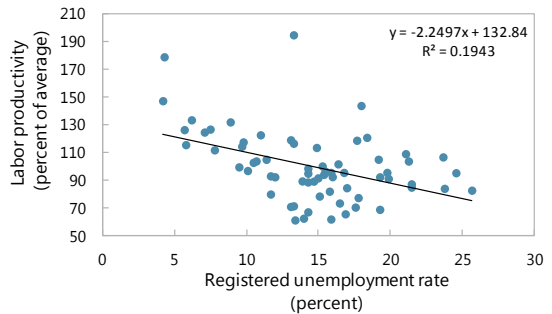
EU Funds and Productivity



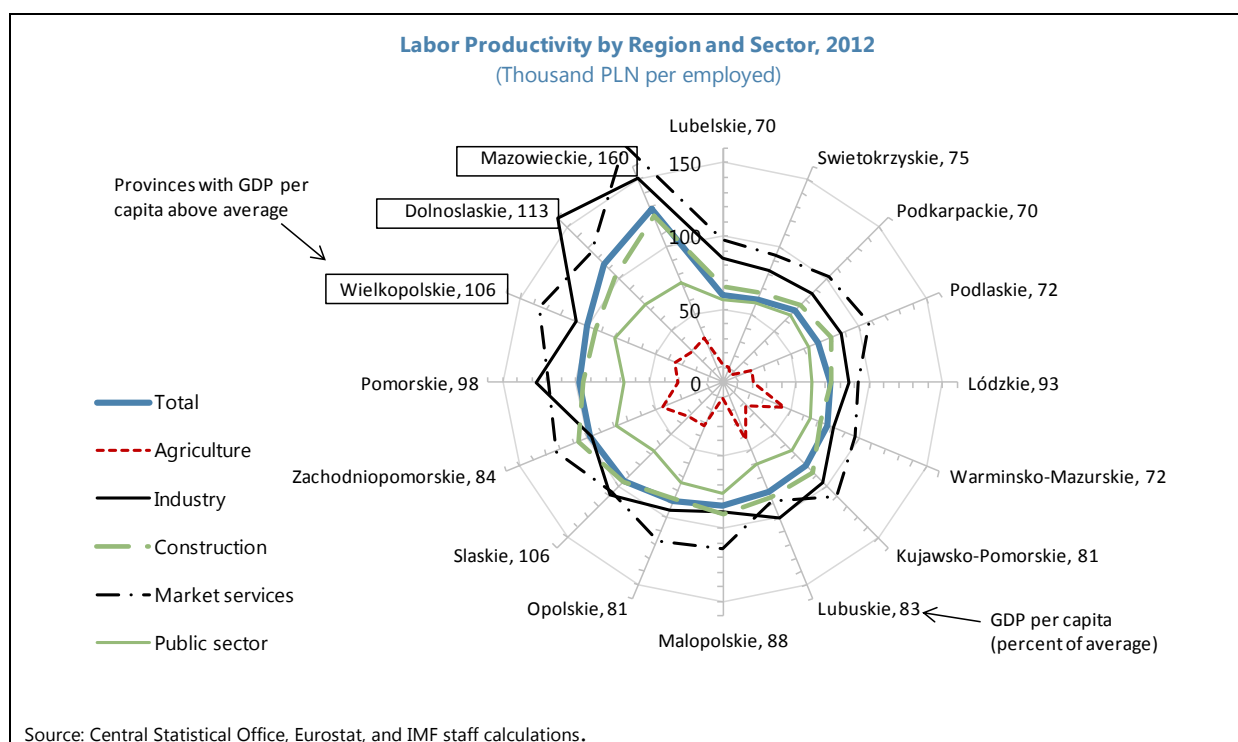
Highway Network and Productivity



Unemployment and Productivity



Sources: Central Statistical Office, Eurostat, and IMF staff calculations.



C. Empirical Analysis

9. This section conducts a more rigorous empirical analysis of the factors determining labor productivity growth at the regional level (Box 1). Determinants of productivity growth are chosen to reflect structural factors and spillover effects. The following structural variables are considered:

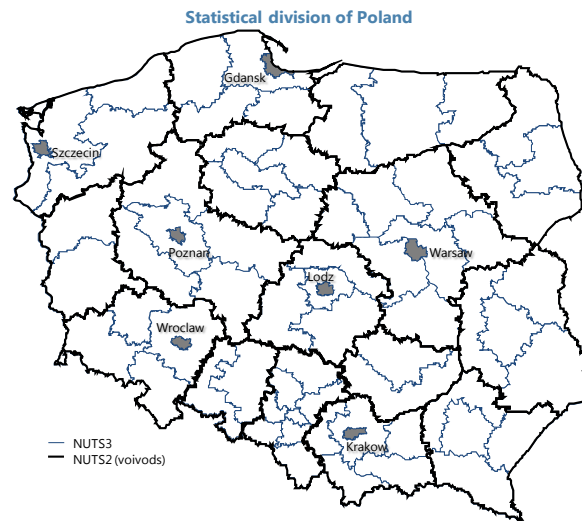
- **Labor quality (share of population with education below secondary school).** Better educated workers are more likely to innovate, quickly adapt to changing technology and relocate towards more productive firms. Access to a well-educated workforce is also an important pull factor for new investments.⁴
- **Structural transformation (change in the share of employment in agriculture relative to industry and services).** Productivity growth patterns are dependent on regional economic structure, whereby productivity growth in a given region is affected by reallocation of labor from low- to high-productivity sectors through the process of structural transformation (Box 2). Agriculture is the least productive sector in the economy, and the analysis controls for changes in the structure of the economy by including the change in the share of employment in agriculture relative to other sectors. In addition, to account for the impact of labor reallocation within industry and services, changes in the shares of employment in these sectors are also considered.

⁴ See for example Polish Information and Foreign Investments Agency Survey (PAIIZ, 2015).

Box 1. Poland: Regions

Poland is divided into 16 administrative regions (voivods), 380 counties (powiats) and 2,479 municipalities (gminas). On average, the population of a voivod is 2.4 million persons, and is close to 100,000 persons for a powiat.

The European Union Nomenclature of Territorial Units (NUTS) classification is used in this analysis. Within the NUTS classification, NUTS level 2 includes the 16 administrative voivods, and NUTS level 3 consists of 66 regions, which are groupings of powiats. Regions excluded from the analysis are Warsaw, the capital city, Ciechanowsko-Plocki, which hosts the largest oil refinery (Orlen), and Legnicko-Glogowski which includes the largest copper company (KGHM).



Source: Eurostat

- **Unemployment.** Productivity growth depends on firms' choice of input factors composition. Structural unemployment may differ across regions due to heterogeneity in search costs, quality of labor and labor mobility. High structural unemployment could also result from low labor mobility or inability of workers to train and change sectors, creating over-supply and low productivity in some sectors. Additionally, weaker labor markets with underutilized or idle workers reduce employee bargaining power, and encourage substitution of capital with labor. Conversely, high search costs increase the marginal cost of labor and could encourage substitution of labor with capital.
- **Ability to innovate.** Regions with more innovative enterprises should display faster productivity growth, if innovations are applied locally and support more efficient use of resources. As a proxy, the number of patent applications to the European Patent Organization per million employed persons is used.
- **Local government finances.** Local government expenditures account for one-third of total general government spending. As such, the composition and size of local budgets may have an impact on productivity growth. The share of investment spending in total expenditures is used to explore whether local investments boost productivity. Nonetheless, this is an imperfect

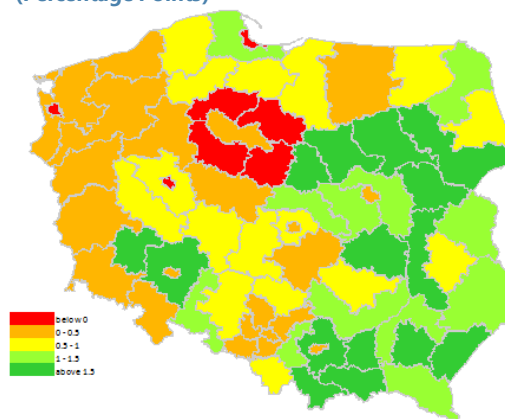
Box 2. Poland: The Role of Structural Transformation and Cross-Regional Reallocation of Labor in Productivity Growth

Reallocation of labor across sectors of the economy affects productivity. The overall change in productivity can be decomposed into two parts: (i) within-sector changes and (ii) changes due to reallocation of labor across sectors (see Appendix III). The latter process, called *structural transformation*, supported productivity growth in Poland in the past, and its impact was larger than in regional peer countries.¹

Structural transformation added more to productivity gains in poorer regions. If regional productivity growth is decomposed as mentioned above, a remarkable difference arises between the east and west of Poland. Poorer regions in the east benefitted visibly more from structural transformation, which likely reflects their higher share of agriculture, implying greater opportunity to shift labor from low-productivity farming to more productive sectors. This also may help to explain why such regions kept productivity growth apace with their richer peers.

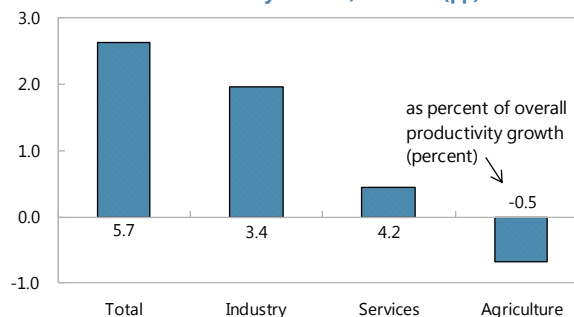
Bottlenecks appear to exist in cross-regional mobility of labor. Productivity is also affected by reallocation of labor across regions.² At the aggregate level, such a process played a rather limited role, contributing just 2.5 percentage points to total productivity gains in 2000–12. Sector analysis of productivity gains from reallocation of labor among regions but within the same sector shows that only industry and services benefitted from such cross-regional labor movements. Such a picture suggests bottlenecks in cross-regional labor mobility. It also may signal adverse policy incentives in sectors like agriculture, discouraging reallocation of labor to more productive sectors and regions.

Contribution of Labor Reallocation across Sectors to Productivity Growth, 2000-12 (Percentage Points)



Source: Central Statistical Office, Eurostat, and IMF staff calculations.

Cross-Regional Reallocation of Labor Contribution to Productivity Growth, 2000-12 (pp)



Source: Central Statistical Office, Eurostat, and IMF staff calculations.

¹ A detailed cross-country analysis of the structural transformation process was presented in IMF Country Report No. 15/183, "Raising Productivity Growth in Poland: The Role of Structural Transformation" (July 2015).

² In this analysis, cross-regional labor reallocation is measured with the ratio of employment in each region to total employment, so it does not have to imply a physical migration of employees.

measure because it does not capture possibly important investments financed by the central government.⁵ The share of non-investment spending to gross value added is also used to control for the impact of local government size on productivity.

The following spillover variables are considered:

- **International spillovers (foreign direct investment (FDI)).** Along with investment, foreign companies facilitate technology transfer and train local employees. Additionally, they stimulate demand for locally supplied goods and subcomponents and foster integration with global supply chains. The share of companies with foreign capital is used as a proxy for FDI in a given region, owing to unavailability of data on actual investment flows by region.
- **Regional spillovers (labor productivity of neighboring regions).** An analysis of spillovers between regions controls for the spatial dimension of data. More productive regions may support growth in neighboring ones by increasing demand for their goods, but also through investment spillovers. The opposite effect may be observed if more productive enterprises cluster in productive regions, and when more skilled workers are drained from less productive regions.

10. Choice of model. The model is estimated using a system GMM estimator⁶ applied to annual data between 2002 and 2012. It includes time dummies to control for common shocks, and individual effects are removed in this identification strategy. Annual changes in productivity growth are regressed on lagged real productivity level, lagged levels of explanatory variables, and contemporary shifts of employment, with all available lags used as GMM instruments (Appendix II).

11. Empirical evidence points to several factors as being significant determinants of regional labor productivity growth. Regression results are summarized in Appendix I. The determinants of labor productivity growth are discussed below in the order of their significance in the model:

- **Foreign investment is a significant positive determinant of labor productivity growth.** Regression results confirm the intuition that higher presence of foreign investors has facilitated productivity growth. In the base model, a ten percent higher share of enterprises with foreign capital results in a 1.8 percentage point increase in labor productivity growth.
- **Structural transformation is a significant determinant of labor productivity growth.** Results suggest that a 1 percent decline of the share of agricultural employment in total employment adds about 0.5 percentage points to productivity growth. This is due to the structural transformation process discussed earlier, in other words labor reallocation from agriculture to higher-productivity sectors. The findings suggest that labor reallocation to industry results in higher overall productivity growth, but do not show a significant impact of labor reallocation on productivity in the services sector.

⁵ Data on central government investments are not available at the regional level.

⁶ Arellano and Bover (1995) and Blundel and Bond (1998).

- **Level of educational attainment matters.** As expected, educational attainment supports productivity growth. Decreasing the share of population with below secondary education by 10 percent boosts productivity growth by 5 percentage points.
- **Tighter labor market conditions support productivity enhancements.** Availability of idle workers has a negative impact on labor productivity by 0.4 percentage point per 1 percent higher unemployment rate.
- **Expenditures of local government have an ambiguous impact on labor productivity growth.** Investment expenditures of local governments are an insignificant determinant of labor productivity growth. Other expenditures have a positive impact of 0.2–0.5 percentage point faster productivity growth per a 1 percentage point increase in the expenditure to gross value added ratio. All in all, regression results suggest that local government outlays do not matter much for regional productivity dynamics.
- **Positive spillovers from proximity to regions with high productivity levels are almost absent.** The estimated impact of neighboring more productive regions on productivity growth is limited.
- **Patent applications are not a significant determinant of labor productivity improvements.** The number of patents applications is not statistically significant, although this maybe an imperfect measure of innovation. This is because of likely limited use of European patents (EPO) in the analyzed period.

12. An analysis of labor productivity growth by sector shows that structural transformation is particularly important in agriculture, while foreign direct investment is important in industry and services. Further, an analysis by urban and rural clusters⁷ shows that foreign direct investment and the level of education matter in each cluster. Higher levels of FDI and higher levels of education are correlated with higher labor productivity growth.

D. Conclusions and Policy Recommendations

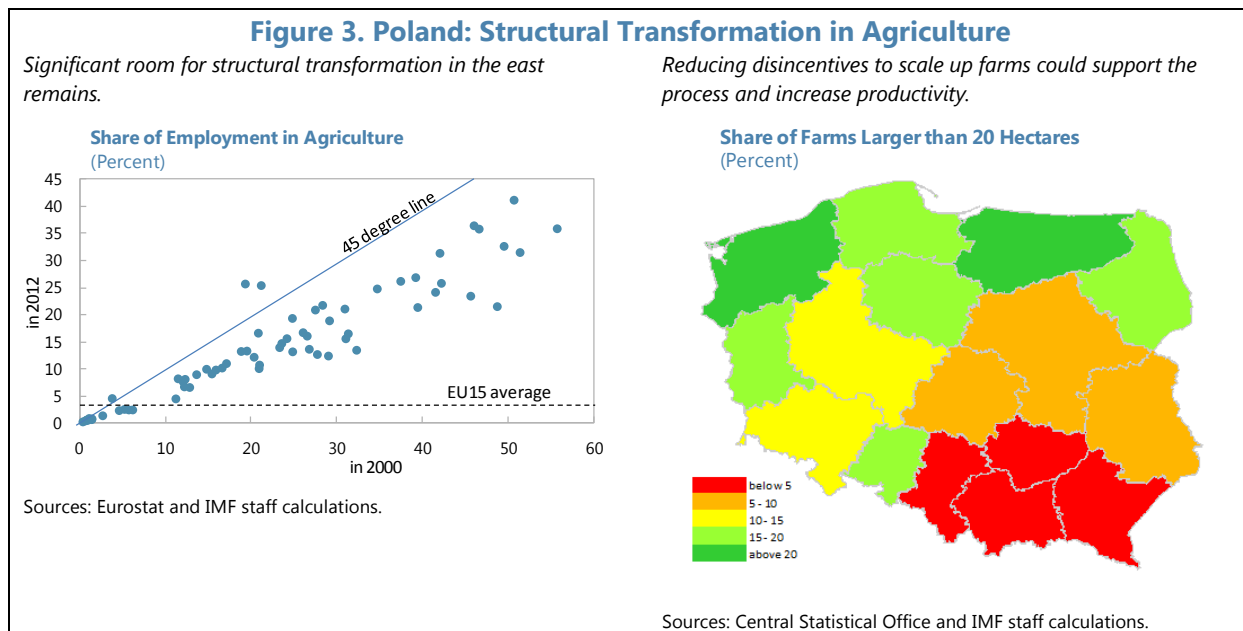
13. Despite strong economic performance over the last two decades, there are significant and enduring income disparities between western and eastern regions of Poland. These disparities are strongly correlated with labor productivity differences. While labor productivity growth in poorer eastern regions has been driven significantly by structural transformation, in wealthier western regions it has been driven by higher investment and integration with the German supply chain. Education and labor market conditions had a significant impact on labor productivity growth across regions. Similar growth rates in labor productivity across regions have prevented eastern regions from catching up to western regions.

14. The analysis of regional productivity determinants points to policies that could be conducive to regional productivity convergence.

- **Support structural transformation and boost productivity in agriculture:** Significant room

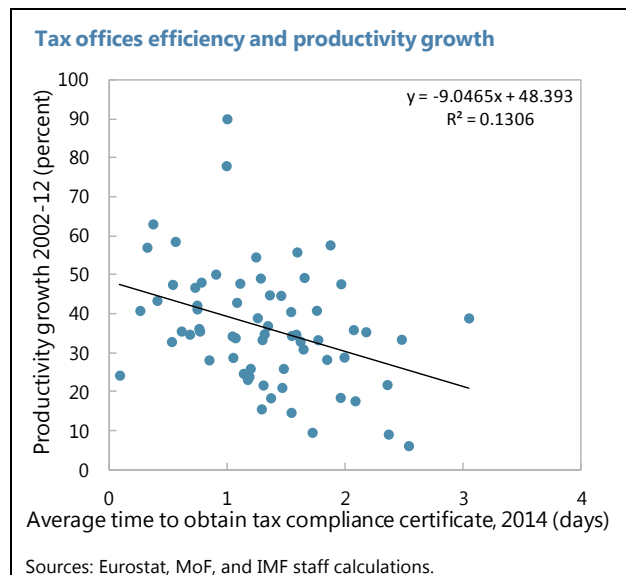
⁷ Regions were grouped into rural, urban and industrialized clusters based on dissimilarities in employment structure.

remains to boost labor productivity growth within poorer regions by supporting the reallocation of labor from low-productivity agriculture to higher-productivity industry and service sectors (Figure 3). To unleash the potential for such structural transformation, a review of incentives pertaining to employment in agriculture would be appropriate to identify mechanisms that may encourage people to stay in low productivity farms. In particular, the highly subsidized pension scheme for farmers could be reformed to gradually align it with the regular system to discourage inefficient farming motivated by pension arbitrage. The more productive farms in western regions tend to be larger, so there may be merit in promoting consolidation of agricultural production also in the poorer eastern regions to exploit the economies of scale. In this regard, moving from the current agricultural taxation based on farm size and quality of land to an income-based tax would reduce disincentives to scale up farms and help define the base for social security contributions. To facilitate structural transformation, such reforms should be accompanied with measures to address skill mismatches and bottlenecks in labor mobility, as described below.



- Encourage labor mobility and reduce structural unemployment:** Decomposition of productivity growth shows that the contribution from reallocating labor across regions has been relatively minor. This suggests bottlenecks in labor market mobility that could be addressed with proper policies, for example, by improving the functioning of the housing rental market. Currently, the rental housing market in Poland is shallow, discouraging labor relocation. Econometric analysis also suggests that high structural unemployment negatively affects regional productivity growth. While a declining working age population should generally reduce the unemployment rate, addressing high structural unemployment in less productive regions would require greater investment in active labor market policies to improve job searching efficiency across regions, upgrade skills, and reduce skill mismatches.

- Attract investments to less productive regions:** Empirical findings show that higher FDI is associated with faster regional productivity growth. FDI is more prevalent in wealthier regions, and this pattern needs to change to support regional productivity catch-up. Some factors important for investors could be altered by government policies to support such a change.⁸ Specifically, strengthening transportation networks in poorer regions would help, and better targeting of EU funds could support this process. Furthermore, investor surveys suggest that access to skilled labor is important for location of projects. In this context, investing in education and tailoring it to local development needs is important; aligning vocational curricula closely to the needs of industry would facilitate the absorption of new production methods and technologies. While local governments' role in boosting productivity appears less statistically significant, it does not imply that quality of local administration is irrelevant. For example, data suggest a positive correlation between regional productivity and the efficiency of local tax administration.



⁸ Factors important to foreign investors are inter alia discussed in Foreign Investments Agency Survey (PAIIZ, 2015).

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| VARIABLES | Dependent variable: Real labor productivity growth | | | | | | | | |
|---|--|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| Real Productivity (t-1) | -0.258*** (0.003) | -0.304*** (0.001) | -0.353*** (0.001) | -0.320* (0.068) | -0.484*** (0.000) | -0.299*** (0.002) | -0.461*** (0.000) | -0.390** (0.011) | -0.405** (0.011) |
| Change in share of employment in agriculture (t) | -0.587*** (0.001) | | | -0.492*** (0.007) | -0.455** (0.0358) | -0.517*** (0.010) | -0.427** (0.035) | -0.490*** (0.007) | -0.538*** (0.002) |
| Change in share of employment in industry (t) | | 0.508*** (0.000) | | | | | | | |
| Change in share of employment in services (t) | | | -0.187 (0.373) | | | | | | |
| Share of enterprises with foreign capital (t-1) | 0.184* (0.075) | 0.2046 (0.042) | 0.248** (0.025) | 0.263 (0.116) | 0.469*** (0.007) | | | 0.387** (0.027) | 0.423** (0.031) |
| Share of population below secondary education (t-1) | -0.439*** (0.005) | -0.495*** (0.000) | -0.553*** (0.004) | | | -0.619*** (0.002) | -1.055*** (0.000) | | |
| Patents applications per million employed (t-1) | | | | 0.00482 (0.830) | | | | | |
| Unemployment rate (t-1) | | | | | -0.396*** (0.004) | | | -0.320* (0.096) | -0.293** (0.016) |
| Local govt investment share of expenditures (t-1) | | | | | | -0.0507 (0.465) | | | |
| Local govt non-investment expenditures to GVA (t-1) | | | | | | | 0.204 (0.490) | | 0.503* (0.057) |
| Neighbors GVA per capita gap (t-1) | | | | | | | | 0.0179 (0.505) | -0.00700 (0.769) |
| Time dummies | YES | YES | YES | YES | YES | YES | YES | YES | YES |
| No. of Observations | 630 | 630 | 630 | 693 | 630 | 630 | 630 | 630 | 630 |
| No. of Regions | 63 | 63 | 63 | 63 | 63 | 63 | 63 | 63 | 63 |
| No. of Instruments | 52 | 70 | 70 | 66 | 70 | 62 | 71 | 73 | 85 |
| AR1 | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| AR2 | (0.156) | (0.038) | (0.012) | (0.143) | (0.100) | (0.119) | (0.082) | (0.114) | (0.100) |
| Hansen test | (0.173) | (0.358) | (0.240) | (0.156) | (0.219) | (0.141) | (0.278) | (0.629) | (0.219) |

Note: p-values in parenthesis (***) p<0.01, ** p<0.05, * p<0.1
Source: IMF staff calculations.

Appendix II. Econometric Model

The identification strategy is the Blundell and Bond system generalized method of moments estimator (see Arellano and Bover (1995) and Blundell and Bond (1998)). This model is suitable for dynamic panel data where the number of individuals is large relative to time periods, where independent variables may not be strictly exogenous and the idiosyncratic disturbances may have individual-specific patterns of heteroskedasticity and serial correlation. In addition, system GMM produces unbiased estimates even in case of highly persistent data, such as structural variables. Two-step procedure was applied, due to its higher asymptotic efficiency, and standard errors downward bias was corrected by Windmeijer's adjustment.

Annual changes in productivity growth are regressed against lagged real productivity level and lagged levels of explanatory variables and contemporary shifts of employment, with all available lags used as GMM instruments. Time dummies are included to control for common shocks. Individual effects are removed in transformation of the data within the GMM estimation process.

The bottom panel of Appendix I reports results of standard specification tests. The Arellano-Bond test for second order autocorrelation¹ confirms that there is no significant autocorrelation among the instruments. Hansen tests for over-identification restrictions do not reject the null, suggesting that instruments are valid.

The unit of observation is a region-year. Data for 63 regions are included over the period 2002 to 2012. The dependent variable is real labor productivity growth, measured as gross value added per employed (including self-employed), and deflated by the GDP deflator. Data are obtained from Eurostat and the Polish Central Statistical Office.

Independent variables include the following structural variables: change in share of employment in agriculture, industry and services, share of the population with education attainment below secondary level, registered unemployment rate, patent applications per million of employed persons, investment share of expenditures and non-investment expenditures of local governments as percent of gross value added.

To measure spillovers, share of enterprises with foreign capital and neighbors' value added gap are included. Neighbors' value added gap measures the difference between average value added per capita in regions neighboring a given region and the given region's value added per capita, as a percent of the latter.

In addition to the base model, a number of robustness tests were performed. The system GMM model was applied to productivity dynamics in each of three main sectors of the economy, to data transformed into 2-year non-overlapping periods, and cross-section and random effects models

¹ As expected, we observe first degree correlation in residuals, as system GMM uses differentiated data as instruments. Results of a second degree autocorrelation test yield no evidence of significant autocorrelation among the set of instruments.

were run on the same variables, confirming the results. Additionally, total factor productivity was calculated and used as a dependent variable, within a random effects specification. Results were broadly consistent.

Appendix III. Decomposition of Growth by Sector and Region

The decomposition of productivity growth by sector follows McMillan et al. (2014). The change in aggregate the labor productivity level (P_t) is decomposed as follows:

$$\Delta P_t = \sum_i \Delta P_{it} \left(\frac{L_{i0}}{L_0} \right) + \sum_i \Delta \left(\frac{L_{it}}{L_t} \right) P_{it} \quad (1)$$

where i is the sector, L is the number of employed people, and t the period indicator. The second term on the right-hand side quantifies the degree of structural transformation. The change in aggregate productivity is decomposed into a “within” effect (first term in the equation) and a “labor reallocation” effect (second term in the equation). The within effect measures within-sector changes in productivity, while the labor reallocation term measures structural transformation (reallocation of labor across sectors). The within-effect is positive when the weighted change in labor productivity levels in sectors is positive. The structural transformation effect is positive when labor moves from less productive to more productive sectors. Decomposition is based on the division of the economy into the following sectors: agriculture, industry (construction and manufacturing), and services (simple and advanced services).

The decomposition of productivity growth by region follows a similar approach, where i denotes a region instead of a sector. The “within-effect” therefore measures within-region changes in productivity, whereas the “labor reallocation” effect measures cross-regional changes in labor. The labor-reallocation effect is positive if labor is reallocated from less productive to more productive regions.

FEMALE LABOR FORCE PARTICIPATION IN POLAND¹

Poland is facing a rapidly aging population, which is expected to weigh on public finances and economic growth. Yet, there is an important underutilized source of qualified labor—Poland’s women. Women in Poland are on average just as educated as men and have a longer potential working lifespan. Nonetheless, female labor force participation is low relative to that for men and low relative to that in many other European countries. Unlocking this valuable source of growth would require leveling the playing field between men and women in the workplace, including by providing high-quality affordable childcare for young children, removing tax disincentives for the second earner in a family, and allowing the retirement age to increase as envisaged by the 2013 reforms. For Poland to unleash its full economic potential, it needs to embrace the vital contribution that women can make to its economy.

A. Introduction

- 1. Poland is facing an aging population.** By 2030, its working-age population² of around 27 million people is projected to shrink by about 3 million people or about 11 percent (Figure 1). By 2060, Eurostat projections suggest the working-age population will have shrunk by more than 30 percent. In turn, the old-age dependency ratio would increase dramatically. Today, for every one hundred persons of working age, there are about 20 people aged 65+. By 2060, this number is expected to increase to about 60 people, with adverse repercussions for social spending, as well as potential growth.
- 2. Alongside, fertility rates are among the lowest in Europe.** While fertility rates have been declining for some time now in Europe, Poland has seen a particularly large decline during the past half century as the number of children per woman more than halved—from an average of close to three in 1960 to 1.3 in 2014. As a result, Poland now ranks among the countries in Europe with the lowest fertility rate.
- 3. Could increasing women’s engagement in the labor force help?** While Polish women obtain as many years of schooling as Polish men, as of 2014, they accounted for only about 45 percent of the civilian labor force. In fact, for every 100 women of working age, only 61 of them were participating in the labor force. At the same time, women’s life expectancy at birth stands at 81 years—well above that of men at 73 years. Hence, the potential for boosting women’s participation in the labor market is notable and could have significant macroeconomic effects. To that effect, closing the gender participation gap in OECD countries by 2030 could increase the level of GDP by 12 percent on average across the OECD (OECD, 2012). A static back-of-the-envelope calculation for Poland, assuming a standard production function with a labor share of 0.5, would suggest that increasing women’s labor force participation rate to that of men could be associated

¹ Prepared by Lone Christiansen and Robert Sierhej, drawing on Christiansen and others (2016).

² For the purposes of this chapter, the working-age population refers to people aged 15–64, unless otherwise noted.

with about 5 percent higher output. If the overall participation gap vis-à-vis the EU frontier was also closed, the effect would be notably larger.

4. This chapter discusses the scope for increasing women’s labor force participation in Poland. First, we present the stylized facts in a cross-country perspective. We then discuss potential drivers of female labor force participation as identified by the literature. Subsequently, we discuss the current policy setting in Poland related to women’s participation in the labor market. Finally, we conclude and point to specific policies that may be particularly relevant in the Polish setting, drawing on international experience.

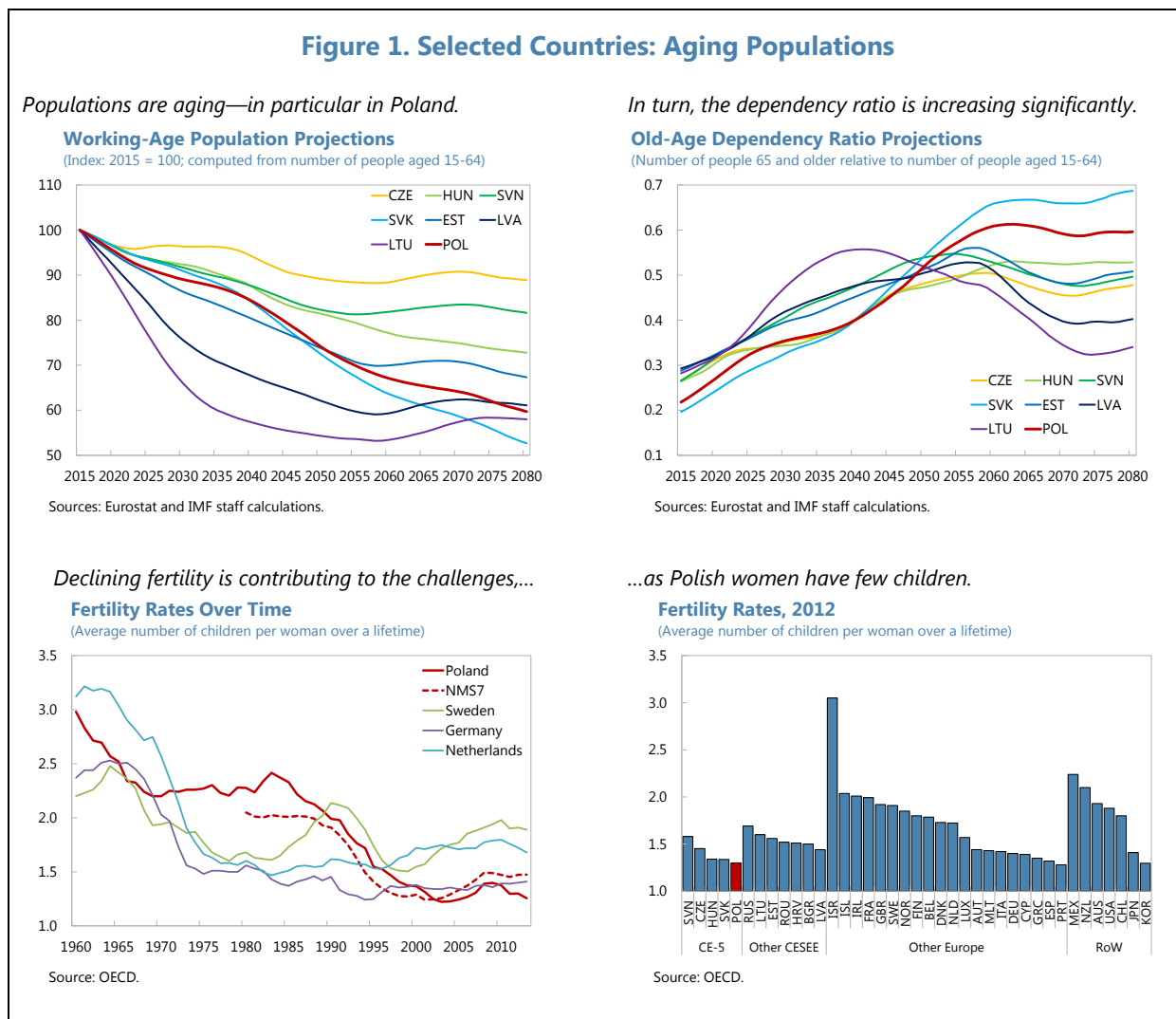
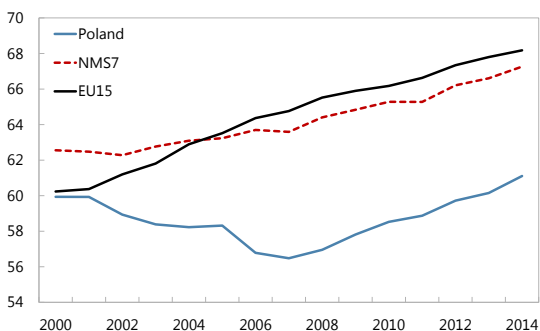


Figure 2. Selected Countries: Female Labor Force Participation in Europe

The Polish participation gap widened during 2000–07...

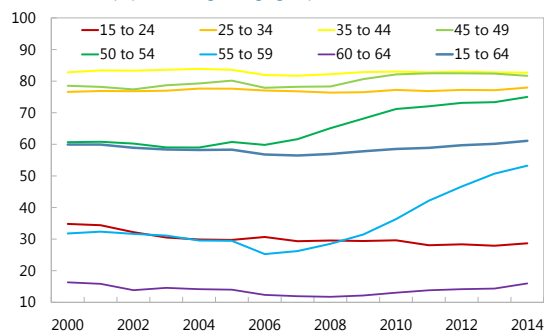
Labor Force Participation Among Women Aged 15-64
(Percent)



Sources: OECD and IMF staff calculations.

...but reversed as the 50–59 year-olds increased activity.

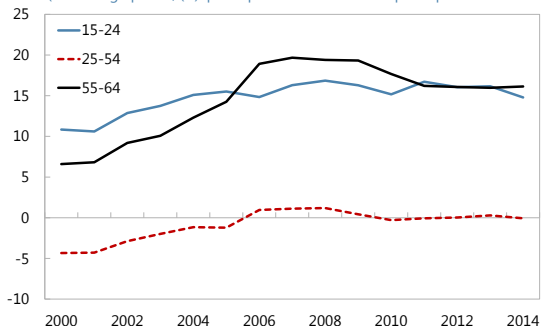
Poland: Female Labor Force Participation By Age
(Percent of population in given age group)



Source: OECD.

Nonetheless, a significant gap remains.

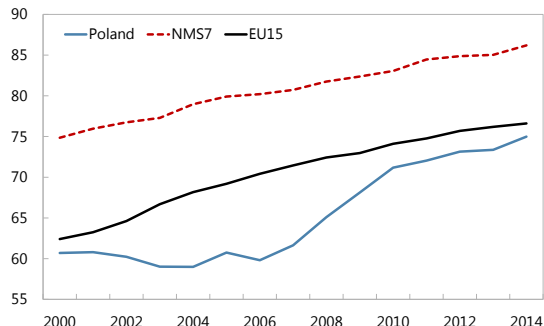
Poland: Female Labor Force Participation Gap Vis-a-Vis EU15
(Percentage points; (+): participation in EU15 above participation in Poland)



Sources: OECD and IMF staff calculations.

While the 50–54 year olds are almost on par with EU15,...

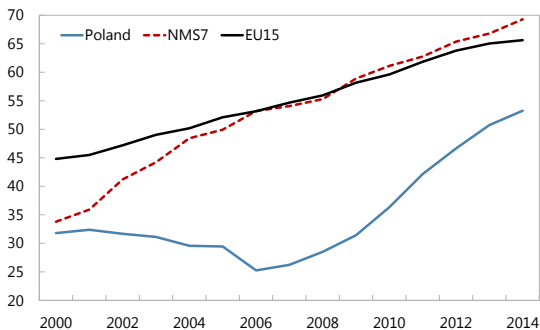
Labor Force Participation Among Women Aged 50-54
(Percent of population in given age group)



Source: OECD.

...55+ women continue to fall behind,...

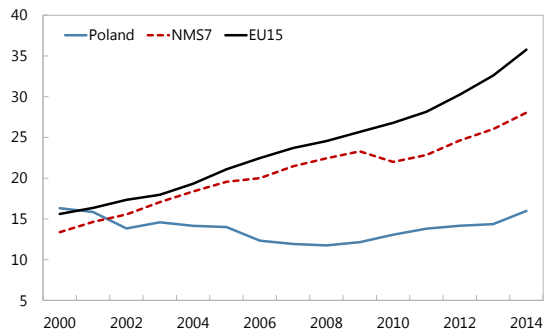
Labor Force Participation Among Women Aged 55-59
(Percent of population in given age group)



Source: OECD.

...with stagnant participation among 60–64 year-olds.

Labor Force Participation Among Women Aged 60-64
(Percent of population in given age group)



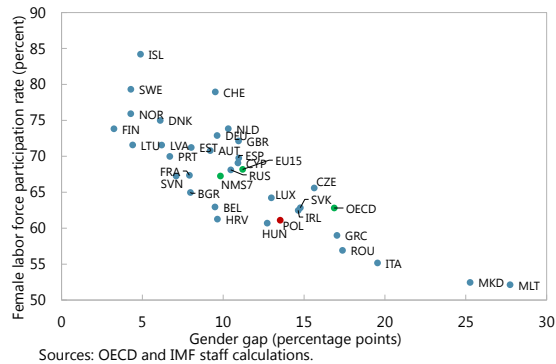
Source: OECD.

Figure 3. Selected Countries: Education and Part-time Employment

The gender gap is significant,...

Female Labor Force Participation and the Gender Gap, 2014

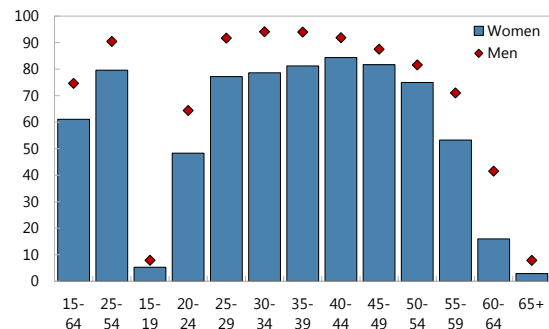
(Based on women and men aged 15 to 64)



...in particular among younger and older women.

Poland: Labor Force Participation by Age, 2014

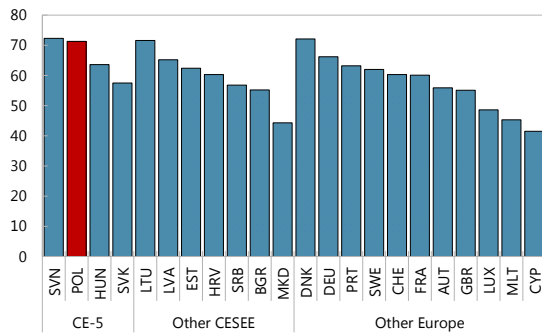
(Percent of population in the given age group)



However, young Poles are highly engaged in education,...

Men and Women in Education, Ages 15-24, 2013

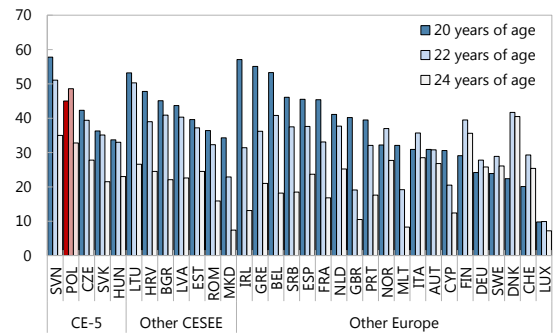
(Percent of total number of people aged 15-24)



...in particular tertiary education,...

Men and Women in Tertiary Education by Age, 2013

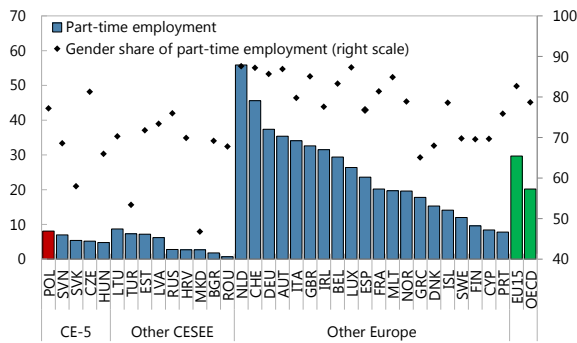
(Percent of total number of people in given age group)



...and Polish working women tend to work full time.

Extent of Part-time Employment Among Women, 2014

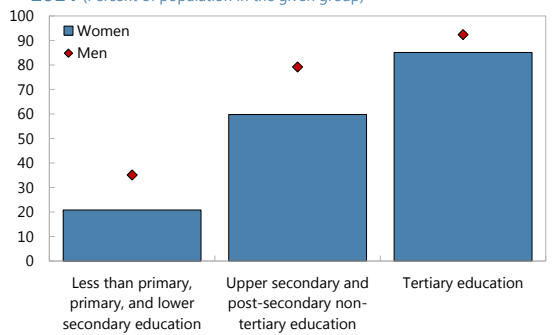
(Part-time employment: percent of total employment; gender share: percent)



Highly educated women are active participants.

Poland: Labor Force Participation by Level of Education, 2014

(Percent of population in the given group)

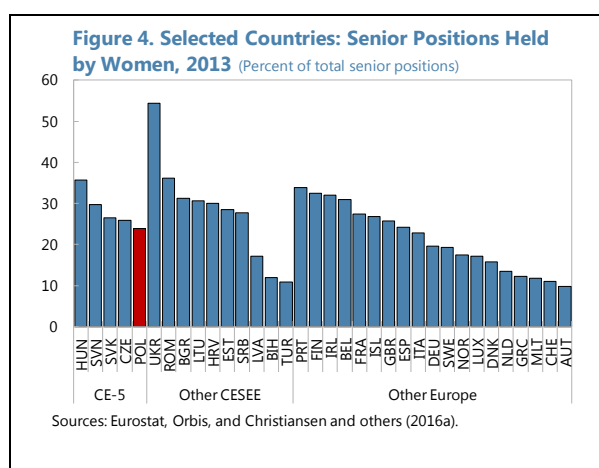


8. Notably, the younger childbearing and older segments of the female population appear to have the largest gender gaps. While the gender participation gap is positive across most ages, a few age groups stand out. Consistent with a life-cycle perspective, women of prime childbearing ages (here defined as ages 20–39) are markedly less active in the labor market than men, with an average gender participation gap of close to 15 percent. In addition, while the gender gap is narrower for women between the ages of 40 and 54, women tend to withdraw from the labor market well before men do.

9. Those who work, usually do so at full time. While some countries in Europe are characterized by a high degree of part-time employment—in particular the Netherlands where more than half of women are employed at less than full time—the prevalence of part-time employment at 8 percent of employed women in Poland is less than half the share seen on average in the OECD (Figure 3). Hence, any increase in women’s labor force participation in Poland would be most likely associated with an increase in the share of women in the labor force rather than an extension of the length of their usual workweek. In addition, women with tertiary education appear more likely to be active in the labor market than women with lower degrees of education.

Women in the corporate sector

10. Female representation is also well below gender equality in top levels of the career ladder. In fact, in 2013, in a sample of about 10 thousand non-financial corporations in Poland, less than a quarter of senior positions⁴ were held by women (Figure 4). While this is only slightly below the median country in the sample of more than 2 million companies, it is well below levels in several peer economies such as Hungary and Romania (Christiansen and others, 2016a). This is also consistent with a recent survey by Cribis of 242,000 commercial code companies in Poland where 22 percent report being managed by women, in particular in the areas of education, social assistance, healthcare services, and small retail trade (Cribis, 2016). That said, in 2013, the Polish Ministry of Treasury (MoT) introduced a gender-representation plan for state-controlled companies, aiming at 30 percent female representation at supervisory boards. Accordingly, the MoT has noted that publicly quoted state-controlled firms were close to that target in mid-2015. Nonetheless, it highlights the significant room for further boosting female representation not only in the labor force at large but also in senior positions. To that effect, Christiansen and others (2016a) found a strong positive association between firms’ gender diversity in senior positions and



⁴ Defined as managers and corporate board members.

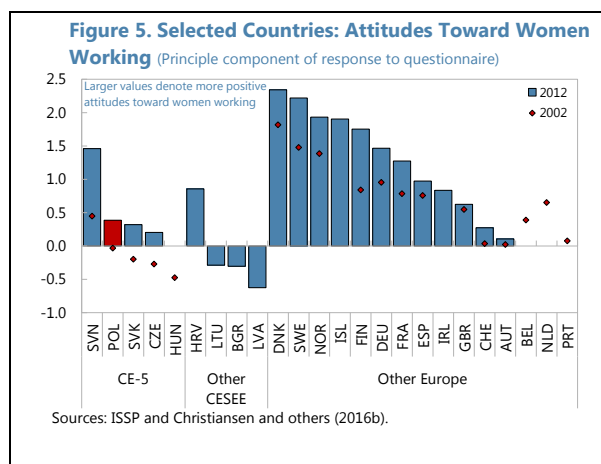
corporate financial performance—in particular in sectors where women comprise a larger share of the labor force and where greater creativity and innovative capacity are in high demand.

C. Drivers of Female Labor Force Participation

11. Both individual characteristics and policies contribute to shaping women’s employment decisions. As shown in Christiansen and others (2016b), individual characteristics, preferences, and attitudes may affect whether or not a woman chooses to work—for pay—outside the home. However, the study also shows that even after accounting for personal characteristics and preferences, policies matter. Below, we briefly list some of the factors that have been highlighted in the literature as correlates with the level of female labor force participation. The subsequent section then describes the current policy setting in Poland.

12. Individual characteristics, preferences, and attitudes:

- Individual characteristics.** The larger the number of young children in the household, the less likely a woman is to be employed. In this context, labor supply varies over the life cycle as personal demands change with age (Heckman and MaCurdy, 1980; Fernández and Wong, 2014). However, more years of education is generally associated with a higher degree of employment (Eckstein and Lifshitz, 2011; Pissarides and others, 2005). In addition, McGinn and others (2015) showed that women are more likely to work if they grew up with a working mother. That is, as women become increasingly engaged in the work force, it has important spillover effects from an intergenerational perspective and would likely help boost women’s participation rates going forward.
- Preferences and attitudes.** Social norms may also affect how women themselves regard participating in the labor force. Based on data from the International Social Survey Programme (ISSP), it appears that women’s own attitudes in Nordic countries are more favorable towards working than in several emerging European countries (Figure 5). Across most countries, however, attitudes have become more favorable towards women working during the past decade (see also Christiansen and others (2016b)).



13. Policies:

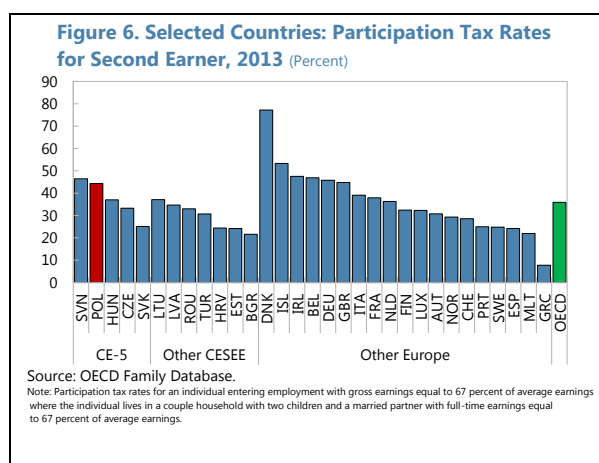
- Tax policy.** Fiscal disincentives can discourage women from entering the labor market (Bick and Fuchs-Schündeln, 2014; Dao and others, 2014). In particular, joint taxation, as is the case in Poland, would tend to have higher marginal tax rates on the second earner in a family—usually a woman.

- Childcare and family benefits.** The availability of high-quality childcare facilitates working outside the home and, hence, can help support female labor force participation (Jaumotte, 2003; Thévenon, 2013). However, family cash allowances would often tend to discourage women from participating in the labor force, owing to their income effect (Jaumotte, 2003; Christiansen and others, 2016c). Leave policy may also help boost female labor force participation as they allow temporary absence from employment to care for children (Jaumotte, 2003; Thévenon, 2013). That said, excessive or too generous leave policy could have the opposite effect (Ondrich and others, 2003; Edin and Gustavasson, 2008). In addition, this could induce employers to perceive women as high-risk workers (Sobocinski, 2014).

D. Policies in Poland

The cross-country and historical perspective

14. **Both tax and expenditure policy suggest available room to support women’s decision to work outside the home.** With respect to tax policy, the participation tax rate⁵ for the second earner in a family in Poland is well above that in the median European country as well as the OECD average, suggesting the existence of tax-induced disincentives to work (Figure 6). Moreover, public spending on family policy—including tax breaks, services, and cash transfers—in Poland as of 2011 was low by international standards. As of 2011, public spending on family benefits accounted for 1¾ percent of GDP—only about two-thirds of the OECD average (Figure 7). Such spending was low also when compared to regional peers. That said, the allocation of spending and not only the amount of spending is an important factor in assessing the need for potential new spending. In that respect, international practice can be a helpful guide in identifying policies for Poland that could prove effective in boosting female labor force participation (Box 1).

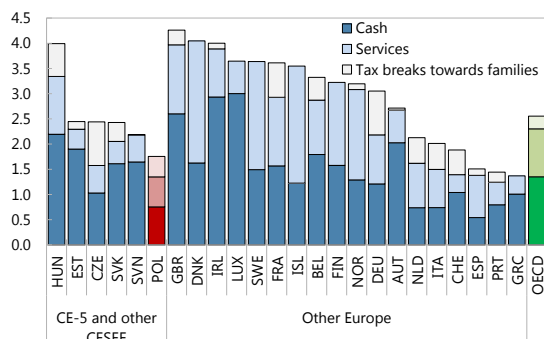


⁵ The participation tax rate for the second earner in a family, as defined by the OECD, measures the extent to which taxes and benefits reduce the financial gain of moving into work. It is defined as the net income for an equal dual-earner couple household as proportion of net income for a single-earner couple household where both have identical household earnings.

Figure 7. Selected Countries: Family Policy

Public spending on family benefits ranked low in 2011...

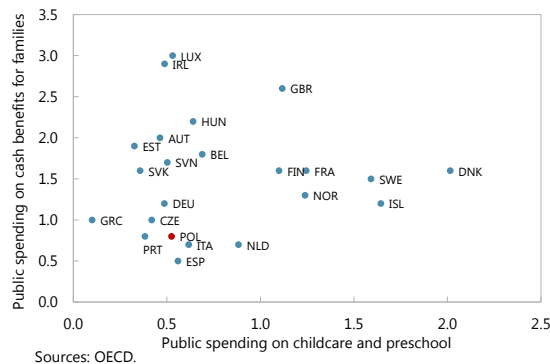
Public Spending on Family Policy, 2011
(Percent of GDP)



Source: OECD Social Expenditure Database, September 2014.

...both across cash benefits and childcare spending.

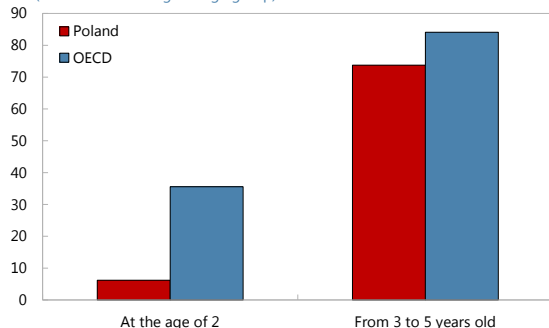
Spending on Family Cash Benefits and Childcare, 2011
(Percent of GDP)



Sources: OECD.

Few of the youngest children attend pre-school,...

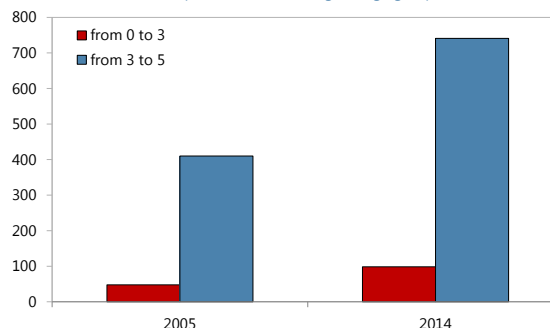
Enrollment Rates by Age, 2013
(Percent of total in given age group)



Source: OECD.

...as coverage has been targeted at the 3–5 year olds.

Poland: Coverage of Pre-School Education
(Number of children per 1,000 children in given age group)



Source: Statistical Yearbook 2015, GUS.

15. The family policy package consist of three main components: tax breaks, services, and cash benefits.

- **Tax breaks.** Tax breaks that relate to personal income tax (PIT) are mainly related to (i) joint filing by married couples⁶ (family tax credits)—which in 2013 accounted for PLN3.2 billion (0.2 percent of GDP)—and (ii) child tax allowances—PLN5.5 billion (0.3 percent of GDP). With respect to child tax allowances, these are means-tested only for the first child and were increased for the third and any subsequent children in 2014.⁷ In turn, these changes allowed families to deduct child tax allowances against PIT, social security, and health contributions.
- **Services.** In Poland, spending in this category is mainly related to pre-school education managed by local governments. As of 2011, such spending in percent of GDP corresponded to around two thirds of the OECD average—though was broadly on par with regional peers. While the share of children aged 3–5 that were covered by pre-school education almost doubled

⁶ Joint filing is also applicable to single parents with children.

⁷ After the 2014 changes, the child tax allowance for the third child is 80 percent above that for the first and second children, and it goes up by an additional 35 percent for the fourth and subsequent children.

during 2004–14, an enrollment gap remains relative to the OECD average. Furthermore, the enrollment gap is particularly large for early childhood education, with the ratio for 2-year olds in Poland corresponding to less than 20 percent of the OECD average. In sum, despite broadened coverage of early childhood facilities,⁸ availability remains scant by international standards.

Box 1. Selected Countries: What Have Other Countries Done? The Nordic Perspective

The gender participation gap is small and fertility is high in Sweden. In 2014, at almost 80 percent, labor force participation among women was merely 4¼ percentage points below that of men. At the same time, women had on average about 1.9 children—only surpassed by a handful of other countries in Europe. In addition, close to 90 percent of Swedish women choose to work at full time.

What factors may help explain the prevalence of both high female labor force participation and high fertility? In addition to a general positive attitude toward women working, policies in Sweden are distributed along the lines of what the literature would suggest would have significant positive impact:

- *Taxation.* Following the OECD's approach, the participation tax on the second earner stands only at around 25 percent and rank among the lowest in Europe.
- *Public spending.* While total public spending on family policy as of 2011 is generally high at more than 3½ percent of GDP, more than half is allocated toward services such as childcare and pre-school facilities.
- *Leave policy.* Paid maternity and parental policy is generally generous, with total paid leave of 38 full-rate equivalent weeks.
- *Retirement age.* The average effective retirement age during 2009–14 among women in Sweden was 64 years.

The experience is not unique to Sweden. While Sweden is close to the European frontier with respect to labor force participation among women between the ages of 15 and 64, other Nordic countries also perform well. Female labor force participation at 84 percent in Iceland coincides with a fertility rate above 2, and fertility rates in Norway, Finland, and Denmark are only slightly below that in Sweden. Alongside, public spending on preschool and childcare in Iceland and Denmark as of 2011 exceeds 1½ percent of GDP, while family cash allowances in Iceland at 1.2 percent of GDP ranks below that in a number of European countries, including Sweden. In contrast, paid leave entitlements available to mothers vary markedly among the Nordic countries—from just above 45 full-rate equivalent weeks in Norway to 27 full-rate equivalent weeks in Denmark. Finally, women tend to have relatively long working careers in several of the Nordic countries, with effective retirement ages of 68 and 64 in Iceland and Norway, respectively, during 2009–14.

- **Cash benefits.** Cash benefits relate largely to means-tested (i) child birth grants and (ii) family allowances (for children aged 0–18 years old). While family-related cash allowances in 2011 in Poland accounted for more than one third of family policy spending, these have traditionally been low by OECD standards—both relative to GDP (about half the OECD average) and as a share of total family policy spending (10 percentage points below the OECD average). While the Ministry of Finance (MoF) has noted that family allowances have been relatively well-targeted (covering some 40 percent of the population in the first quintile of the income distribution and

⁸ Specific action included the special 'Maluch' program, approved in 2011, to encourage local governments to set up facilities for early childhood education.

20 percent in the second quintile), it has also highlighted that improvements could be made to better address the risk of poverty (MoF, 2015). This is particularly relevant as only half of the population below the absolute poverty line received family allowances.

Recent changes

16. Spending on family policy has increased sharply with the new child benefits program.

The new 'Family 500+' benefits program took effect in April 2016 and resulted in a marked increase in family cash allowances.⁹ Overall, the program is to cover about 2.7 million families, including 3.6 million children (about 10 percent of Poland's population). These benefits will amount to about 40 percent of average disposable per-capita income in 2014. In turn, government estimates put the total annual budgetary cost at around 1 percent of GDP during 2017–19, likely raising family policy spending to close to 3 percent of GDP per year—above the OECD average.

17. This follows a move toward more generous leave policy both in terms of length and income coverage. Poland's maternity leave regulations are generous. In 2013, paid maternity leave was increased from 20 to 26 weeks,¹⁰ well above the EU legislative minimum of 14 weeks (of which 2 weeks mandatory) (EPRC, 2014) (Figure 8). More recently, 26 weeks of paid parental leave have been added to allow an extension of the total leave period. In terms of income coverage, maternity benefits amount to 100 percent of the salary when 26 weeks of leave are taken or to 80 percent of the salary when a total of 52 weeks of leave are taken, including 26 weeks of parental leave.¹¹ In addition, Polish parents have the availability of childcare (parental) leave with job protection of up to three years.¹²

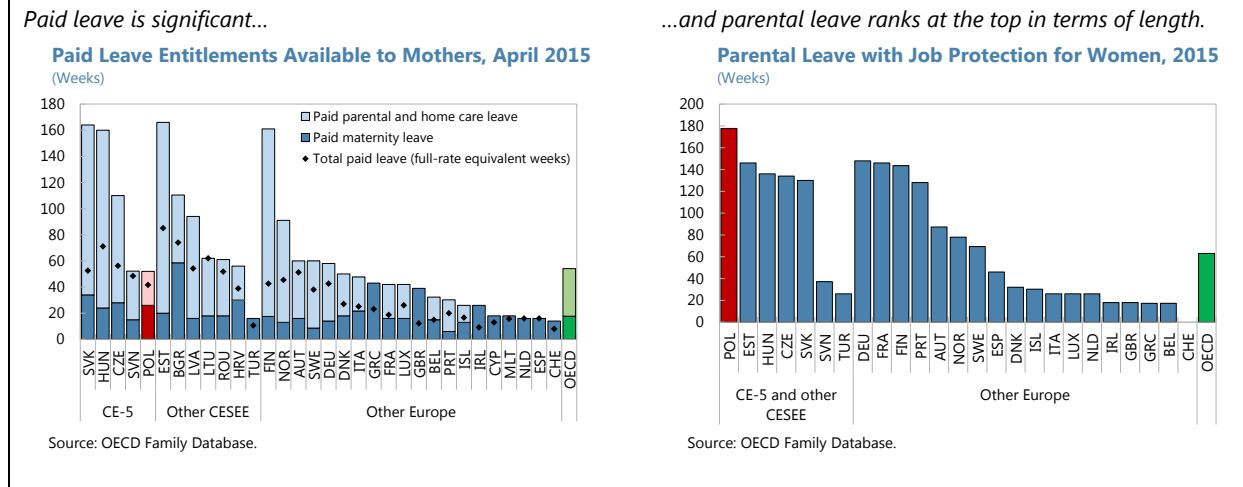
⁹ The new program envisages non-means-tested benefits of PLN500 per month for the second and each subsequent child. For poorer families with monthly income of less than PLN800 per person, the first child will also be entitled to this benefit.

¹⁰ Of this, 20 weeks are obligatory (14 for the mother and 6 transferable to the father).

¹¹ As of 2016, maternity benefits are paid also to uninsured women (students, unemployed, farmers) in the amount of PLN 1,000 per month, about ¼ of the economy-wide average wage.

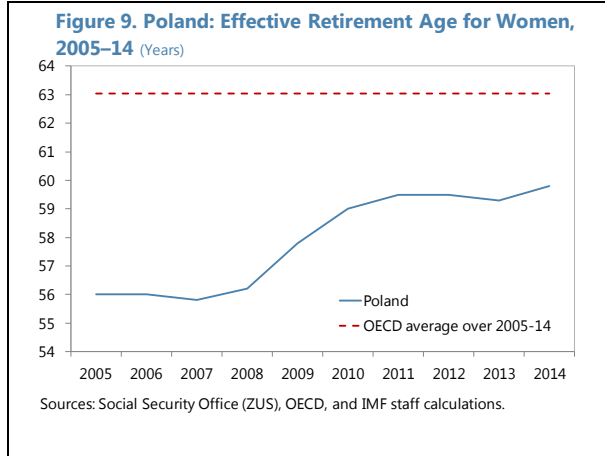
¹² Childcare leave is unpaid but counted in the employment period and covered by social insurance (contributions are paid by the state budget). A person on childcare leave can request part-time work employment from the employer, which must be accepted.

Figure 8. Selected Countries: Leave Policy



18. In contrast, retirement regulations for women have been tightened in recent years.

Until 2009, early retirement regulations allowed women to retire five years before the statutory age of 60, providing 30 years of social security insurance.¹³ Additionally, sector-specific early retirement schemes applied, including in the education sector, where women account for the vast majority of employment. In turn, this resulted in widespread uptake of early retirement among women and an effective retirement age of 56 during 2005–08 (Figure 9). However, starting from 2009, the window for early retirement was closed and sector-specific privileges curtailed, yielding a substantial increase in the effective retirement age. The statutory retirement age was later increased to 67 with the 2013 changes to the pension system, equalizing it for men and women.¹⁴ That said, as of 2014, the effective female retirement age remained well below the OECD average, and ongoing policy discussions aim at reversing the 2013 increases in the retirement age.¹⁵

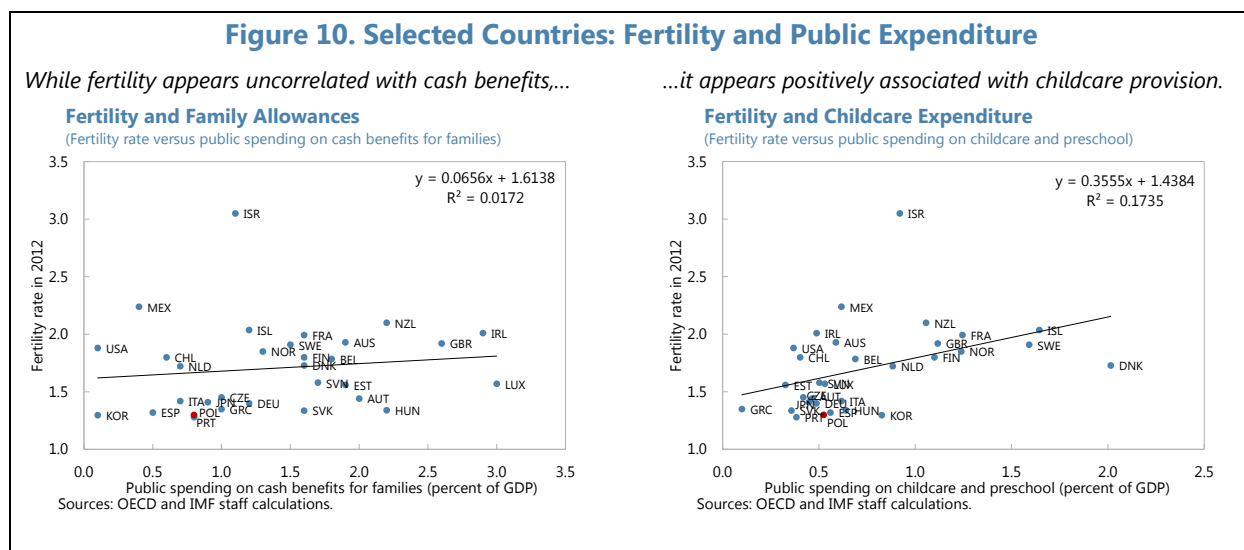


¹³ This included non-contributory years (parental leave or education), which could represent up to 1/3 of the total.
¹⁴ The process is gradual, by 3 months per year, with the target retirement age for men to be reached in 2020 and for women in 2040.
¹⁵ The President has submitted to parliament a draft law to restore the previous retirement age of 60 and 65 for men and women, respectively.

Potential implications of recent changes

19. Recent policy measures could weaken women’s incentives to work. Both the ‘Family 500+’ benefits program and potential changes to the retirement age under discussion would likely have adverse effects on female labor force participation.

- **‘Family 500+’.** As noted above, lump-sum transfers under this benefits program would be a dominant factor in family policy. However, cash transfers are often found to have limited impact on fertility¹⁶ and tend to be associated with lower female employment rates (Christiansen and others, 2016b). In contrast, spending on childcare facilities appears to be more positively associated with fertility (OECD, 2011; Greulich and others, 2013) (Figure 10).
- **Potential lowering of the retirement age.** If the retirement age is lowered to 2013 levels, the envisaged prolonged attachment to the labor market among women would likely not materialize, adversely impacting the effective old-age dependency ratio. The increase in participation rates observed among 55–60 year-old women after early retirement schemes began to be phased out in 2009 highlights the effectiveness of such measures in retaining women in the workforce.



E. Conclusion

20. Female labor force participation in Poland is low, in particular among seniors. While labor force participation among women of prime working age (25–54) does not stand out relative to peers, it is below that of men. Furthermore, women tend to withdraw from the labor market earlier than men, owing to retirement-age regulations, despite an expected longer life span. In turn, the effective retirement age for women in Poland at about 60 is notably below the OECD average of about 63.

¹⁶ A review of the literature is also discussed in Sobocinski (2014).

21. Polish family-related policies have focused on leave and cash transfers rather than childcare provision. Until recently, family policy in Poland has been largely based on leave policy and tax breaks, alongside relatively low levels of spending on childcare facilities and cash benefits. However, a new policy initiative has now significantly increased spending on family cash transfers. In light of cross-country empirical evidence, which tends to point to a negative association between cash transfers and labor market participation but a positive association with childcare provision, this suggests a development in the wrong direction with respect to increasing female labor force participation.

22. International practice suggests the impact of policies on female labor force participation and fertility could be improved. Nordic countries, which rank among countries worldwide with the highest levels of female labor force participation rates have allocated substantial public funds to childcare and preschool facilities, while encouraging long working-careers but allowing for significant maternity leave. In this respect and given the demographic challenges faced by Poland, a larger impact on female labor force participation would likely result by redirecting resources toward pre-school education. Furthermore, such a change need not come at the expense of fertility. Additional focus on pre-school education is also recommended in the 'Europe 2020' strategy, where wide access to pre-school facilities is seen as vital for raising female employment rates (EC, 2015). Promoting flexible work arrangements could also help combining parenting with work, not least in light of the low prevalence of part-time work. Consideration should also be given to addressing potential disincentives to working arising from high participation tax rates on the second earner in a family, as also noted by the OECD (OECD, 2016). Lastly, lowering the retirement age would likely impact female labor force participation in the opposite direction and should be reconsidered.

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MACRO-FINANCIAL IMPLICATIONS OF THE BANK TAX¹

While the Polish banking sector is still generally healthy, bank profitability has recently declined, reflecting narrowing interest margins and other costs on banks. Going forward, the new bank asset tax is expected to further dampen bank profits and a prolonged low-interest-rate environment is likely to continue to weigh on bank returns.² Using bank-level data, this chapter analyzes the potential impact on bank profitability of the recently implemented bank asset tax. Furthermore, to examine macro-financial linkages, it undertakes an aggregate analysis to estimate implications for credit growth and economic activity. The chapter concludes with a summary of findings and policy recommendations.

A. Introduction

- 1. The Polish banking sector performs well on a number of financial soundness indicators.** Banks are well capitalized and the ratio of non-performing loans to gross loans, though still elevated, compares well within the region. Yet, return on average assets is below that in some other countries with similar capital adequacy ratios and NPLs, such as the Czech Republic. Nonetheless, returns to average equity in Polish banks are close to the regional average (Figure 1).
- 2. Bank profitability has recently declined.** The return on average assets has been trending down, starting in 2014 Q3³—with low interest rates being the main driving factor. In addition, most Polish banks have seen an increase in costs in 2015, in particular in the fourth quarter as the bankruptcy of SK bank and the associated payment of guaranteed deposits by the Bank Guarantee Fund (BFG) (about PLN 2 billion) impacted bank balance sheets. As a result, costs for banks grew at a much higher rate than income, resulting in declining efficiency (as measured by the cost-to-income ratio) (Figure 2).
- 3. Going forward, the new bank tax as well as some other factors would further reduce bank profits.** Starting in February 2016, the bank asset tax is levied on the total value of assets (less PLN 4 billion, own funds, and purchased sovereign debt) at a monthly rate of 0.0366 percent (or 0.44 percent per year).⁴ This tax may have created incentives for banks to increase holdings of (exempted) local government bonds. Nonetheless, back-of-the-envelope calculations suggest that tax outlays paid by banks in 2016 may still double relative to 2015 levels. In addition, costs on banks

¹ Prepared by Yorbol Yakhshilikov.

² While the new tax applies also to insurance companies, for the purposes of this annex, only the impact through the tax on banks and other depository corporations is assessed.

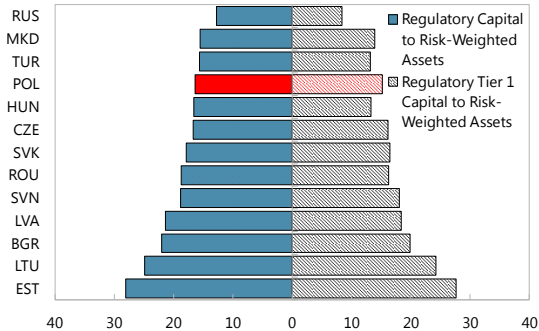
³ Returns on average assets (ROAA) is defined as net income relative to average total assets.

⁴ State-owned banks (relevant for BGK with legal status of state enterprise) and banks under recovery proceedings, in receivership, in liquidation, or those who filed for bankruptcy are excluded from the tax.

Figure 1. Selected Countries: Financial Soundness Indicators

Banks are well capitalized...

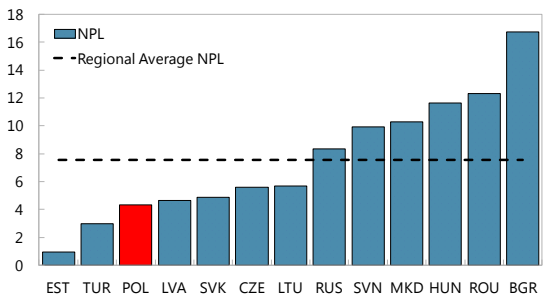
Capital Adequacy Ratios in CEEs Countries
(Percent)



Source: IMF Financial Soundness Indicators.

...and the quality of loans compares favorably.

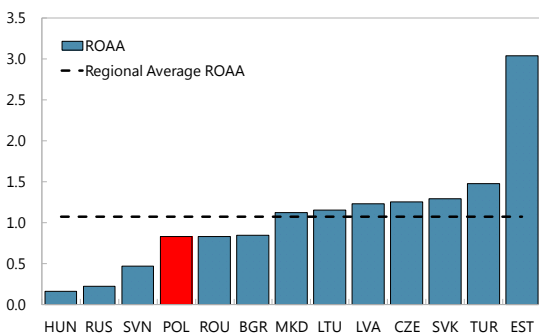
Non-Performing Loans to Gross Loans
(Percent)



Source: IMF Financial Soundness Indicators.
Note: In FCI definition NPLs and total gross loans include some other financial assets beyond loans.

While bank profitability is among the lowest...

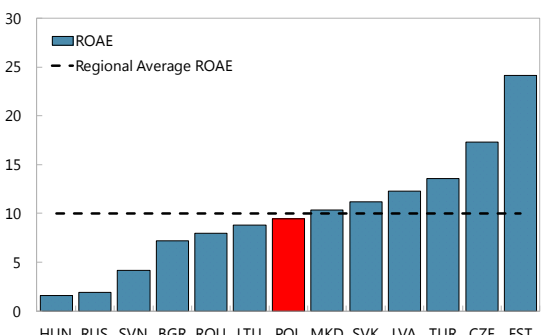
Returns On Average Assets
(Percent)



Source: IMF Financial Soundness Indicators.

...return on equity is at the regional average.

Returns On Average Equity
(Percent)

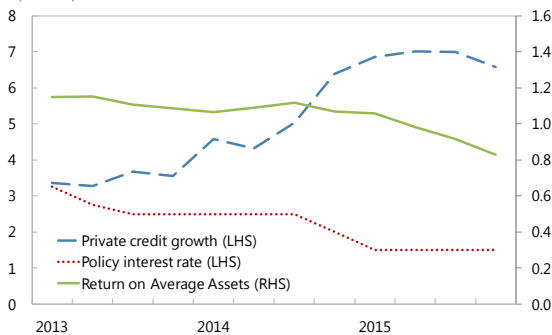


Source: IMF Financial Soundness Indicators.

Figure 2. Poland: Factors Contributing to the Recent Drop in Bank Profitability

Credit has expanded amid low interest rates....

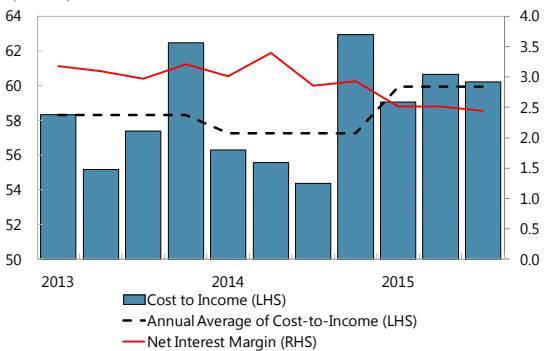
Factors Contributing to Polish Banks' Profitability
(Percent)



Sources: Haver Analytics and IMF Financial Soundness Indicators.

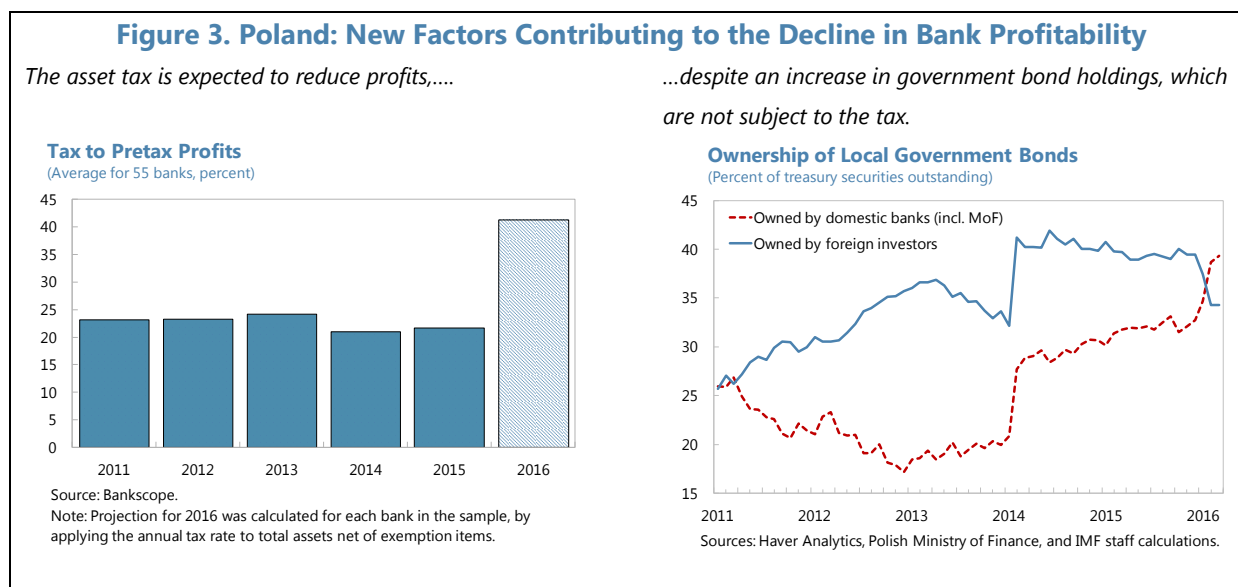
...but bank efficiency has deteriorated.

Efficiency in Poland's Banking Sector
(Percent)



Source: Bankscope.

are expected to increase, owing to increased contributions to BFG and contributions to finance the Borrower Support Fund (Figure 3).



4. Continued weakening of bank profitability would have implications for the real economy. As costs on banks, including related to the bank asset tax, would reduce bank net profits, this could potentially prompt banks to reduce their supply of loans. With reduced credit availability, private sector investment and consumption would decline, slowing economic activity.

5. This chapter assesses the impact of the new bank asset tax on bank profitability, credit, and overall economic growth. The analysis is carried out in two stages. First, in a bank-level analysis this chapter assesses the impact of the bank asset tax on bank profitability. Second, to assess the impact on overall economic activity through macro-financial linkages, an aggregate-level analysis assesses implications for overall credit to the non-financial sector and real GDP growth.

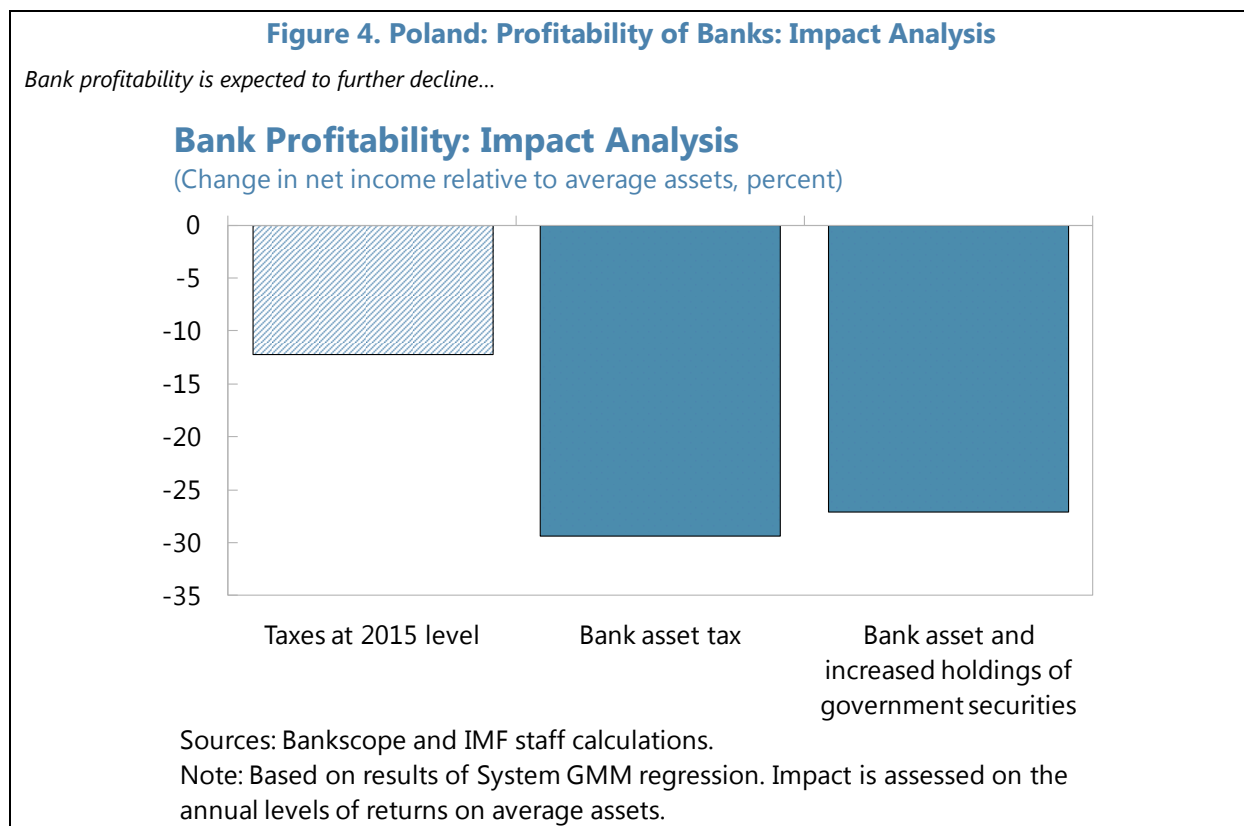
B. Bank-Level Analysis: Impact on Bank Profitability

6. Econometric analysis points to a significant impact from the bank asset tax on bank profitability. To quantify the impact of the new tax on banks, econometric analysis is employed on annual data for 55 Polish banks and other depository corporations (see methodological details below).⁵ Specifically, using panel regressions, individual bank profitability was projected for 2016 under two scenarios:

- **Scenario 1** assumes that interest rates and taxes remain at the 2015 level;
- **Scenario 2** assumes that taxes increase corresponding to the new asset tax.

⁵ For the purpose of this annex, the set of banks and other depository institutions are referred to as banks.

7. In both scenarios, Polish banks' profitability is expected to decline further. The analysis indicates that even in **Scenario 1**, the annual return on assets could decline by 12 percent in 2016 relative to 2015, largely owing to higher costs in 2015. **In Scenario 2**, the new bank asset tax could reduce profitability by an additional 18 percent.⁶ If, in order to reduce the tax base, banks responded by increasing their holdings of government securities by, for example, 10 percent relative to the 2015 level, the difference in bank profitability relative to **Scenario 1** would be 15 percent instead of 18 percent as shown in **Scenario 2**. Thus, even large increments in bank holdings of sovereign debt are likely to have only limited mitigating impact on profitability (Figure 4).



8. Aggregate regression analysis estimates the impact on the real economy. While the strength of the bank-level analysis includes the ability to control for bank-level characteristics, which may be important for explaining the evolution in profitability, it cannot fully capture dynamic effects. Specifically, with annual data, important higher-frequency information may be omitted, limiting the strength of the time-series analysis. In addition, data on lending are not available for all banks. For these reasons, the impact on economic activity is estimated using aggregate quarterly data.

⁶ According to Narodowy Bank Polski, the bank tax, combined with other costs, could increase the share of banks with negative net earnings from 2 to 22 percent of banking sector assets and reduce net earnings of the commercial banking sector by 60 percent (Narodowy Bank Polski, 2016).

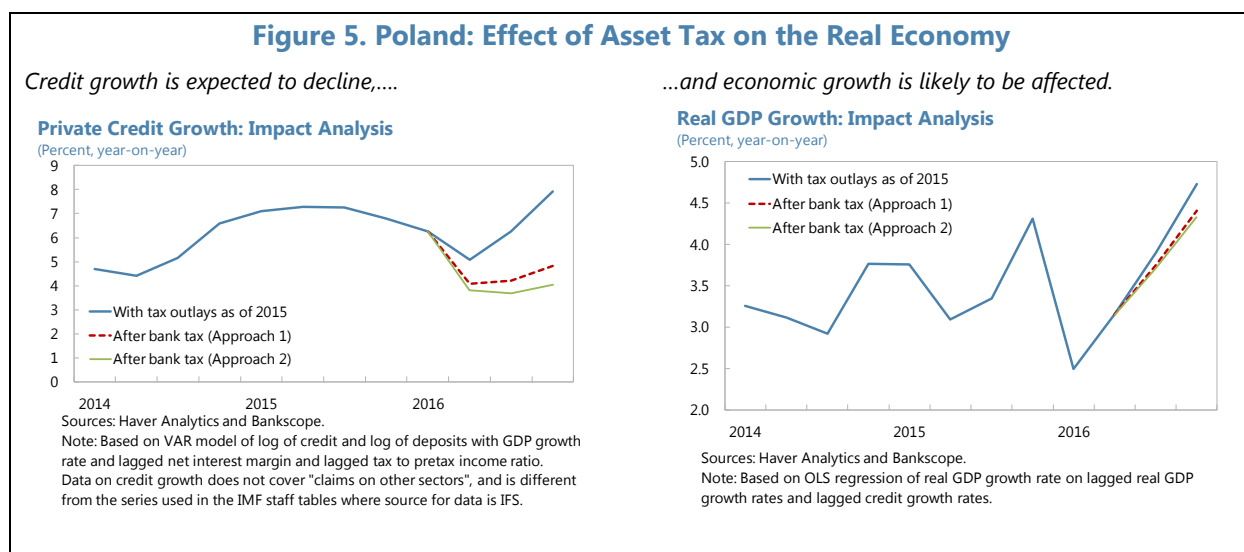
C. Aggregate Analysis: Macro-Financial Implications

9. The aggregate analysis suggests that the bank tax could weaken overall credit growth.

An aggregate vector autoregression (VAR) model is used to assess macro-financial implications of the asset tax (see Appendix I). First, a baseline scenario of no bank asset tax is projected from the VAR. Under this baseline, average credit growth in 2016 is expected to decline by 1 percentage points relative to 2015. An increase in tax outlays would reduce credit growth by between 3 (Approach 1) and 4 (Approach 2) percentage points at end-2016 relative to the end-year baseline. The following two approaches were used:

- **Approach 1** estimates the impact on credit growth, taking advantage of the bank-level estimate of the impact of the bank tax on profitability, discussed above;
- **Approach 2** estimates the impact on credit growth by including tax payments directly in the VAR instead of the indirect effect through bank profitability.

10. As a result, real sector activity would weaken. In order to quantify the impact on overall economic activity, a standard OLS regression framework is used with real GDP and credit growth rates (see Appendix I). Credit growth rates are then varied, corresponding to the two estimates from the VAR analysis above. As shown in Figure 5, after accounting for the impact of the bank tax based on the impact on credit growth found under Approach 1, real GDP growth by end-2016 would be about 0.3 percentage points below a no-tax scenario. Based on Approach 2, the impact could be as large as 0.4 percentage points below a no-tax scenario.



D. Summary of Findings and Policy Recommendations

11. This chapter finds that the bank tax can significantly reduce bank profits, slowing down credit and economic growth. Specifically, the bank asset tax could reduce bank profitability by 18 percent, significantly contributing to a total decline in profitability of 30 percent relative to 2015. Moreover, the analysis points to macro-financial implications. Based on aggregate data, credit growth at end-2016 may contract by between 3 and 4 percentage points relative to a projection without the bank asset tax. In turn, the effect of the bank asset tax on the economy would be significant. Staff estimates suggest that the bank tax alone could reduce GDP growth by up to 0.4 percentage points by end-2016.⁷

12. However, the analysis in this chapter may not fully account for all economic implications of the bank tax. For example, to the extent that the bank tax creates an incentive for banks to increase their holdings of government bonds, this could result in a shift from holdings of NBP bills to government bonds, potentially complicating the conduct of monetary policy. It could also crowd out private sector credit and intensify adverse feedback loops between the sovereign and banks, should public finances come under pressure. Moreover, policy uncertainty associated with potential introduction of additional distortionary sectoral taxes could further sour investor sentiment, increasing financing costs and weighing on public finances and growth. To mitigate the impact of the bank tax on profitability, banks could also respond by shifting lending away from corporate to more risky consumer lending, where spreads are higher, or shift lending activities to less-regulated non-banks. In turn, corporates may be able to obtain loans from other segments such as leasing companies.

13. The negative economic effects of the bank asset tax could be mitigated through better design. To the extent that a tax on banks is desired to raise revenue, a Financial Activities Tax (FAT) would be less distortionary for the private sector and the economy in general than a tax on assets (IMF, 2010). Denmark, Iceland, and Israel, for example, have imposed a FAT. A FAT, levied on the sum of profits and remuneration of financial institutions, is similar to a value added tax (VAT) from which the financial sector is currently exempt. Unlike the current bank asset tax, a FAT does not distort the structure of the activities undertaken by financial institutions themselves, as the tax depends on the level of profit, not on how the profit is earned or on the volume of turnover. For example, a 10–13 percent levy on bank profits and remunerations could generate the same revenue of PLN 4 billion expected from the current bank asset tax.⁸

⁷ Oxford Economics estimates that the impact of the asset tax could reduce 2016 growth by 0.2 percentage points (Bloomberg, April 20, 2016).

⁸ Israel levies an FAT at its standard VAT rate of 17 percent. Iceland levies a 5.5 percent tax on financial institutions' wages and a 6 percent tax on their profits above a floor of ISK 1 billion. The profit base of both taxes is normal rather than economic profits. Denmark levies a 10.5 percent tax on wages.

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Appendix I. Methodology

This chapter presents three types of analyses carried out to measure the macro-financial implications of the new bank asset tax. First, bank-level analysis provides the estimated impact of the asset tax on bank profitability. Second, to quantify the impact of the asset tax on the real economy, changes in credit growth are examined at the aggregate level. Subsequently, using the quantified impact on credit growth, this chapter estimates the association with real GDP growth.

1. Bank-level Analysis

The data used in this study are from the Bankscope database, with the final sample consisting of 39 commercial banks and 16 other depository corporations. The final sample was based on annual data, covering the period 2005–15.

Methodology

This chapter follows the framework of bank profitability, which depends on bank characteristics and the interest rate, as is common in the literature.

$$\begin{aligned}
 ROAA_{it} = & \beta_1 ROAA_{it-1} + \beta_2 (Net\ loans / Assets)_{it-1} + \beta_3 (Equity / Assets)_{it-1} \\
 & + \beta_4 (Cost / Income)_{it-1} + \beta_5 Log(assets)_{it-1} + \beta_6 Net\ Interest\ Margin_{it} \\
 & + \beta_7 GDP\ growth_{it} + \beta_8 (Tax / Pretax\ income)_{it} \\
 & + \beta_9 (Government\ securities/assets)_{it} + Year\ dummies + \varepsilon_{it}
 \end{aligned}$$

As elsewhere in the literature (Borio and others, 2015), bank characteristics include 1st lags of (i) returns on average assets to capture the persistence of the time series; (ii) net loans to assets to capture net liquid financial assets; (iii) equity to assets to capture banks' leverage; and (iv) cost to income ratio to capture bank efficiency. To capture the effect of the macroeconomic environment, the contemporaneous GDP growth rate and net interest margin (NIM) are included. Tax relative to pretax income is included to capture the effect of the tax outlays on banks' returns. Since government securities are exempt from the tax base, holdings of government securities relative to assets are also included.

Similar to Borio and others (2015), this chapter employs the system GMM approach. The attractiveness of this approach is that it deals with the potential endogeneity issues that may arise from a given specification and produces unbiased and consistent estimates. System GMM also allows for dynamic processes. Errors may have heteroscedasticity and serial correlation. The instruments used in the regression are "internal" and consist of the lags of the instrumented variables, collapsed together (Arellano and Bond, 1991).

Assessing the impact on bank profitability

Table 1 reports results from the main regression. As expected, bank liquidity and leverage are positively associated with profitability. Bank efficiency is negatively associated with bank profitability.

The bank size, measured by the log of assets, has a counterintuitive sign. Still, in regressions with different instrument specifications, the sign of the bank size had a negative and expected sign. Net interest margin, which reflects banks' reaction to changes in policy interest rates, has positive effect on banks profitability as expected. Bank profitability is also positively associated with higher GDP growth. Taxes are negatively associated with bank profitability, whereas holdings of government securities have positive impact. In addition, the diagnostics tests, as reported in the bottom section of the table, suggest well-identified internal instruments.

Table 1. Poland: Commercial Bank Performance

| | ROAA |
|----------------------------------|------------------------|
| Lag of ROAA | 0.0745 (0.0969) |
| Lag of net loans to total assets | 0.0119 (0.0089) |
| Lag of equity to total assets | 0.0418 (0.0257) |
| Lag of cost to income | -0.0152*** (0.0043) |
| Lag of log(assets) | 0.0193 (0.0896) |
| Net interest margin | 0.1728** (0.0716) |
| GDP growth rate | 0.0721 (0.2079) |
| Tax to pretax profits | -0.0091*** (0.0031) |
| Government securities to assets | 2.1937** (1.0585) |
| Observations | 328 |
| Number of banks | 55 |
| Number of instruments | 65 |
| P-value for Hansen statistics | 0.5505 |
| P-value for AR2 statistics | 0.4699 |

To forecast the impact of the asset tax on bank profitability a few assumptions were made. Specifically, assumptions were made on contemporaneous variables, NIM, tax to pretax income, GDP growth, and holdings of government securities. For the NIM, an assumption was of no change in

2016 relative to 2015.¹ For the tax variable, in Scenario 1 it was assumed that banks would pay the same ratio of tax outlays relative to pretax income. In Scenario 2, the increment in the tax outlay was calculated as per asset tax regulations on an annual basis. Data from individual banks in 2015 showed little change in the pretax income relative to 2014. Therefore, it was assumed that there was no change in the pretax income in individual banks in 2016 relative to 2015. Staff projections of GDP growth were used for 2016.

Based on the latest available data from 2015, the average tax outlays paid by banks relative to assets were 20 percent. With the new asset tax, this ratio is expected to double. In scenario 1 with assumed unchanged NIM and assumed tax outlays as of 2015, bank profitability is expected to decline by 12 percent. When the asset tax is accounted for in Scenario 2, bank profitability is expected to decline by an additional 18 percent, for a total reduction in profitability of 30 percent. While the coefficient on government securities holdings is positive, a ten percent increase in debt holdings jointly with the new tax will reduce profits by 27 percent.

While the analysis of bank profitability captures the direct effect of the tax on returns, there may, however, be other channels through which the asset tax affects banks' activity. With the new tax in effect for three months as of May 2016, individual banks have already started to engage in activities to reduce their tax base, including by increasing the holdings of government securities. Changes in the structure of loans may also occur. Nonetheless, whether such changes in the structure of loans will offset the initial negative effect of the asset tax is not clear.

2. Aggregate analysis

Credit flow

There is a natural link between credit flows and deposit flows in bank balance sheet. Therefore the VAR framework seems appropriate to capture the dynamics of these flows. At the same time bank characteristics, such as profitability, leverage, cost to income ratio, and cost components also influence the credit flows. To examine how bank profitability and tax outlays relate to credit supply, these indicators were included as exogenous variables in the VAR model.

The impact of the bank asset tax on credit was estimated using two different approaches, with the difference relating to the choice of exogenous variables:

- Approach 1: exogenous variables include lagged real GDP growth and bank profitability.
- Approach 2: exogenous variables include real GDP growth, lagged average banking sector NIM, and tax outlays relative to pretax income.

In Approach 1, quarterly data on return on average assets (ROAA) from the Bankscope database were used. When forecasting four quarters in 2016 in the baseline scenario, ROAA was adjusted

¹ While assumption of no change in NIM may appear strong, empirical data from individual banks over the last two years show slowly moving changes in the NIM.

downward by 12 percent year-to-year to reflect the estimates of the baseline projections of ROAA from the bank-level analysis. Similarly, in the impact scenario, ROAA in each quarter was reduced by 30 percent relative to the same quarter in 2015 as suggested by the bank-level analysis.

In Approach 2, NIM and tax outlays were obtained from the Polish Financial Supervision Authority (KNF) database, available online on the KNF website. Data for 2016Q1 already reflects recent changes in the tax outlays. For the rest of the quarters of 2016, it was assumed that tax outlays will be adjusted in the same proportion as in Q1 of 2016 relative to Q1 in 2015. No change in the net interest margin was assumed relative to the observed levels in the first quarter of 2016. Acknowledging that tax outlays only started in February, it is likely that the estimate of the impact is underestimated.

The VAR is estimated in log levels of credit and deposits. A Dickey-Fuller test on log credit rejects the null of a unit root, whereas the test for order of integration in log of deposits was inconclusive.² In selecting the lag structure of the VAR, two criteria had to be met. First, the Akaike Information Criteria in the selected model has to closely match the global min of AIC (which in both cases is modeled with up to 5 lags). Second, the coefficient of interest in each of the Approaches had to be as close as possible to their true coefficient estimates, as shown in the OLS regression of log of credits on lags of credit and the indicator of the interest (ROAA as in Approach 1, and tax to pretax income as in Approach 2). In the end, the lag structure of the VAR model fits best the true relationship between flows of credit, flows of deposits, and bank performance indicators.

Using staff projections for quarterly real GDP growth, it is then possible to estimate the impact on credit. With respect to Approach 1, the results of the effect of the asset tax through reduced bank profitability on credit are shown in column 1 of Table 2. With respect to Approach 2, as expected, tax outlays are negatively associated with credit as shown in column 3.

² Inconclusive results on non-stationary tests may be due to the short sample. However, when the difference in logs of credits and logs of deposits are considered instead, the effect of the asset tax is even larger.

Table 2. Poland: Effect of Bank Asset Tax on Aggregate Credit Levels

| | Approach 1 | | Approach 2 | |
|-----------------------------|-----------------------|------------------------|-----------------------|------------------------|
| | 1 | 2 | 3 | 4 |
| | Log (credits) | Log (deposits) | Log (credits) | Log (deposits) |
| Log(credits) | | | | |
| Lag 1 | 1.1632*** (0.1434) | 0.2507** (0.1243) | 1.2993*** (0.1638) | 0.1362 (0.1257) |
| Lag 2 | -0.2319 (0.1648) | -0.0211 (0.1428) | -0.2974 (0.1885) | 0.0975 (0.1447) |
| Lag 5 | | | -0.0223 (0.1916) | 0.1260 (0.1471) |
| Lag 6 | 0.2197** (0.1106) | 0.1853* (0.0958) | 0.1159 (0.1952) | 0.0632 (0.1498) |
| Lag 8 | -0.1868* (0.0969) | -0.3503*** (0.0840) | -0.1802* (0.1066) | -0.2905*** (0.0818) |
| Log(deposits) | | | | |
| Lag 1 | -0.1052 (0.1865) | 0.1381 (0.1616) | -0.3153 (0.2350) | 0.4366** (0.1804) |
| Lag 2 | 0.2198 (0.1950) | 0.2114 (0.1690) | 0.3538 (0.2530) | -0.0122 (0.1941) |
| Lag 5 | | | -0.0733 (0.2611) | -0.1777 (0.2004) |
| Lag 6 | -0.1654 (0.1799) | -0.0634 (0.1559) | -0.0181 (0.2422) | -0.0809 (0.1859) |
| Lag 8 | 0.0814 (0.1307) | 0.6332*** (0.1133) | 0.1555 (0.1525) | 0.6950*** (0.1170) |
| Lag of ROAA | 0.0131** (0.0054) | -0.0069 (0.0047) | | |
| Lag of net interest margin | | | 1.6404* (0.9708) | -0.0873 (0.7449) |
| Lag of tax to pretax income | | | -0.4052 (0.6401) | -0.8012 (0.4912) |
| GDP growth rate | | | 0.2820 (0.2206) | 0.4188** (0.1693) |
| Lag of GDP growth rate | 0.4430*** (0.1676) | 0.1609 (0.1452) | | |
| Constant | 0.0568 (0.2913) | 0.2911 (0.2524) | -0.0649 (0.2391) | 0.2423 (0.1835) |
| Observations | 43 | 43 | 43 | 43 |
| R-squared | 0.99 | 0.99 | 0.99 | 0.99 |

While the exercise analyzed the change in total loans, there may be changes in the structure of the loan portfolio, which this aggregate analysis does not capture. However, the empirical evidence from the first three months of the new asset tax suggests a reduction in corporate and mortgage loans—two large components of loans—and an increase in consumer lending—a smaller component of total loans. Overall, the changes in the structure of loans are not detrimental to the direction of credit growth in 2016 as a result of the bank asset tax.

One important caveat of the analysis is short data coverage and the use of levels rather than differences in the VAR setup. It is clear from the credit equation in both VAR models that the series is highly persistent. When instead credit growth and deposit growth were considered in the VAR setup, the effect of bank profitability and tax was even more prominent than suggested in the proposed model. In the future, however, as more reliable data becomes available the proposed model could be revisited to account for the statistical properties of the time series.

Real GDP growth

Linking the effect of the bank asset tax to the real economy is not straightforward. One natural channel through which the tax affects the real economy is via credit growth. Thus, by exploring the relationship between credit growth and GDP growth it is possible to approximate the impact of the tax on the real economy.

An OLS setup seems natural and the first step in establishing the direct link between credit growth and GDP growth rates. In this exercise, lagged credit growth rates are added to an autoregressive process of the GDP growth rate. The cumulative effect of the growth rate of credit over two consequent quarters is significantly and positively associated with GDP growth (Table 3).³

³ In a VAR setup of GDP, investment, and consumption growth, with credit growth as an exogenous variable, the cumulative effect of credit growth over two quarters is of the same magnitude as produced in the OLS regression. In the VAR, credit growth is also positively associated with investment and consumption growth. Considering the effect of suppressed credit growth on investment and consumption, the total effect on the real economy as shown in the OLS setup thus may be underestimated.

Table 3. Poland: Effect of Credit Growth Rate Change in GDP Growth Rate

| | GDP growth rate |
|--------------------|------------------------|
| GDP growth rate | |
| Lag 1 | 0.8436*** (0.0882) |
| Lag 4 | -0.3666*** (0.1016) |
| Credit growth rate | |
| Lag 1 | 0.1775*** (0.0539) |
| Lag 2 | -0.1349** (0.0507) |
| Constant | 0.0153*** (0.0038) |
| Observations | 49 |
| R2 | 0.7242 |