



ITALY

SELECTED ISSUES

July 2023

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July 5, 2023

Approved By
European Department

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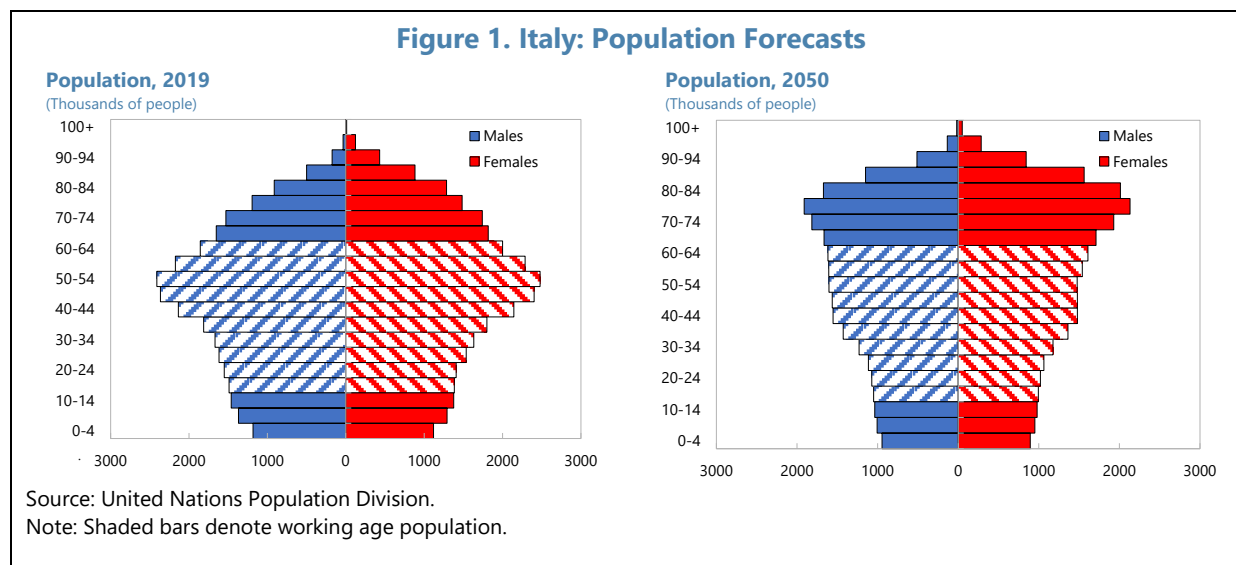
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POPULATION AGING IN ITALY: ECONOMIC CHALLENGES AND OPTIONS FOR OVERCOMING THE DEMOGRAPHIC DRAG¹

Italy's population is shrinking and aging rapidly. To counteract the effect of demographic decline on GDP, a coherent strategy is needed to significantly boost productivity and raise active employment. Ample scope for catchup exists on both fronts.

The Demographic Challenge

1. The Italian economy faces a daunting demographic challenge. The country's workforce is beginning to shrink due to rapid population aging, an extended period of very low fertility, and unfavorable net migration dynamics in the context of low female and youth labor participation.. The outlook is set to worsen: projections by the United Nations Population Division indicate that Italy's working age population will decrease by nearly 30 percent over the next 25 years (Figure 1)². Moreover, in the interim, the size of each incoming working-age cohort will be considerably smaller than the one aging out from the workforce. Therefore, unless offset by productivity- and employment-boosting policies, aggregate output could decrease sharply, which would raise the per capita burden of public debt.



¹ Prepared by Sylwia Nowak and Zhongxia (Sam) Zhang.

² The latest ISTAT projections are less negative and show that the Italian working age population would decline by roughly 20 percent over the same period.

2. A simple growth accounting framework illustrates the size of the challenge. Using a standard Cobb-Douglas production function, aggregate output, Y , can be described by:

$$Y_t = A_t K_t^\alpha L_t^{1-\alpha} \quad (1)$$

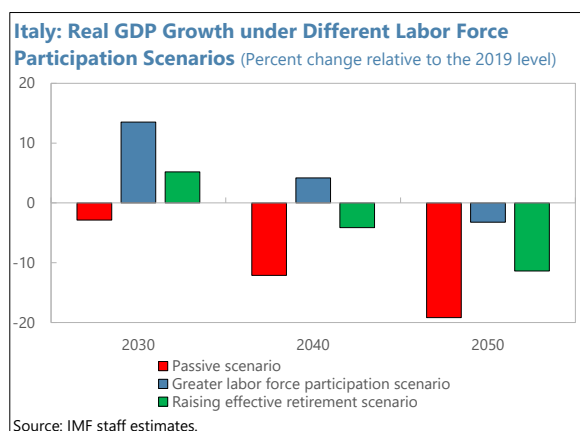
$$K_t = (1-\delta) * K_{t-1} + I_{t-1} \quad (2)$$

where A , K and L denote, respectively, total factor productivity (TFP), stock of physical capital and the number of people in employment, and where α is capital's share of output. The capital stock depends on current period investment and depreciation of existing capital. Letting g denote rate of growth, output growth is the sum of the growth rate of TFP and the weighted average growth rates of employment and capital:

$$g^Y = g^A + [\alpha * g^K + (1 - \alpha) * g^L] \quad (3)$$

A reference year of 2019 is used, and historical data on output and investment come from Istat's national accounts, population projections by age distribution are from the UN's World Population Prospects, and the ratio of the capital stock to output and the capital depreciation rate for Italy are taken from the Penn World Tables. In what follows, the investment rate is assumed to remain at its historical average of 20 percent of GDP, with a depreciation rate of 4 percent.

3. Three scenarios are of interest. A *passive* scenario is characterized by unchanged TFP (not dissimilar to Italy's experience during recent decades) and constant labor force participation rates. This scenario is somewhat more pessimistic than staff's medium-term forecast for potential growth which includes a modest increase in productivity and higher public investment brought by the NRRP. A *higher labor force participation* scenario highlights the importance of raising labor force participation and closing the gender employment gap. The passive scenario is augmented by a step increase in 2024 in both male and female labor force participation rates from their current levels of 74 percent and 55 percent to the EU-average male participation rate of 80 percent. A *raising effective retirement age* scenario builds on the previous scenario by looking at the effect of raising participation of older workers by prolonging their working lives. While Italy has a statutory retirement age of 67 years—higher than in most EU countries—a myriad of early retirement schemes reduces the effective retirement age to just below 64 years. The scenario assumes the effective retirement age increases to 70 years in 2024.



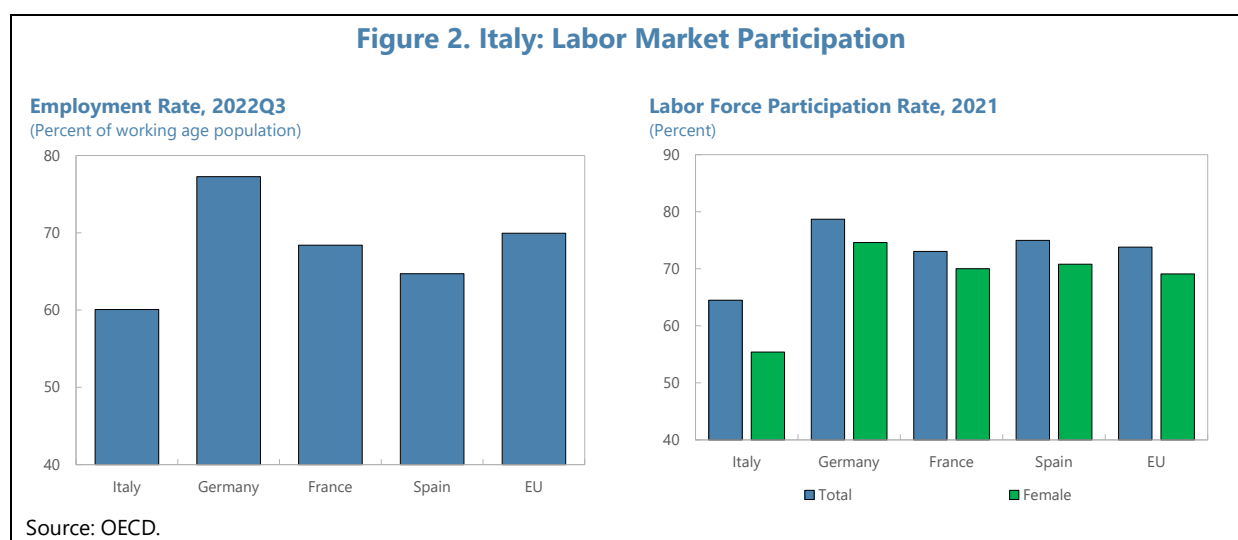
4. These scenarios illustrate the significant drag on output of a shrinking workforce, as well as the important mitigating role of increasing labor market participation. In the *passive scenario*, real output drops relative to 2019 by 3 percent in 2030, 12 percent in 2040, and almost 20

percent in 2050. Boosting labor force participation and lifting the effective retirement age can raise output substantially by 2030 (when the demographic drag is still small), but are insufficient to avert output decline by 2050. Therefore, without a meaningful improvement in labor productivity—by raising TFP and the capital-labor ratio—activating additional Italian workers would not be sufficient to offset the demographic drag.

Italy’s Structural Gaps and How to Close Them: “Quick Wins”

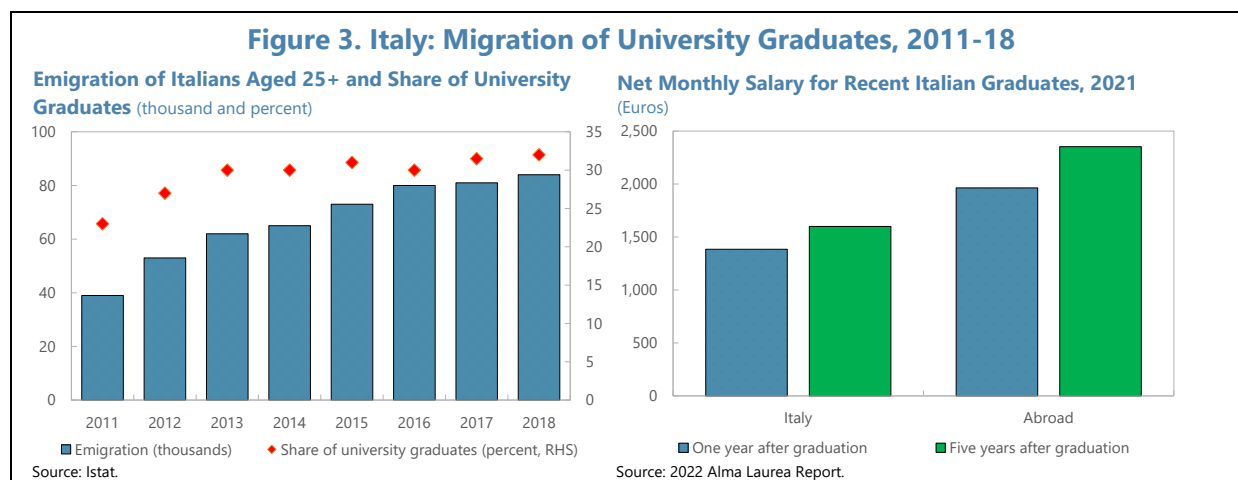
5. Reforms and investments that grow productivity and modernize the economy are essential to address the adverse demographic outlook. An ambitious reform agenda—such as the one established in the NRRP—is needed to address Italy’s long-standing impediments to productivity, investment, and labor force participation. However, even if reforms are implemented fully and without delays, in many instances their benefits will take time to fully materialize. Quickly narrowing some labor market gaps, as discussed in this section, could boost growth more immediately.

6. Getting more people into work would yield near-term benefits. Italy’s employment and labor force participation rates are low compared with other large euro area countries, with especially low participation of women (Figure 2). Increasing employment rates requires policies that tilt the financial balance in favor of joining or remaining in the labor force, and help workers maintain a viable work-family balance. This means providing greater incentives to work by, for example, (1) avoiding social benefit traps due to high marginal rates of benefit withdrawal in the case of low earned income; (2) removing the tax credit that discourages second earners in a household, typically women, from participating in the labor force³; and (3) providing adequate affordable child- and elder-care (IMF 2018).

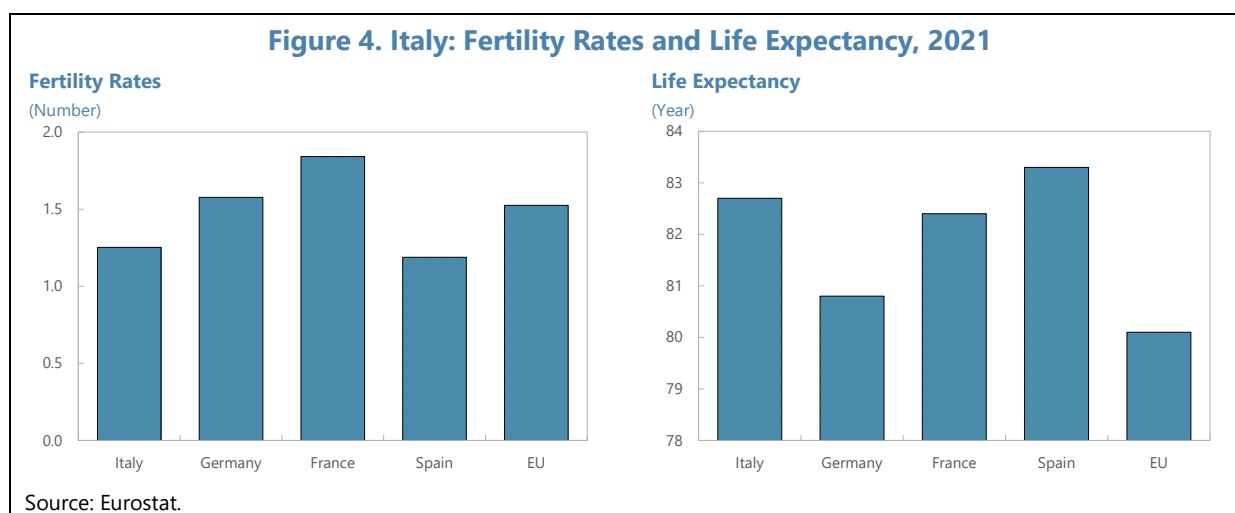


³ While the goal would be to increase family income by encouraging a second earner, if any households saw their disposable income fall as a result of such a policy change, this could be compensated through the means-tested social safety net.

7. Reversing the direction of migration would help ease demographic pressures. Rising emigration outflows and fewer inflows of foreign workers are reducing Italy’s potential labor supply. Italy is losing to emigration a growing number of its workforce-entry-age cohort and a growing share of its university graduates (Figure 3). This reflects the much more favorable salaries that Italian graduates can earn abroad than in Italy. At the same time, the country is facing widespread labor shortages of—according to government estimates—about one million, across different skills levels. According to Unioncamere (Italian Union of Chambers of Commerce) Italy is facing shortages of college and high school graduates of about 20 percent and 40 percent, respectively. The skills needs are widespread. On the one hand, pharmacists, biologists, life scientists, and physicians are increasingly difficult to find. On the other hand, at least 100,000 workers are needed to fill the labor shortage in agriculture. To reduce the loss of highly skilled labor, remuneration and working conditions, career prospects, and business opportunities for graduates need to improve, including through reforms discussed later. At the same time, Italy also needs a pragmatic immigration policy, complemented by training and integration support. Research shows that international migration, especially of young and high-skilled people, can boost output, create new opportunities for local firms and native workers, supply abilities and skills needed for growth, generate new ideas, stimulate international trade, and improve pension and fiscal balances over the longer term (IMF 2020).

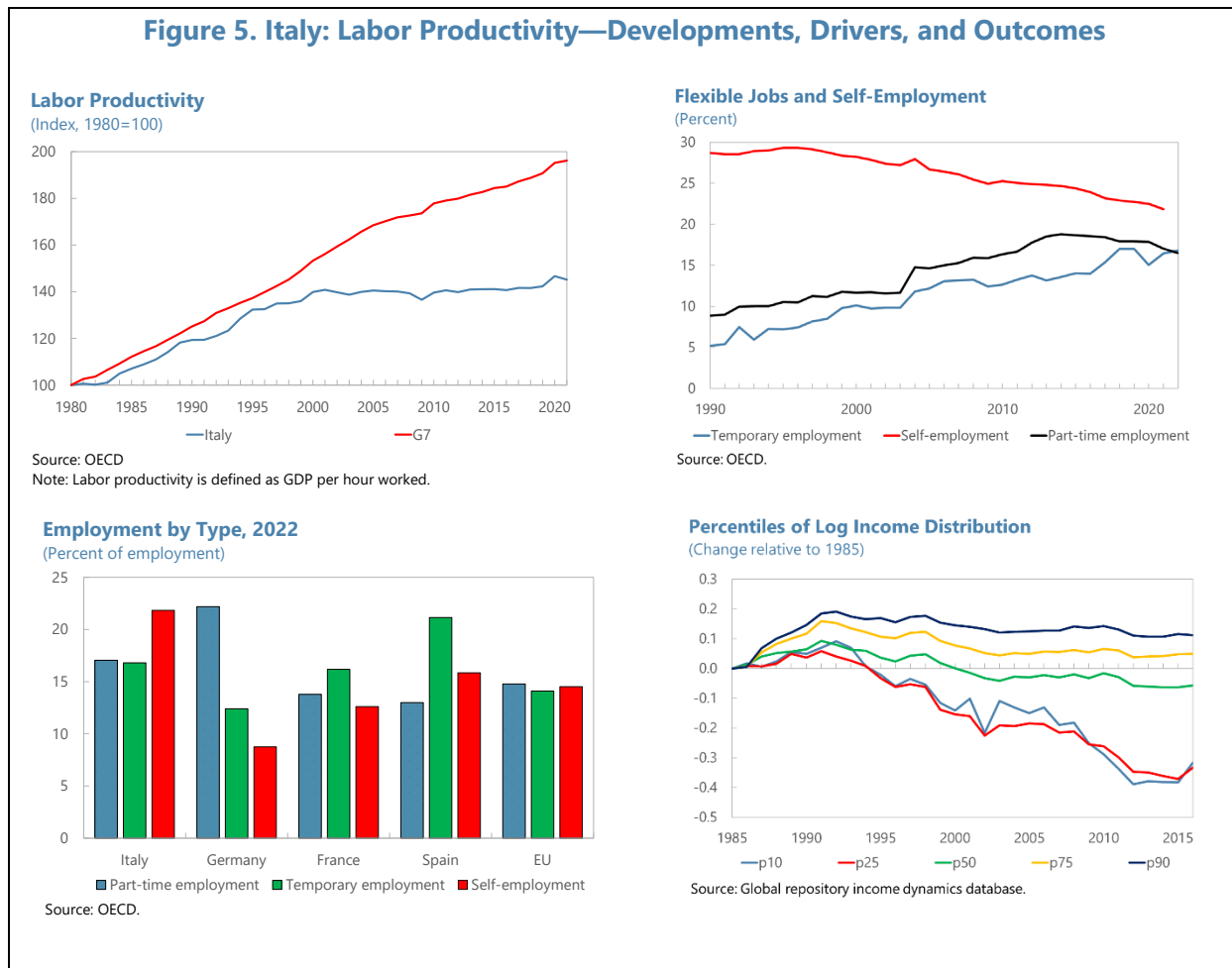


8. Addressing low fertility matters but the rewards of such policies would take several decades to affect working-age demographics and employment (Figure 4). Italy’s fertility rate has been on a prolonged downward path and is now a very low at 1.25, well below the “replacement rate” of 2.1 at which population size stabilizes. Combined with increasing longevity and few chronic diseases, the number of elderly people relative to those below working age (and hence future workforce entrants) is rising rapidly. Numerous policies could influence fertility decisions—adequate provision of affordable childcare (which the NRRP aims to expand) and a tax-cum-social benefit system that recognizes the high financial cost for parents of raising and educating the next generation. However, with the fertility rate now so low, it would take several generations of well-above-replacement-rate fertility to make a material dent in the projected decline in working-age population. As a result, productivity-boosting measures are still needed.

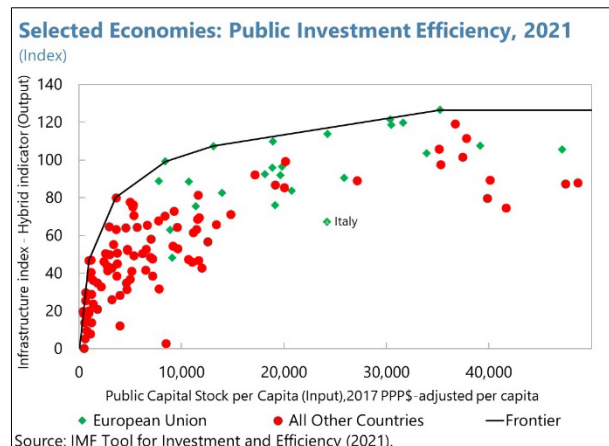


Italy's Gaps and How to Close Them: Essential Reforms with Longer Gestation

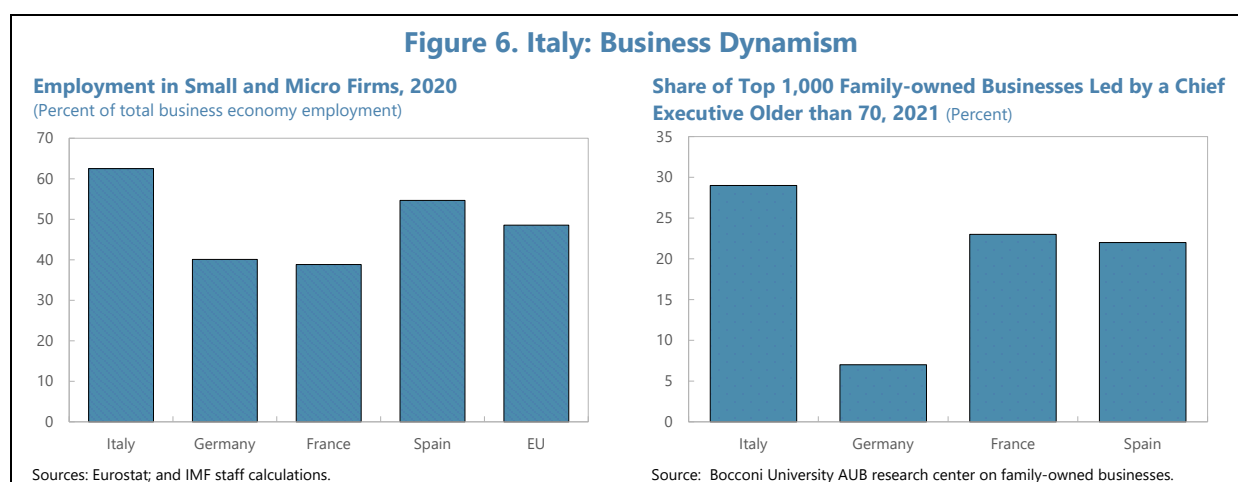
9. Providing quality jobs matters for labor productivity. Italy's labor productivity—both in level and growth terms—lags peers (IMF 2022). Until the mid-1990s, productivity increased in sync with other G7 countries, but diverged since then and remains stagnant (Figure 5). Several factors are thought to have held back productivity, including a weak capacity to innovate and adopt new technologies, a low level of human capital, and a high share of small firms in the Italian economy (Bugamelli and others, 2018). A comprehensive set of reforms is needed for Italy to become more productive, including comprehensive reskilling and upskilling programs, including to facilitate job transitions. The nature of the employment contract also matters. The share of precarious jobs—temporary workers and part-time employment—has risen considerably since the 1990s, bringing the unwelcome side effect of less opportunity to accumulate human capital through on-the-job learning over a worker's lifetime. This reflects the lower incentive for employers to invest in training temporary relative to permanent staff. As a result, incomes of those in more tenuous employment relationships are lower and wage progression ladders over an individual's working life are much flatter. Fixed-term contracts may increase the number of people working and are sometimes seem as a bridge to permanent employment, however, about 20 percent of young people remain on fixed-term contracts after five years of employment (Bank of Italy 2023). Moreover, Hoffmann, Malacrino, and Pistaferrri (2022) find that as precarious work has become more prevalent, the distribution of incomes has widened owing to a sharp relative decline in incomes at least up to the 25th percentile, with the impact felt especially by younger workers in the first decades of their careers owing to lower general and firm-specific knowledge building.



10. Efficient public investment is an important catalyst for sustainable economic growth (IMF 2015). Public investment can increase the economic growth but how much potential growth “bang” each additional euro of public investment brings depends on the efficiency and productivity of investment spending. In Italy, both are low. Analysis based on the IMF’s Tool for Investment and Efficiency (2021) indicates that Italy’s public investment efficiency is well below the global public investment efficiency frontier, which represents the best practices by countries at different per capita income levels. Italy’s public investment efficiency is particularly low relative to EU countries. Reforms to improve investment effectiveness envisaged in the NRRP aim to close this gap, making full and timely implementation of the Plan’s reforms essential. But public investment needs will remain high for the coming decades. Ensuring value-for-money in public investing would therefore bring lasting benefits. The IMF’s Public Investment Management Assessment and the Climate Public Investment Management Assessment tools can help support effectiveness.



11. Building a more vibrant business environment could bring in private investment and create permanent jobs (Figure 6). The prevalence of relatively less productive micro and small firms, and a large informal economy⁴ hold back productivity and labor participation. Due to a “trust deficit,” small firms tend to hire family members to limit arm’s length interactions with the legal system and the public administration, weakening demand for skilled “outside” labor (Pellegrino and Zingales, 2017); while informal firms tend to stay small in order to conceal business activity from the tax authorities, and therefore have less incentive to invest in the modernization of production. Thus, they tend to drag down employment and productivity growth.⁵ Birth rates of Italian enterprises are falling from already low levels while family-owned businesses—which account for around half of GDP and nearly two-thirds of employment—face succession risk given the large share of such firms where the CEO is older than 70 years. Full and timely implementation of structural reforms in the areas of competition, public administration, civil justice, as envisaged in the NRRP, would be helpful. More effective capital markets, including for private equity, is also needed.



12. Realizing the full potential of young Italians by improving education outcomes is critical (Figure 7). Italy is facing a NEET emergency: 26 percent of young people in Italy were neither in employment, education, nor training in 2021. At 20 percent, the youth unemployment rate is among the highest in the EU. Education outcomes of young Italians who do complete their education are subpar compared with other large euro area countries, both for teenagers (as measured by PISA scores) and young adults (the share of university graduates among people of 25-34 years is below 30 percent in Italy, compared to the European average of over 40 percent; Bank of Italy, 2023). In part, this reflects the lower-than-average share of young Italian teachers with tertiary degrees (44 percent compared to the OECD average of 60 percent). Yet even though the supply of highly educated workers is limited, the wage premium on tertiary education is low (reflecting weak demand, as discussed in Pellegrino and Zingales, 2017), discouraging higher education while incentivizing emigration of highly-qualified graduates. To close these education gaps, Italy needs to

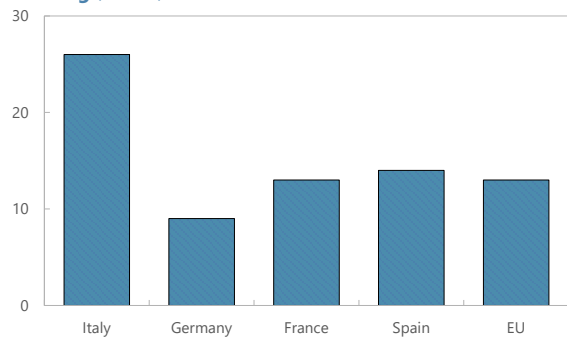
⁴ ISTAT estimates that the underground and illegal economy in Italy is equivalent to 11 percent of GDP.

⁵ Schneider (2013) finds that having a larger shadow economy is associated with high and persistent unemployment rates and low labor force participation.

align school curricula with in-demand skills, increasing teachers' training and professional development, effectively apply active labor market policies, provide sufficient affordable child- and elder-care, and implement the structural reforms needed to address the "trust deficit."

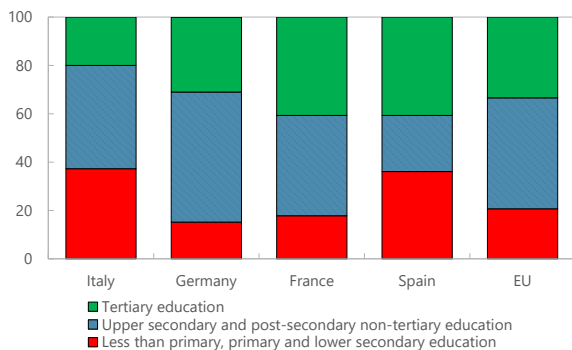
Figure 7. Italy: Youth and Education Outcomes

Young People neither in Employment, Education, nor Training (Percent)



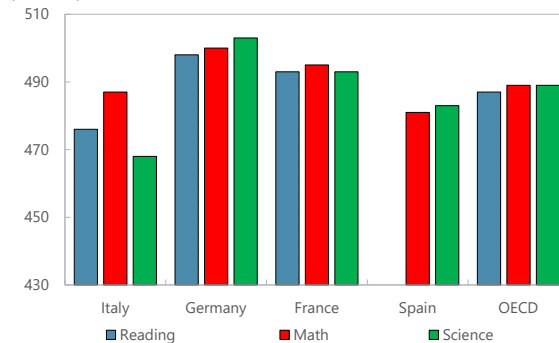
Source: Eurostat.

Population by Education Level (Percent)



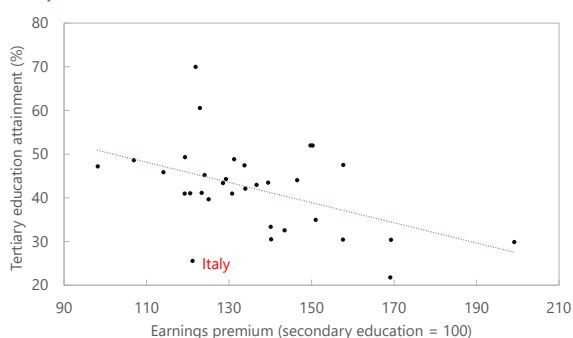
Source: Eurostat.

PISA Scores (Number)



Source: OECD, PISA 2018.

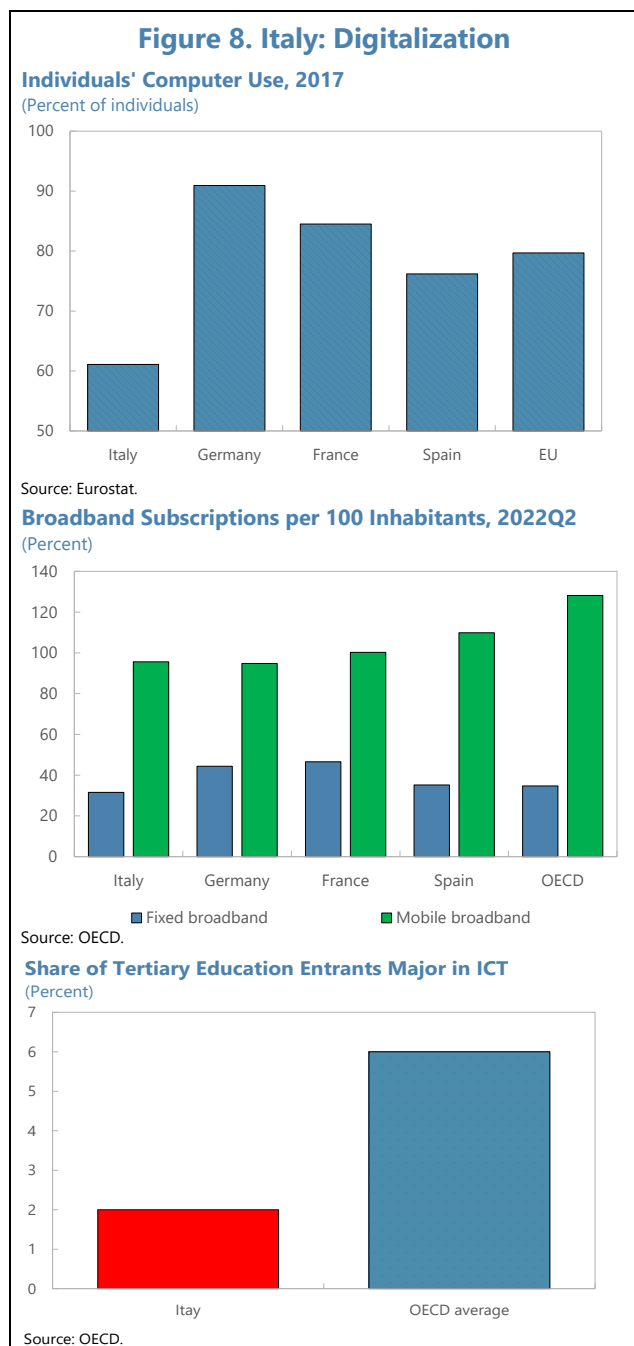
Tertiary Education and Earnings Premium, 25-34 Year-Olds, 2017

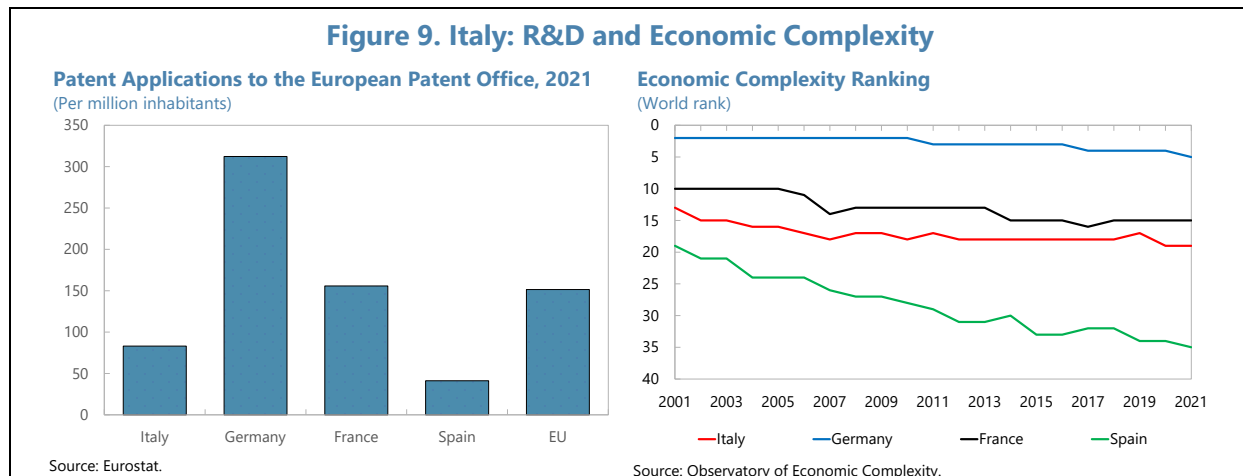


Source: OECD and staff calculations.

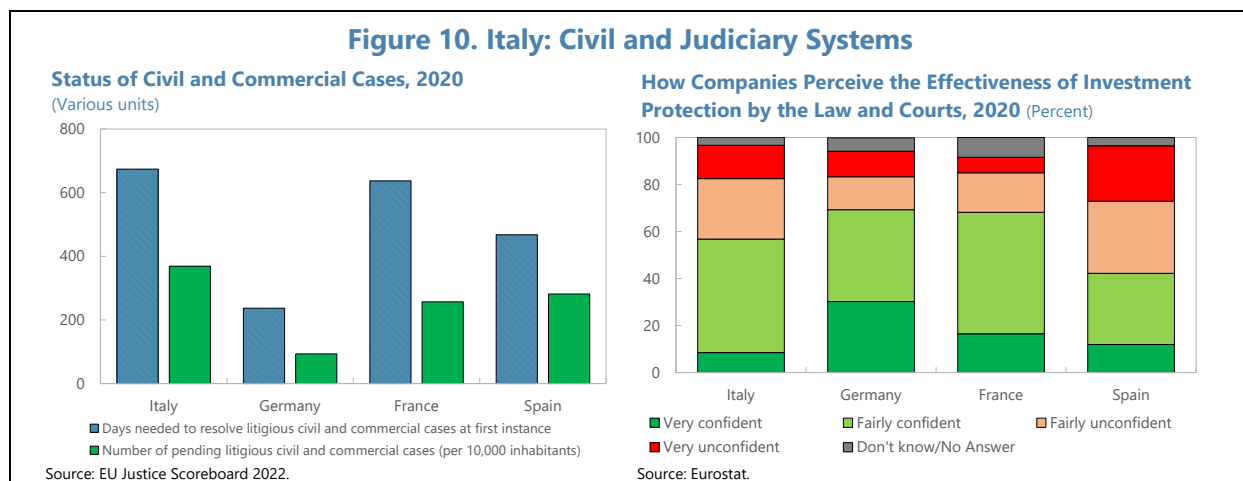
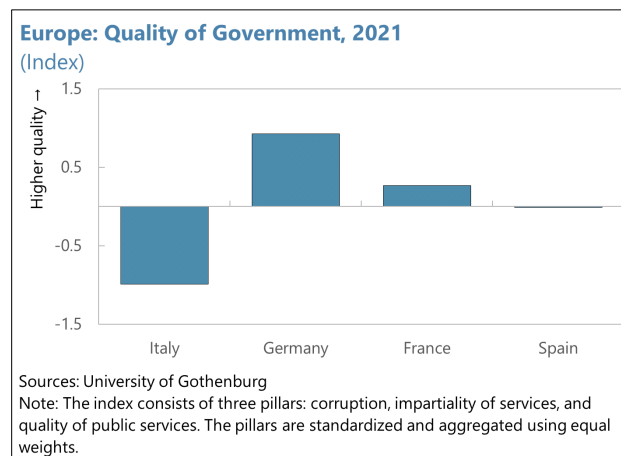
13. Accelerating the digital transition is urgently needed for Italy's economic success in an increasingly computerized world (Figure 8). However, Italy currently lags in digitalization, including broadband technology adoption, computer use, internet use, online banking, and e-commerce. Despite the growing importance of digital skills and graduates with degrees in Information and Communication Technologies (ICT), only 2 percent of Italian college entrants major in ICT, well-below the OECD average of 6 percent. In contrast, arts and humanities are the most popular fields of study among new entrants into tertiary education in Italy. To close the digital gap and ensure sufficient supply of ICT workers, Italy needs to achieve the NRRP's detailed milestones and targets on digitalization. This would stimulate demand for ICT skills, increase the earning premium on ICT tertiary degrees, attract more college enrollment in this field and reduce skill mismatches in the labor market.

14. Innovation is another vital element for economic growth. Constant innovation helps a country maintain competitiveness. Yet Italy's spending on R&D is a low 1.5 percent of GDP, about half the OECD average. Less than 1.5 percent of the labor force is devoted to R&D. As a result, Italian patent applications lag other large euro area countries (Figure 9). At the same time, according to the Observatory of Economic Complexity, Italy's economic complexity is relatively low among advanced countries and its ranking has declined over the last two decades. A virtuous cycle greater digitalization and STEM specialists is needed to close the innovation gap and improve comparative advantage in products and services closer to the technology frontier.





15. Fixing the “plumbing” of the public administration and judiciary systems is needed to ensure a smooth functioning of the economy. Against a backdrop of perceived low quality of government, the estimated time to resolve civil and commercial legal cases is long in Italy, resulting in a large backlog of pending cases (Figure 10). According to the European Commission’s survey on EU justice, only 9 percent of Italian companies are very confident in the effectiveness of investment protection by the law and courts in their home country, while 40 percent of Italian firms are fairly unconfident or very unconfident. In this regard, implementation and monitoring should continue of the effectiveness of Italy’s new Insolvency Code, which entered into force less than a year ago, together with continued emphasis on public administration and judicial modernizing reforms and upgrading of staffing that is ongoing.



Conclusions

16. Italy has large catch-up potential to help overcome the demographic drag on output, but fundamental changes are needed to shift from the current suboptimal equilibrium. On numerous metrics, Italy is among the worst EU performers in areas that directly bear on output, including female labor force participation, NEET youth, educational attainment, and digitalization. Increasing employment is essential, but not sufficient. While boosting female labor force participation and the effective retirement age would raise economic output, it would not achieve positive growth in the long run unless accompanied by higher capital and total factor productivity. Going forward, Italy needs a sustained, pro-growth strategy to significantly boost productivity in order to counteract the effect of demographic decline. While there is scope to quickly narrow labor participation gaps, reforms are needed to address critical shortcomings in education, competition, public administration, and the judicial system. However, such transformational change likely entails long gestation periods. It is therefore imperative that these reforms be implemented promptly and decisively.

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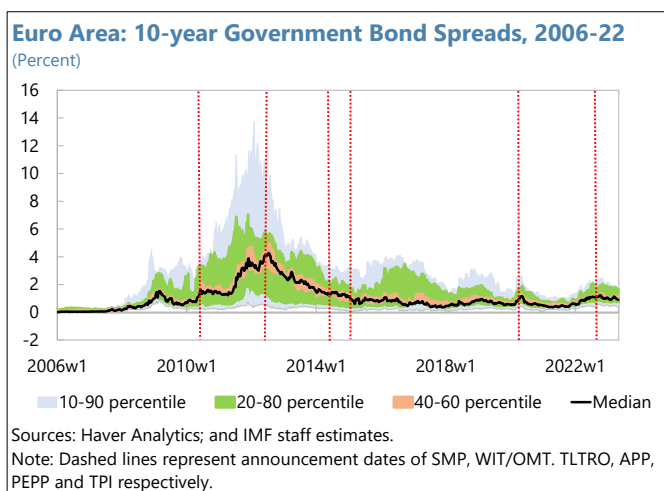
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ITALY'S SOVEREIGN BOND SPREADS: EVOLUTION AND DRIVERS¹

Dispersion of Sovereign Bond Spreads in the Euro Area

1. **Over the past 15 years, the dispersion of sovereign bond spreads across euro area countries has widened and narrowed several times, primarily due to spreads of some high debt countries.** The distribution of 10-year sovereign bond spreads relative to the 10-year German bund initially widened around the global financial crisis, then surged during the euro area sovereign debt crisis. Since then, the distribution has narrowed, but remained wider and more volatile than pre-GFC. The widening and narrowing of the distribution are driven by spread movements of high debt countries, with the median spread generally low and much more stable, although appearing to respond to changes in monetary policy and risk perceptions.



2. **Such spread divergence has important implications at the country and the euro area levels.** Wider spreads imply higher government borrowing costs, thereby increasing the share of fiscal resources devoted to servicing public debt, especially in high-debt countries. In addition, diverging spreads—if they were to become disorderly—could impair the efficient transmission of monetary policy across the currency union and, in extreme circumstances, compromise financial stability of an individual country and/ or the entire monetary union.

Role of Macroeconomic Fundamentals vs. Monetary Policy: Literature and Gaps

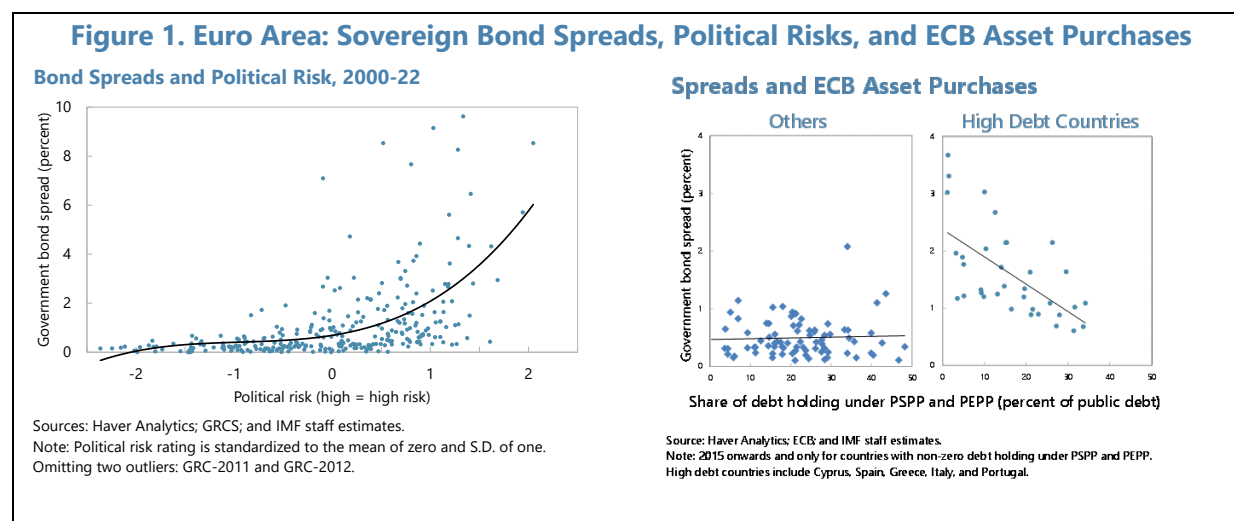
3. **Studies of Euro Area government bond spreads have identified macroeconomic fundamentals and, more recently, unconventional monetary policy as key determinants:²**

¹ Prepared by La-Bhus Fah Jirasavetakul (SPR). Analysis in this Annex is based on the joint forthcoming working paper entitled “Determinants of Sovereign Bond Spreads in the Euro Area” (Jirasavetakul, Ljungman, and Shahmoradi, forthcoming).

² For studies related to the impacts of macroeconomic fundamentals and risk factors on sovereign bond spreads, see, for example, Codogno and others (2003); Gomez-Puig (2006); Manganelli and Wolswijk (2009); Sgherri and Zoli (2009); Gomez-Puig and others (2014); Alfonso and others (2015); and Ceci and Pericoli (2022). For those related to the impacts of unconventional monetary policy intervention, see, for example, Andrade and others (2016); Afonso and Kazemi (2018); De Santis (2020); Altavilla and others (2019 and 2021); Rostagno and others (2021); Havlik and others (2022); Blotevogel and others (2022).

- GDP growth, public debt, and primary fiscal balance are found to be key factors influencing *credit risk* of sovereign borrowers, thereby affecting their borrowing costs.
- *Liquidity and external solvency risks*—proxied by the size and depth of sovereign bond markets, external debt, and trade openness—also impact spreads, especially when financial conditions are tight.
- *International risk factors and global/regional market sentiment*—approximated by, e.g., the US and euro area stock market implied volatility (VIX and VSTOXX, respectively)—are found to affect sovereign bond spreads of euro area countries differently, with stronger impact for countries with high public debt and/or high exposure to international financial markets.
- *ECB asset purchase programs*—both announcement and actual implementation—are found to compress sovereign bond spreads.

4. This paper extends the previous research in several important directions. First, the existing literature assumes a common impact of unconventional monetary policy on spreads of all euro area countries, which appears at odds with the data. Specifically, ECB purchases of government securities appear to be highly negatively correlated with spreads for high debt countries, but correlation is weak for other countries. In addition, monetary policy's effects could vary with the stance of policy (tightening versus loosening) and with the type of intervention (signaling versus implementation, or conventional versus unconventional policy). Second, a more comprehensive measure of country-specific political risk—beyond the previous election cycle indicators—is used to measure government stability, political consensus, internal and external conflicts, corruption, and quality of bureaucracy (as measured by the political risk indicator in Figure 1). This broader measure likely better captures governments' capacity or willingness to service debt.



Empirical Analysis: Potential Drivers of Euro Area Sovereign Bond Spreads

5. The determinants of government bond spreads for euro area countries at an annual frequency are estimated using a range of explanatory variables. The model uses a country-year dataset of annual data for the period 2000 to 2022 and encompassing 13 to 15 euro area countries.³ The explanatory variables are classified into four groups—macroeconomic fundamentals, common regional and global risks, country-specific policy and political uncertainty, and euro area-wide monetary policy. Annual data is used to focus on the persistent or slow-moving determinants of spreads that bear on debt service costs.⁴ The baseline panel regression is:

$$y_{i,t} = \alpha + y_{i,t-1} + \beta \cdot X_{i,t} + \gamma \cdot R_{i,t} + \delta \cdot D_{i,t} + \theta \cdot M_{i,t} + \epsilon_{i,t}$$

where i and t denote country and year; $y_{i,t}$ is the spreads on 10-year government bonds (vis-à-vis German government bonds); and $X_{i,t}$, $R_{i,t}$, $D_{i,t}$, and $M_{i,t}$ are vectors of explanatory variables, with the following details:⁵

- *Macroeconomic fundamental variables ($X_{i,t}$)* include public debt to GDP ratio, primary fiscal balance (as a share of GDP), real GDP growth, inflation, and current account balance (as a share of GDP)—all of which from the IMF World Economic Outlook (WEO) database.
- *Common regional and global risk factors ($R_{i,t}$)* are approximated by the composite indicators of systematic stress for the euro area and the US, obtained from the ECB (Hollo and others, 2012), and the implied volatilities of the US and European stock markets.
- *Domestic policy and political uncertainty variables ($D_{i,t}$)* comprise economic policy uncertainty indices for European countries (Baker and others, 2016); country-level world uncertainty index (Ahir and others, 2022); and the ICRG's composite rating index of political risks.
- *Monetary policy variables ($M_{i,t}$)* include (i) interest-rate based instruments (ECB policy interest rate, and the shadow interest rate and the difference between the shadow and neutral interest rates to measure the overall stance of monetary policy in a zero lower bound environment (Arena and others, 2020)); (ii) net purchases of country-specific government bonds under the ECB's Asset Purchase Program (APP) and the Pandemic Emergency Purchase Program (PEPP) (as a share of a country's public debt); (iii) two text-based indices measuring the ECB's communication and/or commitment through signaling effects. This is done using a text-based index measuring the ECB's commitment to act as a lender of last resort based on ECB press releases/speeches (a so-called *whatever-it-takes* index by Baumgärtner and Zahner, 2021) and a

³ The dataset includes only those euro area countries for which the full set of variables is available.

⁴ While earlier studies primarily focused on short-term spread dynamics, this paper examines more persistent determinants of spreads, which are likely more relevant for fiscal sustainability and financial stability.

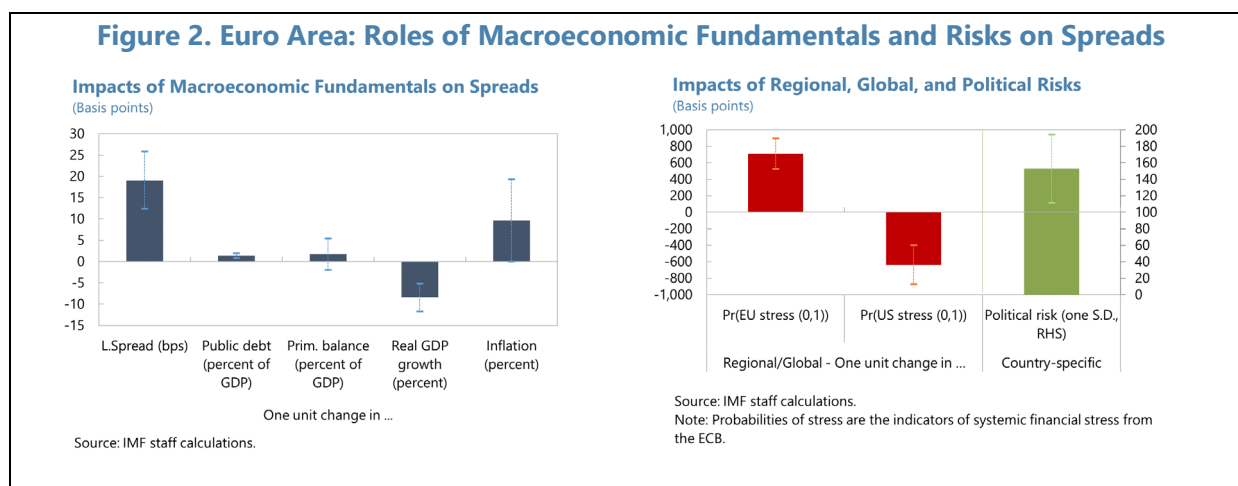
⁵ For a detailed description of the variables, see empirical result tables in the Appendix.

text-based policy intention to capture the ECB’s monetary policy stance (Picault and Renault, 2017).⁶

Persistence is captured by a first-order lag of spreads and the dynamic panel data (Arellano-Bover/Blundell-Bond) estimator is applied to address potential endogeneity problems related to both omitted variables and a correlation between the lagged dependent variable and the fixed effects (Nickell, 1981). Nonetheless, given that some potential estimation biases may remain, the direction of causality should be interpreted with caution.

6. Macroeconomic variables are found to be correlated with spreads in the expected direction. Countries with higher public debt tend to have wider bond spreads.⁷ The impacts of economic growth and inflation are found to be relatively large, with a one percentage point increase in growth associated with a narrower spread of 10 basis points (Figure 2).^{8, 9}

7. Regional risk and country-specific political uncertainty are positively associated with sovereign bond spreads. A unit increase in the EU systemic stress index—implying a doubling of the (composite) probability of financial system stress—is associated with a widening of countries’ spreads by 500 basis points, on average. On the other hand, a unit increase in the US systemic stress index would narrow euro area countries’ sovereign bond spreads by about 400-500 basis points, consistent with flight-to-safety. Higher country-specific political risk widens bond spreads—with a one standard deviation increase in the political risk index associated with a 130 basis point widening of spreads.



⁶ Other recent literature measures the ECB’s monetary policy and communication by constructing monetary policy surprise measures, using high frequency financial data around the ECB press conferences.

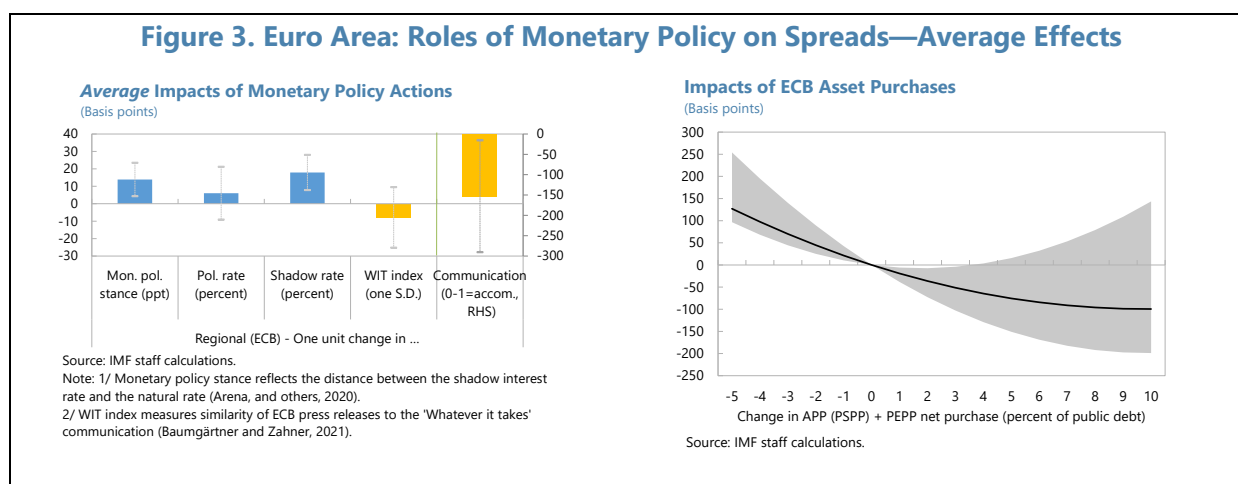
⁷ The insignificant correlation between spreads and fiscal balance after controlling for public debt is consistent with a few studies. In particular, some studies conclude that the effect of fiscal performance is small during normal times but high during crisis periods (Afonso and Rault, 2015; Afonso and others, 2015).

⁸ Empirical results throughout the paper are robust to additionally controlling for euro area-wide inflation (which could be used to capture co-movements of inflation among euro area countries).

⁹ See tables in the Appendix for further details on empirical results.

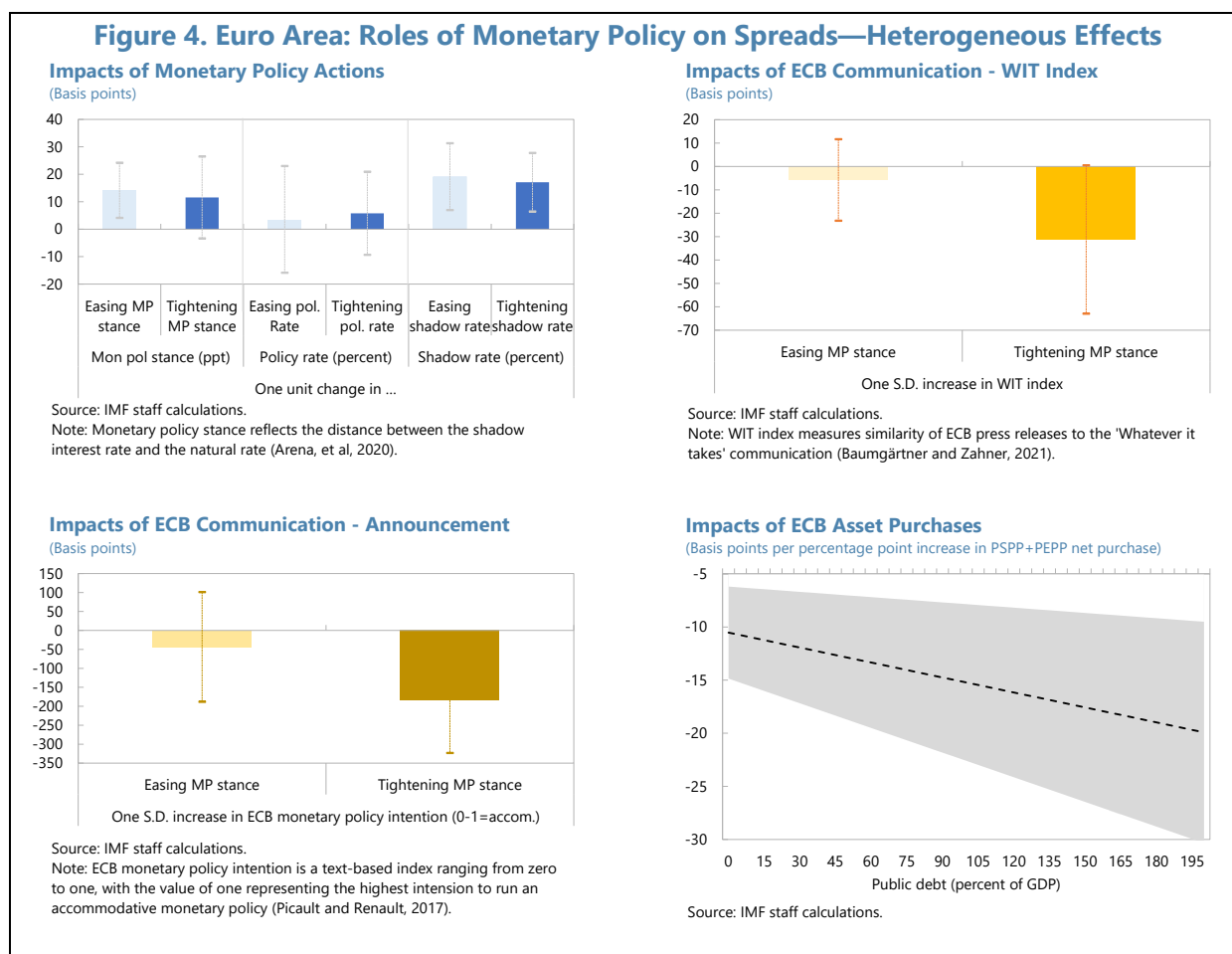
8. Monetary policy, both standard and unconventional, is found to be correlated with spreads. On average, tightening (loosening) of monetary policy by the ECB is associated with a widening (narrowing) of euro area sovereign bond spreads, with the magnitude and significance of the correlation differing depending on the type of monetary policy instrument (Figure 3):¹⁰

- *First*, a higher ECB policy interest rate is found to be associated with an increase in bond spreads. Potentially owing to the prolonged period of at the zero lower bound (ZLB), the positive coefficient estimate on the ECB policy rate is not statistically significant. However, the result becomes statistically stronger once the ZLB environment is considered, with a percentage point increase in the shadow interest rate being associated with a widening of spreads by about 10-18 basis points (Figure 3). This result is robust to using the difference between the natural and shadow interest rate to measure the stance of monetary policy.
- *Second*, net purchases of a country's government securities by the ECB tend to narrow that country's bond spread, but the impact diminishes as net purchases increase. A percentage point increase in net purchases as a share of that country's outstanding government debt is associated with a narrowing of spreads by about 20 basis points lower on average. However, this average effect (per percentage point increase) is subject to diminishing returns—with the decline falling to about 15 basis points when once the amount purchased has risen to about 7 percentage points of outstanding government debt.
- *Third*, ECB communications regarding its commitment to running an accommodative monetary policy coincide with a decline in euro area government bond spreads. The ECB's perceived commitment to avoiding fragmentation risk (measured by the *what-ever-it-takes* index) also appears to help narrow bond spreads, but the estimated average impact is not statistically significant.



¹⁰ Despite being operationally different, these monetary policy tools are found to be highly correlated. Therefore, the regression analysis only includes one monetary policy tool at a time to avoid a strong correlation among explanatory variables.

9. In addition, monetary policy’s effect on spreads is found to be asymmetric, with larger impacts when policy is tightening. While such asymmetric effects are relatively small for interest rate-based instruments, they are sizable for the signaling effects of ECB communications (Figure 4). A stronger commitment by the ECB to mitigate fragmentation risk is more effective when monetary stance is tightening. Specifically, during a tightening period, ECB commitment to address fragmentation risk (measured by a one standard deviation increase in the WIT index) is associated with a narrowing of spreads by about 30 basis points. On the other hand, such commitments do not have a statistically significant impacts on spreads when the monetary policy stance is being loosened.



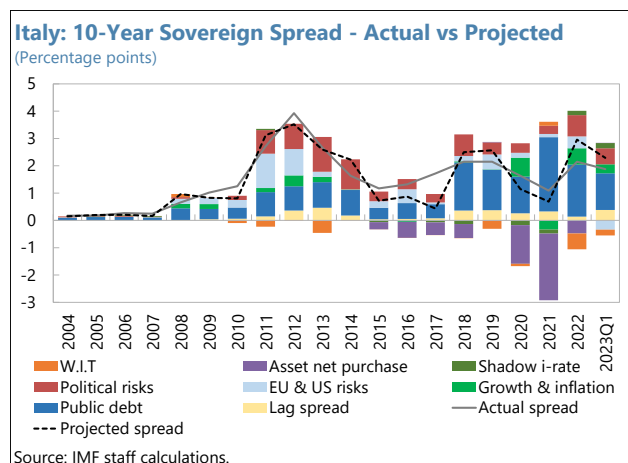
10. Asset purchases have materially larger effects on spreads of high-debt euro area countries. The interaction term of asset purchases and the outstanding debt ratio is negative and significant. This implies a larger decline in spreads for high-debt countries during quantitative easing, and a larger increase in spreads during quantitative tightening (Figure 4, bottom-right chart).¹¹ For instance, a percentage point increase (decrease) in net asset purchases (as a share of

¹¹ It is important to note that the public debt ratio can be a proxy for both a borrower’s credit risk and the size and depth of sovereign bond market.

public debt) is associated with an almost 20 basis point decline (increase) in bond spreads for countries with a public debt ratio of 150 percent, compared with a 12 basis point impact for those with a public debt ratio of 50 percent.

Implications for Italy

11. For Italy, public debt, unconventional monetary policy and political risk are key factors influencing sovereign bond spreads in recent years. Over the past five years, these factors explained nearly two-thirds of movements in Italy's spreads. Spread widening from the high public debt-to-GDP ratio and episodic jumps in political risk were dampened by spread-compressing effects from asset purchases and commitments to mitigate fragmentation risk.



12. Looking ahead, quantitative tightening could be expected to weigh on Italy's spreads more than for other euro area countries, but there is also scope to mitigate this effect. The impact of asset purchases on spreads reflects the share of Italy's government bonds held by the ECB (relative to its total public debt) and the fact that a high level of public debt magnifies the impact of unwinding sovereign bond holdings. However, persistently lowering the public debt ratio could moderate the spread widening through the direct effect of debt on spreads and indirectly through debt's interaction with euro area monetary conditions. Faster growth and reinforcing political stability could additionally help to contain spreads. The ECB's commitment to support effective transmission of monetary policy could also help limit any asynchronous reaction of country-specific interest rates to changes in monetary conditions.

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Appendix I. Empirical Results

1. Empirical results are generally in line with expectations when allowing for a structural break and splitting data into different time periods. Given a potential structural break in the relationship between bond spreads and their determinants, the regressions are also run separately for periods prior to the unconventional monetary policy regime (2013) and after.¹ While results are not entirely robust to specifications (likely due to a much shorter time dimension), they broadly point to similar relationships between spreads and factors in consideration with these factors being at play at different times. Macroeconomic fundamentals and standard monetary policy tools are found to have stronger associations with sovereign bond spreads during the early period. However, their role in determining sovereign bond spreads has declined over the past decade, in which market risks and unconventional monetary policy instruments have gain their importance.

Table 1. Euro Area: Empirical Results—Average Effects

	Spread on 10Y government bond (ppt; vis-a-vis DEU)									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
L.Spread on 10Y government bond (ppt; vis-a-vis DEU)	0.39*** (0.03)	0.37*** (0.03)	0.26*** (0.03)	0.23*** (0.04)	0.25*** (0.03)	0.23*** (0.03)	0.20*** (0.03)	0.25*** (0.03)	0.19*** (0.04)	0.19*** (0.03)
Public debt (percent of GDP)	0.01*** (0.00)	0.01*** (0.00)	0.01** (0.00)	0.01*** (0.00)	0.01** (0.00)	0.01*** (0.00)	0.01*** (0.00)	0.01*** (0.00)	0.01** (0.00)	0.01*** (0.00)
GG primary balance (percent of GDP)	-0.04** (0.02)	-0.02 (0.02)	0.02 (0.02)	0.05** (0.02)	0.02 (0.02)	0.02 (0.02)	0.01 (0.02)	0.02 (0.02)	0.03 (0.03)	0.02 (0.02)
Real GDP growth (percent)	-0.10*** (0.02)	-0.08*** (0.02)	-0.09*** (0.02)	-0.09*** (0.02)	-0.09*** (0.02)	-0.10*** (0.02)	-0.08*** (0.02)	-0.10*** (0.02)	-0.11*** (0.03)	-0.08*** (0.02)
Inflation (percent)	0.21*** (0.05)	0.21*** (0.05)	0.21*** (0.04)	0.18*** (0.05)	0.19*** (0.05)	0.12** (0.05)	0.15*** (0.04)	0.20*** (0.04)	0.16** (0.06)	0.10** (0.05)
EU Systematic stress index		7.11*** (0.86)	5.36*** (0.86)	5.35*** (0.86)	5.59*** (0.93)	6.77*** (0.95)	6.28*** (0.85)	5.72*** (0.95)	4.53*** (1.04)	7.08*** (0.94)
US Systematic stress index		-6.67*** (1.10)	-4.41*** (1.10)	-4.15*** (1.10)	-4.72*** (1.22)	-6.23*** (1.23)	-5.28*** (1.08)	-4.94*** (1.23)	-3.14** (1.36)	-6.38*** (1.21)
Political risk rating (high=high risk)			1.39*** (0.20)	1.52*** (0.20)	1.42*** (0.20)	1.50*** (0.20)	1.47*** (0.19)	1.48*** (0.22)	2.12*** (0.31)	1.53*** (0.21)
EA Monetary policy stance (+ =tight)				0.14*** (0.05)						
ECB policy rate					0.06 (0.08)					
Shadow interest rate						0.18*** (0.05)				0.12** (0.06)
PSPP+PEPP net purchase (percent of public debt)							-0.22*** (0.06)			-0.20*** (0.06)
PSPP+PEPP net purchase (percent of public debt; square)							0.01* (0.01)			0.01* (0.01)
Whatever it takes index (standardized)								-0.08 (0.09)		0.01 (0.10)
ECB communication (0-1=accommodative)									-1.53** (0.70)	
Constant	-0.35 (0.25)	-0.85*** (0.26)	-0.27 (0.26)	-0.25 (0.26)	-0.35 (0.29)	-0.42 (0.26)	-0.34 (0.25)	-0.22 (0.27)	0.25 (0.51)	-0.43 (0.26)
Observations	244	244	244	244	244	244	244	244	189	244
Country	13	13	13	13	13	13	13	13	13	13

Note: Dynamic panel data (Arellano-Bover/Blundell-Bond) estimator; including time trend and country fixed effects.

¹ Eijffinger and Pieterse-Bloem (2022) conduct a sequential test and find three major break points in Euro area sovereign bond spreads and their relationship with economic and risk factors, namely, the period prior to mid-2010, mid-2010 to 2013 (the sovereign debt crisis), and post-2013 when the policy rate entered negative territory and the ECB started their quantitative easing intervention. Given a much smaller time dimension when using annual data, a major structural break adopted in this paper is 2013. For the period prior to 2013, dummy variables capturing the sub-periods of global financial crisis and the Eurozone sovereign debt crisis are included (similar to Afonso and others, 2015).

Table 2. Euro Area: Empirical Results—Heterogeneous Monetary Policy Effects

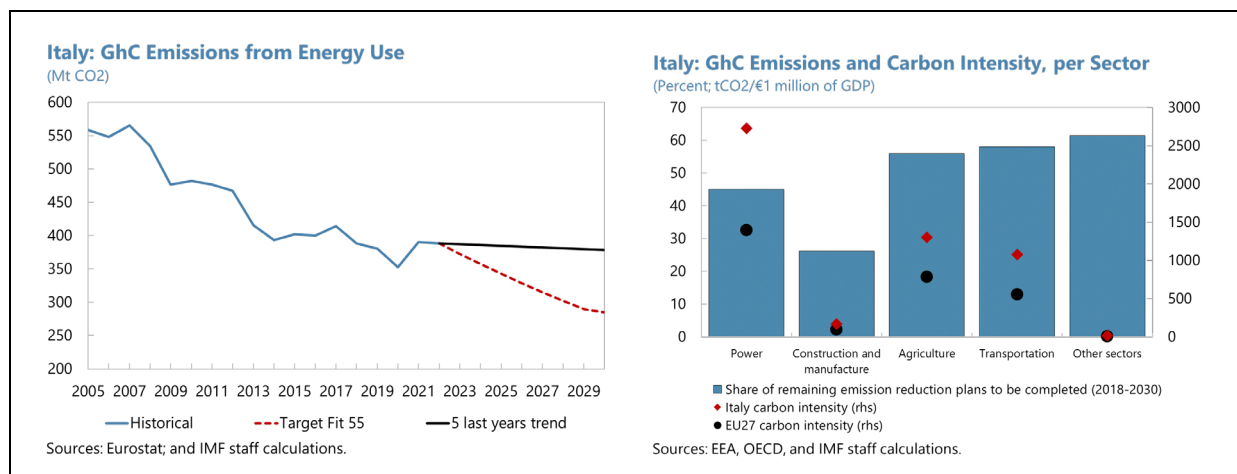
	Spread on 10Y government bond (ppt; vis-a-vis DEU)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
EA Monetary policy stance (+ =tight) when positive delta (tightening)	0.12 (0.08)						
EA Monetary policy stance (+ =tight) when negative delta (loosening)	0.14*** (0.05)						
ECB policy rate when positive delta (tightening)		0.06 (0.08)					
ECB policy rate when negative delta (loosening)		0.04 (0.10)					
Shadow interest rate when positive delta (tightening)			0.17*** (0.05)				
Shadow interest rate when negative delta (loosening)			0.19*** (0.06)				
Whatever it takes index (standardized) when tightening MP stance				-0.31* (0.16)			
Whatever it takes index (standardized) when loosening MP stance				-0.06 (0.09)			
ECB communication (0-1=accommodative) when tightening MP stance					-1.85*** (0.71)		
ECB communication (0-1=accommodative) when loosening MP stance					-0.44 (0.74)		
PSPP+PEPP net purchase (percent of public debt) x high debt country						-0.25*** (0.05)	
PSPP+PEPP net purchase (percent of public debt) x non-high debt country						-0.08*** (0.02)	
PSPP+PEPP net purchase (percent of public debt)							-0.11*** (0.02)
PSPP+PEPP net purchase (percent of public debt) x the public debt ratio							-0.0005*** (0.00)
Observations	244	244	244	244	189	244	244
Country	13	13	13	13	13	13	13

Note: Dynamic panel data (Arellano-Bover/Blundell-Bond) estimator; including time trend and country fixed effects.

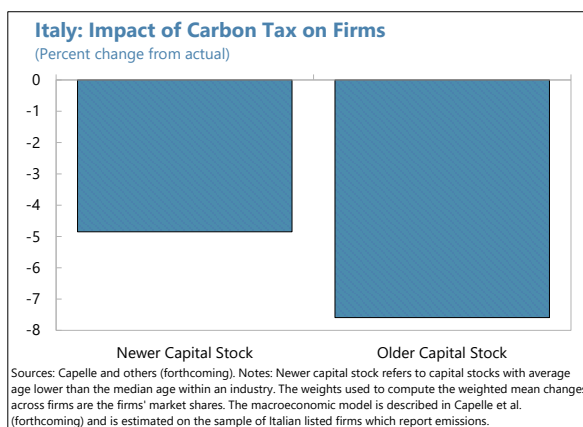
All regressions include lagged dependent variable, macroeconomic fundamental variables, regional and global risk factors, and political risk variable as specified in Table 1.

REACHING CLIMATE TARGETS¹

1. Italy has a lower carbon intensity of GDP than the EU27 average, but remaining progress needed to achieve its climate commitments is large. Italy has committed to reducing its carbon emissions by 55 percent by 2030 relative to 1990 levels under the EU’s Fit-for-55 initiative. To meet this target, emissions would need to decline by a further 33 percent relative to a forecast based on the trend of the last 5 years. The required reduction differs considerably across sectors. Notably, the agriculture, transport and “other sectors” (mainly services) are lagging, and action is needed to accelerate progress. Despite noticeable improvements, the power sector remains the main carbon emitting sector in absolute terms and per unit of value added produced.

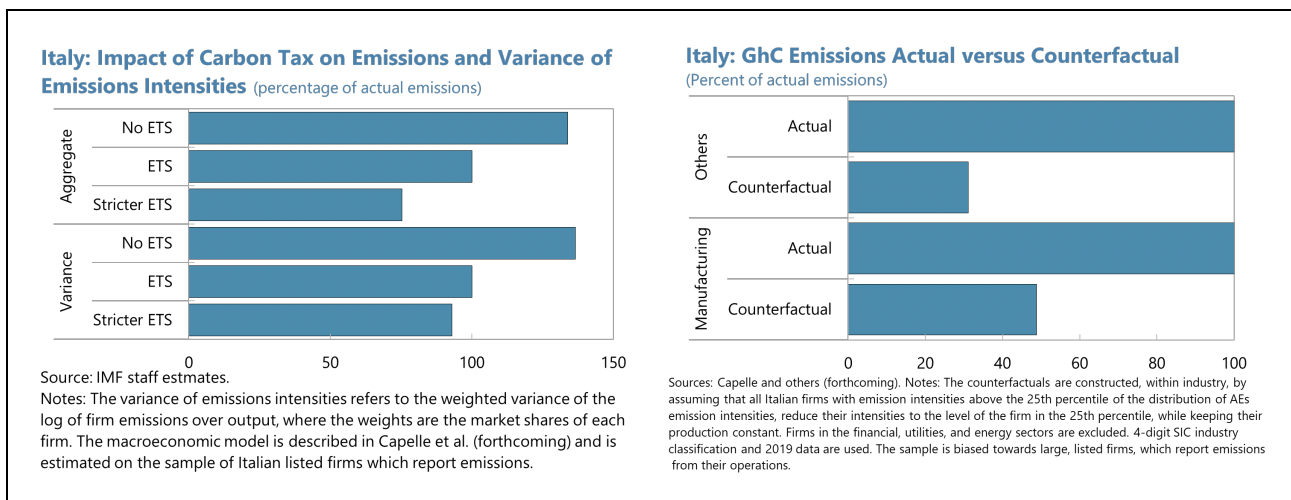


2. Substantial emissions reduction could also be achieved within sectors by focusing on firms with weaker environmental performance. Capelle and others (forthcoming) find significant room for improvement by Italian firms whose emissions exceed those in other advanced economies within the same industry. Based on a sample of 1,192 firms, those with a higher emissions intensity typically operate older physical capital, are less knowledge intensive, have weaker management practices, and are less productive. In a scenario where those Italian firms with weaker environmental performance improve to the 25th percentile of emission intensities for their industry, total emissions by Italian firms in the sample would fall significantly: by 43 percent in manufacturing, and nearly 67 percent in other sectors (excluding finance, energy, and utilities).



¹ Prepared by Magali Pinat (EUR).

3. Phasing out free allowances and applying a uniform carbon price in industry would help to lift performance of firms with higher emissions intensity. Simulations shows that a uniform carbon tax of €40 per ton could reduce within-industry variation in carbon emissions by more than 40 percent, helping to reduce total emissions by 25 percent.² This would be require replacing more-polluting with greener physical capital, with the cost tending to fall disproportionately on older firms that have less-green capital.



² While the price of carbon in the EU Exchange Trading System significantly exceeds this level, its application within industry is not uniform given extensive “free allowances” based on historical emissions.

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