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ICELAND

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INTERNATIONAL MONETARY FUND

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July 10, 2026

Approved By
European Department

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INFLATION DYNAMICS AND KEY DRIVERS OF INFLATION[1]

A. Introduction

1. Conducting monetary policy in Iceland presents important challenges. Since the inflation target was adopted in 2001, inflation has averaged 4.9 percent — nearly double the target. Even restricting attention to the more stable post-crisis period (2011–25), inflation averaged 4.0 percent and exceeded the target in roughly two-thirds of the months over this period. The central bank's policy rate has averaged 5 percent since 2011 with a maximum of 9.25 percent and a minimum of 0.75 percent. Despite this, inflation has proved stubbornly difficult to bring back to target durably, pointing to structural drivers that monetary policy alone has struggled to offset.

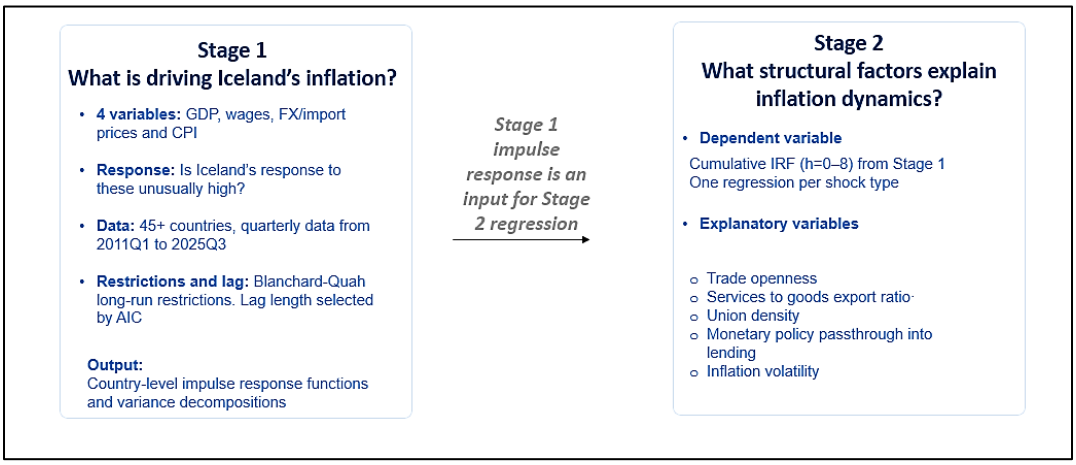
2. Iceland's inflation persistence reflects a combination of structural features. As a highly open, commodity-exporting economy with substantial services exports, Iceland is inherently exposed to large external price shocks. But exposure alone does not explain persistence: many small open economies face similarly large shocks without the same inflationary consequences. The literature points to labor market institutions, sectoral composition, and the strength of monetary transmission as important channels — and Iceland sits at an extreme high end of the spectrum on union density and near the low end of the distribution for policy-rate pass-through. Understanding which of these channels dominates, and by how much, is essential for assessing the appropriate policy response.

3. This paper identifies the sources of inflation in Iceland and the main structural factors that could help explain its persistence. The analysis aims to address two related questions. First, what is driving Iceland's inflation — import prices, wages, or domestic demand, and by how much? Second, how does Iceland respond to these shocks relative to peer economies? To answer these questions, we employ a two-stage empirical framework building on Pedroni (2013).

B. Methodology

4. We adopt a two-stage estimation framework. The first stage estimates a heterogeneous Panel SVAR following Pedroni (2013) to identify the structural drivers of Iceland's inflation and compare Iceland's response to these drivers relative to other countries. The second stage links the country-level impulse responses recovered from the first stage to observable structural characteristics in a cross-sectional regression, identifying the institutional and economic features that help explain cross-country differences in inflation dynamics.

[1] Prepared by Amit Kara (EUR) and Yurii Sholomytskyi (ICD).



5. We impose the same long-run restrictions in a 4-variable VAR for 45 countries. The Panel SVAR is estimated on four variables: real GDP growth, nominal wage growth, CPI inflation, and import price growth. The Blanchard-Quah (1989) long-run restrictions impose economically motivated constraints on which shocks may have permanent effects. The VAR is estimated in the ordering [GDP, wages, import prices, CPI], reflecting the structural causal chain in a small open economy. GDP (productivity) shocks may permanently affect all variables; wage shocks may permanently affect import prices and the price level but not output; import price shocks may permanently affect the price level but not output or wages; and CPI shocks have no permanent effect on any other variable, consistent with the view that price level shifts are ultimately absorbed by the nominal exchange rate through purchasing power parity. This ordering is well suited to recovering the slow-building, institutionally mediated transmission from import prices and wages to consumer prices that is the central object of interest. Lag length in each country VAR is selected independently by the Akaike Information Criterion (AIC).

6. The Panel SVAR is estimated on four variables, and we use long-run identifying restrictions. In total, we run 45 country-level VARs with real GDP growth, nominal wage growth, import prices, and CPI inflation. We adopt Blanchard-Quah (1989) long-run restrictions as the identification strategy. The economic rationale is straightforward: the central object of interest — the long-run pass-through from import prices and wages to consumer prices — accumulates gradually over multiple quarters and is not well captured by contemporaneous impact restrictions. Blanchard-Quah restrictions instead operate directly on the long-run impact matrix, imposing economically motivated constraints on which shocks may have permanent effects. Lag length in each country's VAR is selected independently by the Akaike Information Criterion (AIC).

Table 1. Iceland: Blanchard-Quah Long-Run Restrictions

Long-run impact on →	GDP shock	Wage shock	Import price shock	CPI shock
GDP	✓	0	0	0
Wages	✓	✓	0	0
Import prices	✓	✓	✓	0
CPI	✓	✓	✓	✓

Note: ✓ denotes a permitted permanent effect; 0 denotes a restriction to zero in the long run.

7. The identifying restrictions impose a hierarchy across shocks where only real shocks move output permanently. GDP shocks are the only shocks permitted to have a permanent effect on all four variables. Wage shocks may permanently affect import prices and CPI but not GDP, reflecting the view that nominal wage innovations shift the cost base without altering productive capacity. Import price shocks may permanently affect CPI but not GDP or wages, consistent with the small open economy assumption that import prices are externally determined, and CPI shocks have no permanent effect on any other variable. These restrictions are imposed on the long-run moving average representation of the VAR rather than on contemporaneous relationships, making them well suited to recovering transmission mechanisms that accumulate over multiple quarters.

8. The first stage recovers country-specific responses net of global factors and generates the impulse response for all 45 countries separately. The Pedroni (2013) framework constructs a synthetic global entity from the panel to isolate idiosyncratic country-level shocks orthogonal to global factors. Country-level impulse response functions and forecast error variance decompositions are then recovered from the idiosyncratic component of each country's SVAR. These country-level estimates form the dependent variable in the second-stage cross-sectional regression, which relates the cumulative impulse response at an eight-quarter horizon to a set of structural characteristics: union density, trade openness, inflation volatility, the strength of monetary transmission through the lending channel, and inflation-targeting regime.

9. The second stage links these country-specific responses to structural features that may explain cross-country differences in pass-through. The country-level impulse responses recovered from Stage 1 are used as the dependent variable in a second-stage regression. For each country, we extract the cumulative impulse response of CPI to an import price shock at the eight-quarter horizon and regress it on variables that capture the structural characteristics of each economy. The objective is to identify which structural features explain why some countries — and Iceland in particular — transmit import price shocks more strongly and persistently into consumer prices than others.

C. Data

10. The dataset provides a consistent post-crisis panel for estimating inflation dynamics across countries. The panel comprises 45 advanced and emerging market economies over the past

decade and a half. The sample window (2011Q1-2025Q3) covers the post-Global Financial Crisis period and thereby avoids the structural break associated with Iceland's financial crisis. The four core VAR variables — real GDP growth, nominal wage growth, CPI inflation, and changes in import prices — are drawn from standard national sources and expressed as annualized quarterly log-differences. Seasonal adjustment is applied to all variables prior to estimation using STL decomposition with a seasonal window of four quarters. The full country list is provided in Annex I.

11. The second stage regressors include a selection of structural variables available for all 45 countries in the panel. Trade openness is measured as the sum of exports and imports as a share of GDP. The service-to-goods export ratio captures the sectoral composition of each country's export base. Union density, measuring formal trade union membership as a share of employees, is drawn from the ILO and OECD ICTWSS databases. The strength of monetary transmission is captured by the sum of the pass-through coefficients in a regression of policy rate changes into bank lending rates. Inflation volatility is measured as the annualized standard deviation of quarterly CPI inflation over the sample period. Iceland sits at the extreme upper end on union density and close to the lower end on the strength of the bank lending channel.

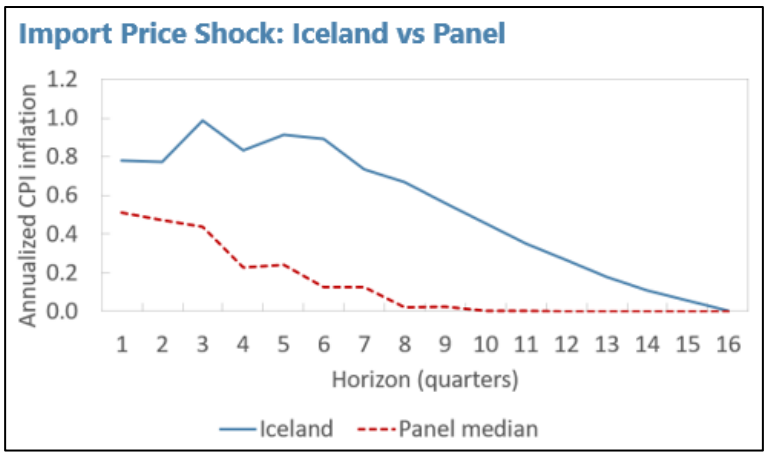
D. Results

12. Import price shocks are the dominant driver of Iceland's CPI variance. The import price shock in Iceland accounts for 75 percent of forecast error variance at the eight-quarter horizon — nearly three times the panel median of 26 percent for the overall sample. By contrast, wage and demand shocks play a comparatively smaller role in Iceland relative to peers. For instance, wage shocks account for 11 percent of Iceland's CPI inflation variance against a panel median of 33 percent, while GDP shocks account for just 3 percent compared with a panel median of 20 percent. Iceland's inflation is thus predominantly an external price phenomenon, with domestic wage and demand dynamics playing a secondary role that is the reverse of the typical cross-country pattern.

Table 2. Iceland: CPI Forecast Error Variance Decomposition at h = 8 Quarters

	Iceland	Panel Median
Import Price	75%	26%
Own-CPI	11%	13%
Wages	11%	33%
Supply (GDP)	3%	20%

13. Iceland's impulse response to import price shocks is larger and more persistent relative to other countries. A one-standard-deviation import price shock raises Iceland's CPI by close to 1 percentage point at its peak in the third quarter, a response that is large relative to the panel distribution. It is also more persistent - while the panel median response dissipates relatively quickly, Iceland's response takes considerably longer to unwind. This combination of a larger peak effect and a slower dissipation is consistent with import price shocks becoming embedded in the domestic price level through successive rounds of adjustments, rather than passing through at once and fading soon afterwards.



14. Inflation volatility and labor market characteristics seem to be the main factors explaining Iceland's relatively high import price pass-through. Inflation volatility is the most robust predictor of import price pass-through, entering with a positive and highly significant coefficient: countries with more volatile inflation history transmit import price shocks more strongly and persistently into consumer prices. This is consistent with the role of inflation expectations: economies with a history of volatile inflation are more likely to have less firmly anchored expectations, making each new shock more persistent. Einarsson and Pétursson (2026) find that Iceland's trend inflation continues to be more volatile than in other advanced economies, largely reflecting less firmly anchored inflation expectations and, more recently, the interaction of weakly anchored expectations and large global supply shocks. Union density also enters positively and significantly, indicating that higher-union-density economies tend to exhibit larger cumulative CPI responses to import price shocks. Trade openness and the strength of monetary transmission through the lending channel do not enter significantly, suggesting that the pass-through mechanism operates through the inflation expectations and wage-setting channel rather than through goods market competition or the interest rate channel. [2]

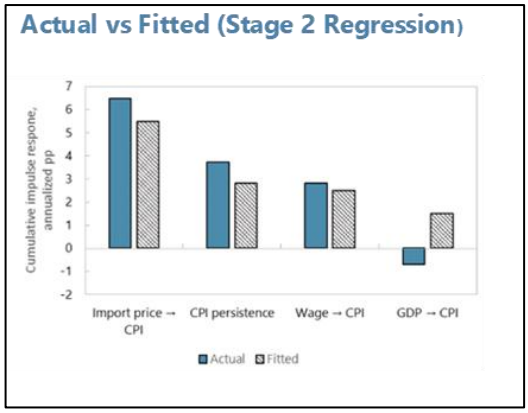
[2] While the cumulative impulse response is, by construction, partly a function of each economy's inflation volatility—since structural responses are scaled by the underlying shock standard deviation—this dependence enters as a common scaling factor rather than as a structural channel; because our institutional regressors are themselves largely orthogonal to inflation volatility (jointly explaining under 5 percent of its cross-country variation), the scale sensitivity affects the amplitude of the dependent variable but not the estimated significance of the structural coefficients.

Table 3. Iceland: Structural Determinants of Inflation Dynamics: Cross Country Regression Results
(Dependent variable: Cumulative IRF h=0-8 quarters)

	Import price → CPI	CPI persistence	Wage → CPI	GDP → CPI
Constant	-2.4***	+1.0	-0.1	+2.8
Lending channel (θ)	-0.3	-1.0	-0.0	-4.0*
Union density	+0.0**	+0.0	-0.0	+0.0
Trade openness	-0.2	+0.2	-0.2	-0.5
UD × Openness	+0.0	+0.0	+0.1	+0.2*
Inflation volatility	+1.9***	+0.6**	+1.7***	-0.1
R^2	**0.68**	**0.27**	**0.56**	**0.18**
Adj R^2	**0.64**	**0.16**	**0.50**	**0.06**

*** p<0.01, ** p<0.05, * p<0.10. HC3 robust Ses, 2011Q1–2025Q3

15. Iceland's position in the cross-sectional regression is well explained by its structural characteristics. Above-average inflation volatility and economies with high union density tend to show stronger pass-through. The second-stage regression fits Iceland's estimated impulse response closely, indicating that Iceland is not a true outlier once its institutional and historical features are accounted for.



E. Conclusions

16. This paper set out to address two questions: what is driving Iceland's inflation, and what factors help explain Iceland's relatively stronger inflation response to shocks. The Panel SVAR results establish that import price shocks are the dominant driver of Iceland's CPI, accounting for 75 percent of forecast error variance at the eight-quarter horizon — nearly three times the cross-country sample median. The second-stage cross-sectional regression shows that this excess sensitivity reflects Iceland's structural characteristics, such as its history of elevated inflation volatility and high union density.

17. Inflation volatility reflects the degree to which inflation expectations are anchored. In general, economies with a history of volatile inflation also have less firmly anchored expectations, and less anchored expectations make each new import price shock more persistent and more difficult to contain, thereby creating a self-reinforcing dynamic. Conversely, achieving a sustained

period of low and stable inflation could help reduce pass-through by firmly anchoring expectations — a virtuous cycle in which disinflation begets disinflation.

18. The significant association between union density and import price pass-through points to a second structural channel. High union density tends to be associated with stronger pass-through of external price shocks, likely embedding import price increases into the domestic cost base through successive bargaining rounds. Structural measures that strengthen the link between wage settlements and productivity — rather than realized inflation — would help moderate these second-round effects and reduce the degree to which external shocks become entrenched in domestic prices.

19. Two limitations of the analysis merit acknowledgment. First, Iceland's extensive system of CPI-indexed financial contracts and wage agreements is likely an additional channel that operates independently of union density and warrants further analysis. Second, the results could be assessed for sensitivity to a broader set of VAR variables in Stage 1 and structural characteristics in Stage 2, as well as alternative methods such as local projections. Both limitations point to productive directions for further research.

Annex I. Country List

1. The panel comprises the following 45 advanced and emerging market economies:

- *Advanced Economies:* Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Israel, Italy, Japan, Korea, Netherlands, New Zealand, Norway, Portugal, Singapore, Spain, Sweden, Switzerland, United Kingdom, United States.

- *Emerging Market Economies:* Brazil, Bulgaria, Chile, China, Colombia, Croatia, Hungary, India, Indonesia, Latvia, Lithuania, Malaysia, Mexico, Peru, Philippines, Poland, Romania, Russia, Slovak Republic, Slovenia, South Africa, Thailand, Turkey, Ukraine.

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DIAGNOSING ICELAND'S PRODUCTIVITY SLOWDOWN: FIRM-LEVEL EVIDENCE[1]

Iceland maintains a high level of GDP per capita despite relatively weak level of labor productivity, and a sharp slowdown in productivity growth over the last decade. Economic growth in recent years has relied increasingly on high labor utilization rather than productivity growth. Using firm-level evidence, this paper examines the drivers of the aggregate productivity slowdown. We show that while the typical firm continues to post productivity gains, those firm-level gains do not translate into stronger aggregate productivity. This outcome is due to four main reasons: (i) capital and labor are not allocated toward the most productive firms; (ii) productivity convergence occurs toward a frontier that itself remains below the European one; (iii) low-productivity firms remain in the market for too long; and (iv) productive firms face a penalty when they try to scale. Possible options to address these challenges center on: (i) improving allocative efficiency; (ii) strengthening entry/exit conditions and competition; and (iv) improving framework conditions to allow productive firms to expand, including further developing the nascent venture capital and startup ecosystem and increasing access to skilled labor.

A. Introduction

1. Iceland combines very high income levels with comparatively low labor productivity. Iceland ranks near the top of advanced economies on a GDP per capita basis and has recorded very strong social outcomes, yet labor productivity remains below the Nordic average and productivity growth has slowed materially over the past decade and a half. The gap has increasingly been filled by strong labor input growth and higher hours worked rather than efficiency gains. This configuration has supported living standards, but cannot provide the basis for sustained medium-term growth.

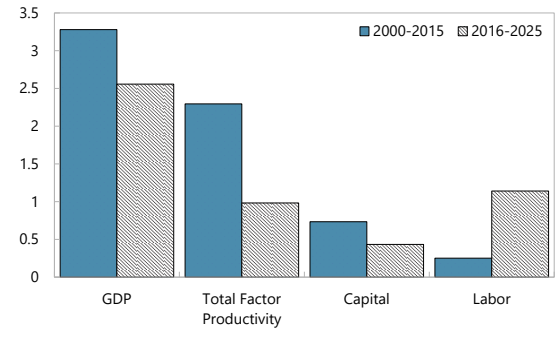
2. This paper uses firm-level data to investigate whether Iceland's productivity slowdown reflects weaker within-firm performance, structural shifts, or resource misallocation. There are three main candidate explanations for the productivity slowdown. First, within-firm productivity growth has slowed – i.e., firms themselves are underperforming. Second, labor and capital have shifted toward structurally lower-productivity activities. Third, resources are not allocated efficiently across firms and sectors. Drawing on firm-level ORBIS data, the paper shows that within-firm productivity growth remains relatively strong. Instead, the evidence points to between-firm/within-sector allocative inefficiencies as the main driver of the aggregate productivity slowdown.

[1] Prepared by Harri Kemp.

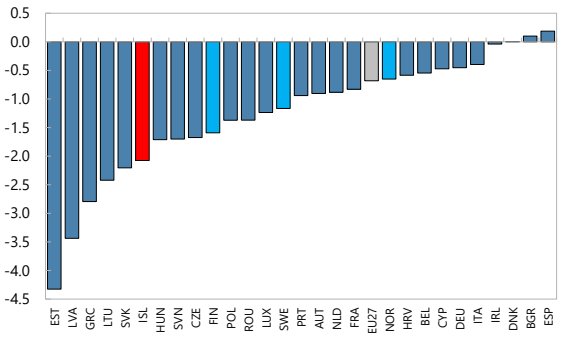
B. Aggregate Backdrop

3. Iceland's recent growth performance has become increasingly labor-driven. A standard growth accounting decomposition using national accounts data shows that the contribution of total factor productivity to output growth fell sharply between the pre-crisis and post-crisis periods, while the contribution of labor rose and capital deepening slowed (Figure 1, left). In fact, aggregate labor productivity has declined by more than in most comparable economies (Figure 1, right). Growth has relied less on producing more efficiently and more on employing a larger share of the population for longer hours. This suggests that recent output performance increasingly reflects input accumulation rather than sustained productivity gains.

Figure 1. Growth Accounting and Labor Productivity



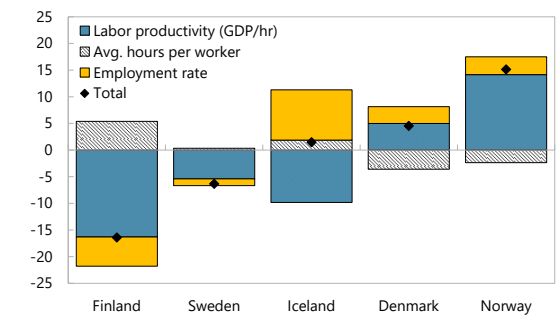
Sources: Penn World Tables, Statistics Iceland, and IMF staff.



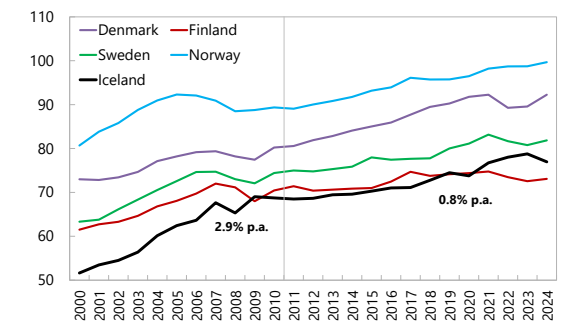
Sources: Eurostat, IMF staff calculations.

4. High labor utilization has allowed Iceland to maintain strong GDP per capita despite a lower level of labor productivity. A decomposition of GDP per capita into labor productivity, hours worked, and the employment-to-population ratio shows that Iceland is close to the Nordic-4 average in terms of GDP per capita even though labor productivity is about 10 percent below average. The offset comes from an employment-population ratio that is around 9 percentage points above the Nordic-4 average and even higher relative to the broader European Union (Figure 2, left). This pattern underscores both Iceland's strength in labor market participation and the extent to which living standards are being upheld by labor utilization rather than labor productivity.

Figure 2. GDP per Capita and Labor Productivity



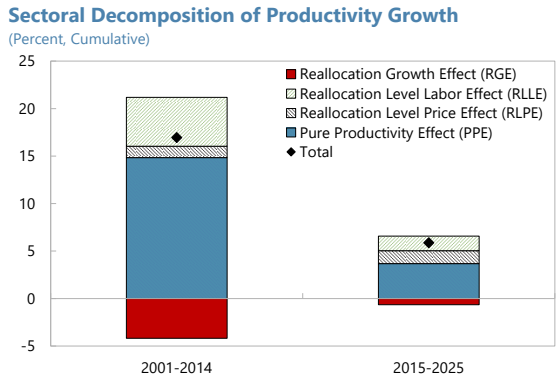
Sources: OECD and IMF staff.
Note: USD, PPP-converted, chain-linked volumes, 2020 prices



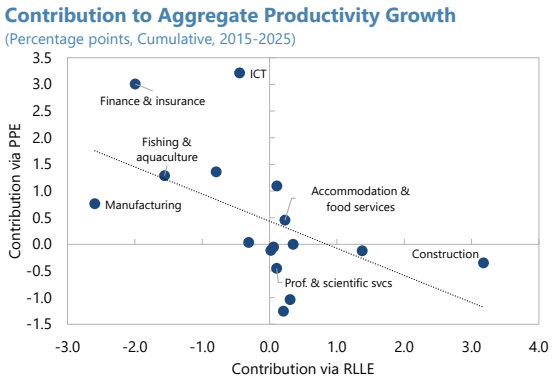
Sources: OECD and IMF staff.
Note: USD, PPP-converted, chain-linked volumes, 2020 prices

5. The aggregate productivity slowdown is predominantly a within-sector phenomenon. A generalized exactly additive decomposition (GEAD) of aggregate labor-productivity growth into a within-sector pure productivity effect (PPE), a reallocation level effect (RLE), and a reallocation growth (covariance) effect (RGE) shows the pure within-sector productivity effect dominates (Figure 3, left).[2] Both reallocation level effects remained positive (i.e., price and labor), but the labor reallocation contribution declined meaningfully between periods. The reallocation growth effect was a small drag over the last 10 years. The main drag on overall productivity growth is the decline in pure within-sector productivity (PPE). Cumulatively, the PPE falls from 14.8 percentage points over 2001–14 to 3.7 over 2015–25 – roughly halving the within-sector contribution to annual aggregate productivity growth. This indicates that while the compositional shift *between* sectors contributed to the aggregate slowdown, the main source of the aggregate weakness lies *within* sectors.

Figure 3. GEAD Productivity Decomposition



Sources: Tang and Wang (2004), Statistics Iceland, and IMF staff.



Sources: Tang and Wang (2004), Statistics Iceland, and IMF staff.

6. Labor reallocation has compounded rather than mitigated the within-sector slowdown. Sectoral evidence shows that the sectors gaining employment share–most notably tourism, construction, and business services–are also those with weaker within-sector productivity growth, while sectors losing labor share - such as manufacturing, fishing, and finance–have stronger within-sector performance (Figure 3, right). This shift in the sectoral composition of employment has reinforced rather than offset the aggregate productivity decline. It reflects primarily the absorption of a rapidly growing–and, in the case of tourism and construction, largely immigrant–labor force into lower-productivity, labor-intensive sectors. The result is not only slower productivity growth within sectors, but also a cross-sectoral pattern that has not supported aggregate allocative efficiency.

7. The within-sector slowdown might point to between-firm resource misallocation. The aggregate decompositions show that the productivity slowdown is largely a within-sector phenomenon. However, a within-sector slowdown does not necessarily mean that firms inside those sectors have become less productive. It may instead indicate that resources are no longer concentrated in the most productive firms within each sector. A decline in allocative efficiency within

[2] The GEAD decomposition follows Tang and Wang (2004) with the price/labor extension of Montebello and Darmanin (2021); the specification is identical to Box 1 of Annex VII in the 2025 Iceland Staff Report and is reproduced in the Annex.

sectors can look, in the aggregate, like a broad-based loss of productivity even when individual firms continue to register productivity gains. For this reason, we use firm-level data to better understand the within/between-sector versus within/between-firm productivity dynamics.

C. Data and Measurement

8. The firm-level analysis uses Icelandic micro-data from the IMF RES-ORBIS database (Díez et al, 2021). The analysis sample covers 2000–2023. Labor productivity is measured as real operating turnover per employee (turnover deflated by producer price indices) since value-added coverage in Iceland's ORBIS data is low (about 3% of observations). Sector exclusions and the productivity measure are applied consistently throughout the analysis.[3] Sample sizes vary by specification and variable requirements, from about 4,800 observations per year in the labor-productivity specifications (which impose a two-employee floor) to roughly 10,000–11,000 in the Olley–Pakes and misallocation specifications, which use the full firm-size distribution.[4] Sample size figures are for 2016 onward with fewer observations pre-2016.

9. Two data limitations are important for interpreting the results, but do not materially affect the main conclusions. First, productivity is measured using turnover rather than value added. This measure is less well suited for cross-sectional level comparisons because it incorporates intermediate inputs and may therefore reflect differences in production structure as well as productive efficiency. However, it remains informative for analyzing productivity dynamics over time, which are the primary focus of the paper. Second, ORBIS coverage in Iceland increases sharply in 2016, approximately doubling the number of firms captured in the dataset. To mitigate potential coverage-related distortions, the analysis of firm dynamics focuses on the post-2016 period. Sensitivity checks comparing pre- and post-2016 results are reported where relevant, although findings for the pre-2016 period should be interpreted with caution.

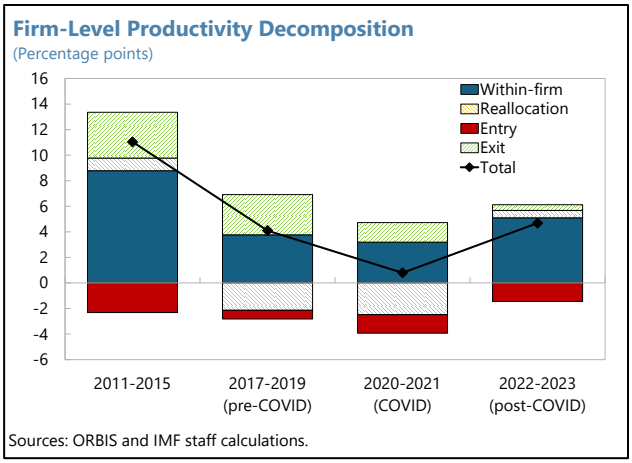
[3] Definitions held fixed across the analysis: Labor productivity = log(real operating turnover / number of employees); NACE2 sector exclusions (1, 2, 64, 65, 66, 68, 84–99): primary agriculture, financial intermediation, real estate, and non-market activities (including public services).

[4] Specifications investigating labor productivity growth and firm dynamics require a clean productivity measure: a firm with one (or fractional/rounded) employee has a tiny denominator and a wildly noisy labor productivity. The employment floor strips out sole-proprietor noise. Misallocation specifications measure allocation across the whole size distribution. The main aim of a misallocation measure is to capture resources stuck in small, low-productivity firms, so imposing a floor would mechanically truncate the dispersion we are trying to measure.

D. Drivers of the Aggregate Productivity Slowdown: Firm-Level Evidence

Within-Firm Gains Versus Reallocation

10. Within-firm productivity gains are the main engine of aggregate productivity growth.[5] Following Decker et al. (2017)[6], we decompose aggregate labor-productivity growth into a within-firm term (continuing firms becoming more productive), a between-firm reallocation term (market share shifting toward more productive continuing firms), and entry and exit terms, presenting the firm-level analogue of the GEAD decomposition discussed earlier. The decomposition shows that within-firm productivity improvements generate the largest share of overall productivity growth over time (text chart).[7] This presents one of the central firm-level findings: the typical (continuing) firm keeps improving over time. In all, the within-sector slowdown observed in the GEAD decomposition above does not seem to simply reflect within-firm productivity losses but appears to be also a symptom of *between-firm* resource misallocation.



11. Entry, exit, and resource reallocation have weighed on aggregate firm-level productivity growth. Firm entry has subtracted since around 2010 as new firms entered below incumbent firm productivity levels. The exit margin has contributed positively over the last 15 years, but the contribution has weakened over time, while reallocation among surviving/continuing firms is close to zero on average. This suggests that the mechanisms that normally translate firm-level improvements into stronger aggregate productivity (i.e., resource reallocation, firm entry/exit) have become less effective.

Rapid Convergence to a Low Ceiling

12. Continued within-firm productivity growth is confirmed by the fact that laggard firms catch up to the national frontier. Estimating the error-correction catch-up model of Griffith et al (2004), in which firm productivity growth depends on the distance of laggard firms to the frontier, yields a national catch-up coefficient for Iceland that is the highest among the economies in the sample (Figure 4, left).[8] Domestic diffusion therefore appears strong: laggard firms converge rapidly

[5] While within-firm productivity growth has also slowed over time, the data coverage caveat applies to the pre-2016 sample: Pre-2016 point estimates are uncertain, but broad trends hold.

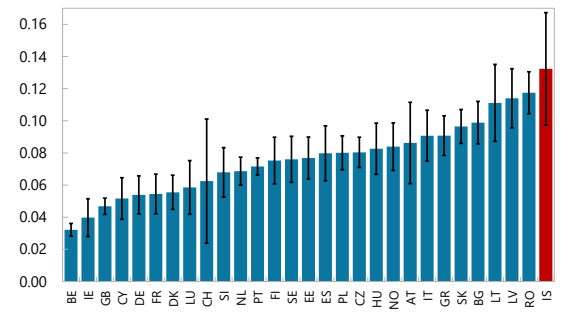
[6] Firm-level analogue of the GEAD decomposition; detailed derivation provided in the Annex.

[7] Results are consistent with firm-level evidence presented in Mosiashvili and Jin (2025).

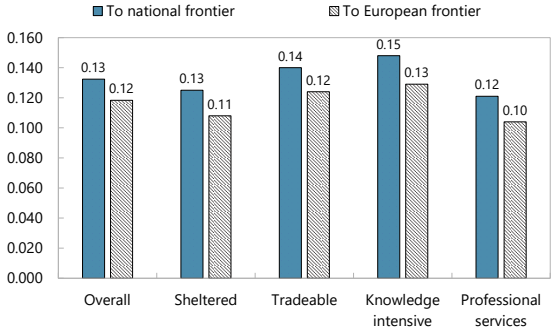
[8] See the Annex for details on the specification and regression results for Iceland.

toward the national frontier, suggesting that the transmission of existing knowledge and technology within Iceland is not the main constraint on productivity growth.

Figure 4. Laggard-Frontier Productivity Catch-Up

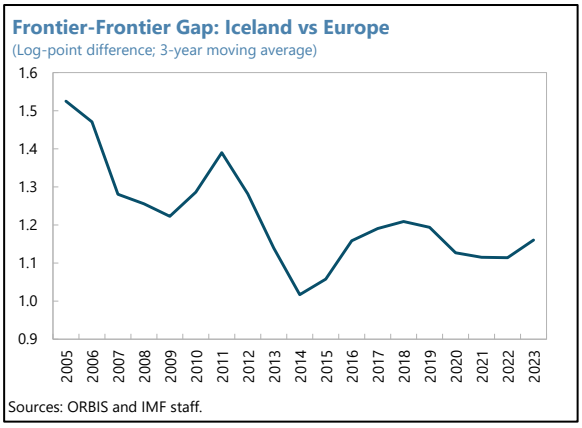


Sources: ORBIS and IMF staff calculations
Note: Error bars show 95 percent interval.



Sources: ORBIS and IMF staff calculations.

13. However, convergence to the European frontier is consistently weaker than convergence to the national frontier (Figure 4, right). The largest shortfalls are concentrated in sheltered and professional services–the same sectors that have absorbed a growing share of labor. Additionally, after improving between the mid-2000s and mid-2010s, the absolute productivity gap of Icelandic frontier firms relative to the European frontier has stopped narrowing (text chart). The implication is not that Icelandic firms fail to catch up, but that they converge toward a frontier that remains below the European benchmark. Within-firm productivity gains remain positive because laggard firms continue to improve, but those gains have weakened over time as firms converge toward a frontier that is advancing only slowly relative to Europe's best performers. Rapid catch-up to a relatively low (versus European top performers) and slowly moving frontier compresses the productivity distribution without generating a corresponding increase in aggregate productivity.



Sources: ORBIS and IMF staff.

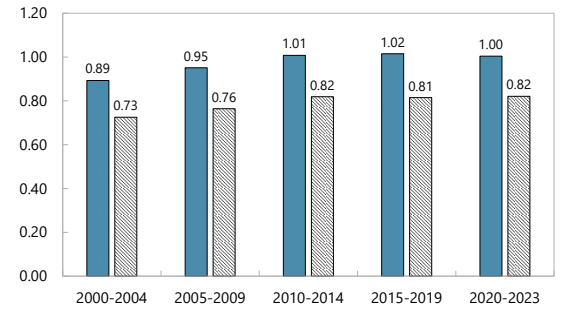
14. The frontier evidence reinforces the broader finding that individual firms continue to improve, but aggregate productivity growth has weakened. The explanation for the decline in aggregate productivity growth is therefore unlikely to lie within firms. Instead, it points toward weaknesses in the mechanisms that allocate capital and labor across firms and sectors. We explore these aspects in more detail below.

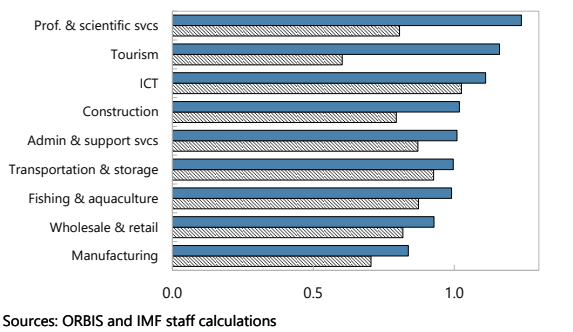
Resource Misallocation

15. Capital and labor misallocation is high and concentrated in sheltered services. Under the Hsieh-Klenow (2009) framework, allocative efficiency can be measured by the dispersion in the

marginal revenue products of capital (MRPK) and labor (MRPL).[9] In an efficient allocation, returns should be broadly equalized across firms; when they are highly dispersed, there is scope to raise output by reallocating existing resources toward more productive uses. By this measure, both capital and labor misallocation increased into the mid-2010s and remains elevated, with no sign of the compression that would accompany a meaningful improvement in allocative efficiency (Figure 5, left). Sectoral results show that dispersion in returns is highest in professional services and tourism and lowest in manufacturing (Figure 5, right). The manufacturing sector is most exposed to international product-market discipline, while the sectors with the largest distortions are those more insulated from such pressures. This suggests that the allocation problem is closely related to weak competition and limited market discipline in sheltered parts of the economy.

Figure 5. Within-Sector Capital and Labor Misallocation



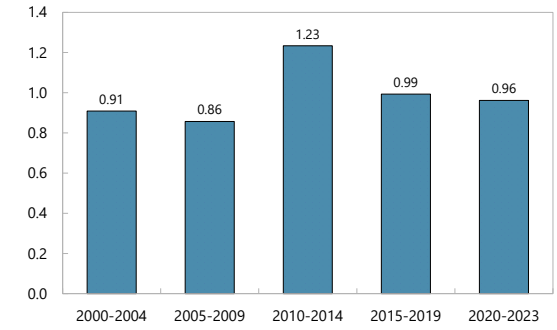


16. Productive firms are also no longer the largest firms, pointing to a deterioration in within-sector resource allocation. The Olley-Pakes (1996) decomposition expresses aggregate productivity as the sum of the unweighted average of firm productivity and a covariance between firm size and productivity.[10] A large positive covariance indicates that economic activity is concentrated in the most productive firms. According to this decomposition, aggregate within-sector covariance rises through 2009–11 and then declines toward much lower levels, indicating that output is less concentrated in the most productive firms than it was a decade ago (Figure 6, left). The sectoral pattern tells a broadly similar story as for capital and labor allocation: in sheltered sectors and certain services industries, output is not concentrated in the most productive firms (Figure 6, right). This highlights the between-firm, within-sector allocation problem that underpins the results of the GEAD decomposition above: inside sectors, output isn't concentrating in the most productive firms, partly explaining why within-sector productivity growth has weakened.

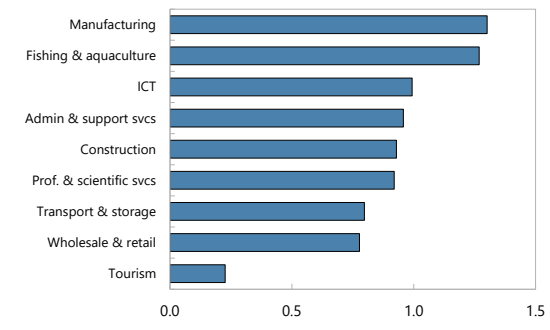
[9] See the Annex for details.

[10] See the Annex for details.

Figure 6. Within-Sector Allocative Efficiency



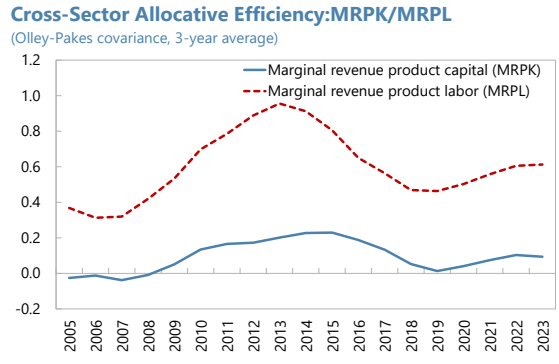
Sources: ORBIS and IMF staff calculations



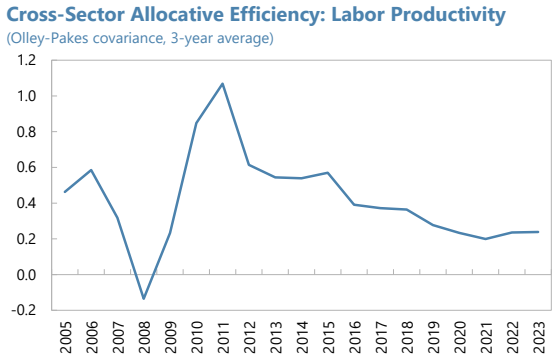
Sources: ORBIS and IMF staff calculations

17. Across sectors, labor is more misallocated than capital, while output is not concentrated in the most productive sectors. The cross-sector Olley-Pakes covariance between sector size and marginal product is close to zero for capital but large and rising for labor (Figure 7, left). This suggests that capital is allocated across sectors in a roughly efficient way, whereas labor is increasingly misaligned with sectoral productivity conditions. In practice, this means that larger, higher-value-added sectors appear systematically understaffed while labor has continued to flow into sectors with weaker productivity performance, a pattern consistent with a rapidly expanding, largely immigrant labor supply being absorbed by labor-intensive lower-productivity activities, while more capital- and skill-intensive high-productivity sectors drew proportionately less. The deterioration of labor allocation across sectors complements the within-sector evidence of impaired selection and scaling (see below).[11] Finally, the Olley-Pakes covariance between sector size and productivity has declined steadily since 2010, suggesting that output is not concentrated in the most productive sectors (Figure 7, right). The evidence therefore implies that both within- and between-sector allocative efficiency has deteriorated, contributing to the decline in aggregate productivity growth.

Figure 7. Cross-Sector Allocative Efficiency



Sources: ORBIS and IMF staff calculations.
Note: Values different from zero point to allocative inefficiency.



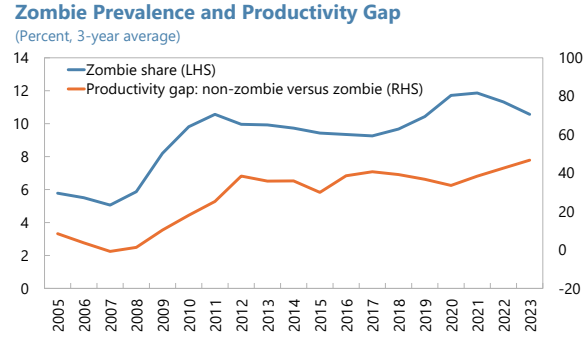
Sources: ORBIS and IMF staff calculations.
Note: Values below zero point to allocative inefficiency.

[11] Part of this cross-sector gap may reflect differential effective taxation rather than pure misallocation: sectors facing heavier levies will optimally employ less of a factor – raising its measured pre-tax marginal product – while sectors with lighter treatment will employ more. Disentangling such policy-induced wedges from pure misallocation is left for future work.

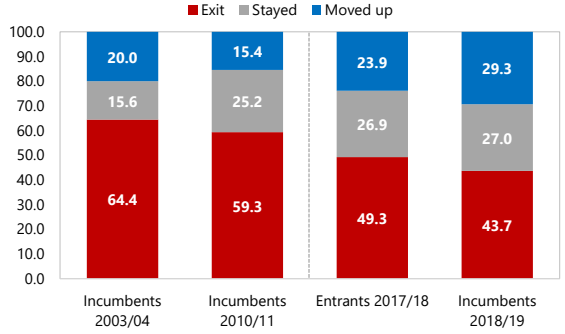
Exit Failure and Zombie Firms

18. Selection has weakened over time, allowing low-productivity firms to survive longer and lock in resources. Zombie firm analysis shows that the share of zombie firms has roughly doubled since the mid-2000s to around 11 percent in 2023 (Figure 8, left).[12] Over the same period, the productivity gap between healthy firms and zombie firms has widened to around 45 percent. This suggests that an increasing share of capital and labor is tied up in older, less productive firms that are not exiting the market efficiently.

Figure 8. Zombie Firms and Firm Transition

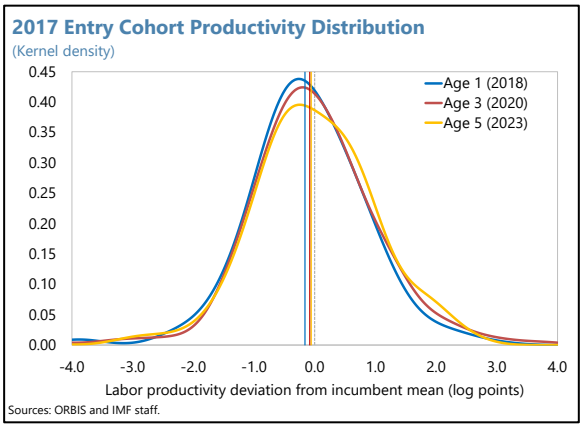


Sources: ORBIS and IMF staff calculations.
Note: Zombie firm defined as firm older than 10 year with two consecutive years of negative net income.



Sources: ORBIS and IMF staff calculations.

19. Transition evidence confirms that low-productivity firms often remain trapped rather than moving up the productivity distribution. A productivity-quintile transition analysis shows that among firms starting in the bottom quintile, roughly half exit and about one quarter remain in the bottom quintile after four years, with broadly similar patterns for entrants and incumbents (Figure 8, right).[13] The persistence of a substantial share of firms across both groups indicates that this relatively weak performance is not just a transitory feature of young firms. Instead, it points to a structural weakness, whereby the bottom of the distribution does not clear quickly enough. Cohort productivity profiles also show little systematic improvement in productivity with age, suggesting that survival alone does not bring convergence toward best practice (text chart).



Sources: ORBIS and IMF staff.

[12] Zombie firms are defined as firms older than 10 years with two consecutive years of negative net income, in the spirit of Adalet McGowan et al (2018).

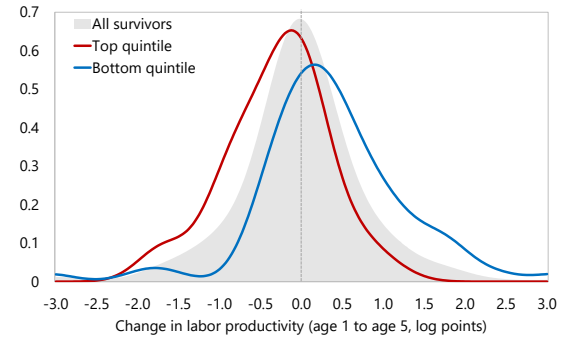
[13] The analysis tracks entrants and incumbents over four years. For each period (pre-GFC, post-GFC, post-2016), firms are pooled over two years to increase coverage.

20. Recent cohorts show that exit has become materially weaker over time. Across successive incumbent cohorts, the exit rate of bottom-quintile firms falls from about two-thirds before the global financial crisis to under one-half after 2016, while the share remaining in the bottom quintile stays relatively stable (Figure 8, right). This means that the long-standing persistence problem has been compounded by a more recent decline in the likelihood that the weakest firms leave the market. While the quintile transition shows that the share of firms that move up the distribution has also increased, most barely improve (around two thirds only move up to quintile 2) and firms that move up do so largely by cutting employment.[14]

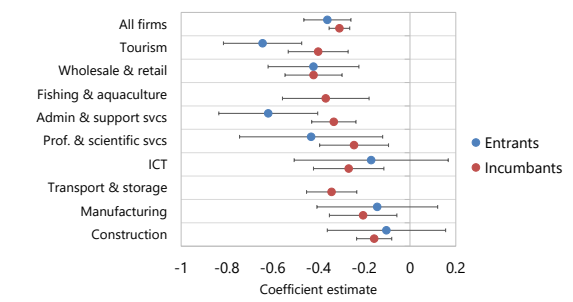
Scaling Penalty

21. The dynamics of surviving entrants reveal a compression in the productivity distribution rather than healthy firm scaling. Among surviving entrants tracked from age one to age five, firms that start in the bottom productivity quintile mostly improve (around 70 percent show positive productivity growth), while firms that start in the top quintile more often lose ground (Figure 9, left). The result is a narrowing of the productivity distribution from both ends: weak firms improve, but productive firms frequently see their advantage fade over time. This development is not indicative of a highly dynamic environment where productive firms keep expanding and boosting aggregate productivity.

Figure 9. Entrant Productivity Developments and Scaling Penalty



Sources: ORBIS and IMF staff.



Sources: ORBIS and IMF staff calculations.
Note: Entrants - Pooled 2017/18 entrants; Incumbents - Pooled 2018/19 incumbants; Whiskers = 95 percent confidence interval.

22. A broad-based scaling penalty helps explain why productive firms do not translate their initial advantage into larger aggregate gains. Regressions of firm-level productivity growth on employment growth yield negative coefficients in every sector and for both incumbents and entrants (Figure 9, right).[15] On average, expanding employment is associated with lower productivity, with coefficients of about -0.30 for incumbents and -0.36 for entrants (i.e., for each percentage point increase in employment, productivity declines by around 0.3 percent), even when controlling for

[14] Data coverage caveat applies to the pre-2016 sample: Pre-2016 point estimates are uncertain, but broad trends hold.

[15] See the Annex for the detailed specification. Chart shows results for the 2017/18 entry cohort and 2018/19 incumbent cohort. Results are robust to different sample periods.

firms' initial position in the productivity distribution. While the penalty is largest in tourism and administrative and support services, it is present economy-wide and is not confined to specific sectors. This suggests that the scaling penalty is structural and pervasive and not an idiosyncratic feature of a narrow segment of the economy.

23. Productive firms lose their productivity advantage as they expand, while less productive firms improve by staying small. The data show that top-quintile entrants tend to expand employment aggressively and therefore, based on the regression results above, incur a large scaling penalty as they grow. In contrast, bottom-quintile firms that improve typically do so without significant employment expansion and often while shedding labor. Bottom-quintile firms improve through mean reversion (see the domestic laggard-frontier catch-up discussion above) and through shedding employment (see the quintile transition discussion above). In other words, productive firms lose some of their productivity advantage when they scale, while weaker firms improve mainly by remaining small or shrinking. This is the opposite of a healthy reallocation environment, in which more productive firms can expand – and absorb a larger share of labor and capital – without diluting their productivity advantage, so that reallocation pulls aggregate productivity upward.

Three Reinforcing Failures

24. Taken together, the firm-level evidence points to three reinforcing failures behind Iceland's aggregate productivity slowdown:

- *First, reallocation is weak both within and across sectors*: the size-productivity link has deteriorated, labor has shifted toward lower-productivity activities, and marginal-product dispersion remains high.
- *Second, the domestic frontier is low (relative to European top performers) and slow-moving*: firms converge quickly to the national frontier, but the national frontier remains below the European frontier.
- *Third, selection is weak*: zombie firms have become more prevalent, the lower tail of the distribution does not clear efficiently, and productive firms face a scaling penalty.

These three mechanisms jointly show why firm-level productivity improvements have not translated into stronger aggregate outcomes.

25. The core of the problem is allocative, not technological. Weak exit leaves resources tied up in low-productivity firms, a relatively stagnant domestic frontier limits the payoff from catch-up, and the scaling penalty limits the gains from expansion by productive firms. The common theme is insufficient competitive pressure and insufficient and/or inefficient reallocation of resources toward the most productive firms and activities.

E. Possible Implications

26. The analysis points to the importance of stronger business dynamism, increased competition, and productivity-enhancing structural reforms. The firm-level evidence discussed above suggests that the main constraint to increased productivity growth is not individual firms' ability to improve, but rather weak reallocation, limited competitive pressure, and barriers that prevent productive firms from expanding. These results echo a broader cross-country literature underscoring the critical role of strengthening business dynamism while also supporting innovation, skills, infrastructure, and improved labor-market outcomes (OECD, 2024; Adilbish et al, 2025).

27. Drawing on cross-country evidence, the following areas hold the potential to strengthen productivity and lift the economy's growth potential:

- *Strengthening competition and resource reallocation:*

  Lower barriers to entry and exit are associated with improved allocative efficiency and stronger productivity growth across OECD economies. Cross-country evidence indicates that streamlining licensing and permitting procedures, reducing administrative burdens on firms, and strengthening competition in sheltered sectors help sharpen market discipline and facilitate the movement of labor and capital toward more productive firms (OECD 2024; Cho et al, 2024). Comparative OECD analysis further finds that simplifying insolvency and restructuring procedures can allow non-viable firms to exit more quickly while enabling viable firms to reorganize efficiently – reducing the share of capital sunk in "zombie" firms and supporting reallocation toward more productive uses (Adalet McGowan et al, 2018; Adalet McGowan and Andrews, 2018; Andrews and Petroulakis, 2019). Greater openness to foreign investment and entry has also been linked, in the cross-country literature, to enhanced competition and faster diffusion of new technologies and business practices (Adilbish et al, 2025).

- *Supporting the expansion of productive firms:*

  Cross-country firm-level evidence points to scaling constraints as a key bottleneck for young, high-growth firms. Improving access to finance for innovative and high-growth firms–including through a deeper venture-capital ecosystem–has been associated with stronger young-firm dynamism and frontier productivity growth (Adilbish et al 2025; Bank of England 2025). Maintaining wage settlements aligned with productivity developments is also widely regarded as important for preserving competitiveness and supporting the growth of productive firms. Continued efforts to strengthen coordination in wage bargaining could likewise help ensure that wage growth remains consistent with productivity developments and the inflation objective.

- *Raising innovation, skills, and the productivity frontier:*

  Cross-country evidence suggests that the returns to innovation policy depend on its design and evaluation as much as on its scale. Strengthening the evaluation of existing R&D

support schemes, improving monitoring of innovation outcomes, streamlining research-support mechanisms, and deepening collaboration between research institutions and the private sector have been highlighted in OECD reviews as central to raising the return on innovation spending (OECD, 2013). Further development of venture-capital financing and stronger international research linkages have also been associated in the literature with stronger commercialization and frontier innovation outcomes (Adilbish et al, 2025).

Human-capital conditions are central to sustaining long-term productivity growth. Cross-country analysis shows that reducing education–job mismatch is associated with meaningful gains in output per capita (Abdulla, 2025). Implementing the authorities' education reform agenda, strengthening STEM education, expanding vocational training and reskilling opportunities, and improving labor-market integration of immigrants would help address skills shortages and mismatches (see, for example, Adilbish and others 2025). Continued efforts to strengthen digital skills and support the adoption of new technologies have likewise been linked to higher productivity growth (Cho et al, 2024).

- *Addressing infrastructure bottlenecks:*

Easing infrastructure constraints are associated with stronger productivity growth, economic diversification, and resilience. Transportation infrastructure is positively associated with total factor productivity, with larger estimated payoffs where development constraints are more binding, while better infrastructure is linked to smaller productivity losses during adverse shocks (Kim, 2026). Expanding energy generation and transmission capacity and improving transport connectivity would ease bottlenecks that increasingly constrain investment and firm expansion. Timely implementation of planned infrastructure projects–supported by strong infrastructure governance–would strengthen economic resilience and improve the conditions for growth in emerging high-value-added sectors.

F. Conclusion

28. Iceland's productivity problem is not that firms fail to improve in general, but that the within-firm improvements do not translate into aggregate productivity gains. The aggregate slowdown is largely within-sector, but the firm-level evidence shows that this reflects a between-firm allocation failure rather than a loss of firm capability. The result is a pattern in which within-firm gains are real but do not cumulate into stronger aggregate productivity growth.

29. The analysis highlights the importance of enhancing the allocative mechanism. Cross-country evidence suggests that stronger competition, more efficient restructuring and exit, and framework conditions that allow productive firms to scale would make it more likely that the productivity gains already occurring within Icelandic firms translate into economy-wide productivity growth. The same body of evidence points to investment in innovation, skills, and infrastructure as central to raising the productivity frontier and underpinning the long-run growth path, while reforms that improve competition and resource allocation are key to ensuring that these gains translate into stronger aggregate productivity growth.

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Annex I. Technical Annex

A. Generalized Exactly Additive Decomposition (GEAD)

1. Aggregate labor-productivity growth G_t is decomposed following Tang and Wang (2004), with the price/labor extension of Montebello and Darmanin (2021). The specification is identical to Box 1 of Annex VII (IMF, 2025), reproduced here:

$$G_t = \sum_i \frac{Y_{i,t-1}}{Y_{t-1}} G_{i,t} + \sum_i \frac{Z_{i,t-1}}{z_{t-1}} \Delta(p_{i,t} l_{i,t}) + \sum_i \frac{Z_{i,t-1}}{z_{t-1}} \Delta(p_{i,t} l_{i,t}) G_{i,t} \quad \text{(I.1)}$$

where $G_{i,t}$ is within-sector productivity growth, $\frac{Y_{i,t-1}}{Y_{t-1}}$ the nominal value-added share, $p_{i,t}$ the relative price level, $l_{i,t}$ the employment share, and $\frac{Z_{i,t-1}}{z_{t-1}}$ the sector's relative productivity level. The first term is the pure productivity effect (PPE), the second the reallocation level effect (RLE), and the third the reallocation growth effect (RGE).

2. Following Montebello and Darmanin (2021), the reallocation level effect can be decomposed into relative-price and relative-labor components. Reproducing equation (2) of Annex VII (IMF, 2025) in full, the decomposition expands to:

$$G_t = \sum_i \frac{Y_{i,t-1}}{Y_{t-1}} G_{i,t} + \frac{Y_{i,t-1}}{Y_{t-1}} \left(\frac{p_{i,t}}{p_{i,t-1}} - 1 \right) + \frac{Y_{i,t-1}}{Y_{t-1}} \left(\frac{l_{i,t}}{l_{i,t-1}} - 1 \right) + \frac{Y_{i,t-1}}{Y_{t-1}} \left(\frac{p_{i,t}}{p_{i,t-1}} - 1 \right) \left(\frac{l_{i,t}}{l_{i,t-1}} - 1 \right) +$$
$$\frac{Y_{i,t-1}}{Y_{t-1}} \left(\frac{p_{i,t}}{p_{i,t-1}} - 1 \right) G_{i,t} + \frac{Y_{i,t-1}}{Y_{t-1}} \left(\frac{l_{i,t}}{l_{i,t-1}} - 1 \right) G_{i,t} + \frac{Y_{i,t-1}}{Y_{t-1}} \left(\frac{p_{i,t}}{p_{i,t-1}} - 1 \right) \left(\frac{l_{i,t}}{l_{i,t-1}} - 1 \right) G_{i,t} \quad \text{(I.2)}$$

The first term is the pure productivity effect (PPE); the second and third are the reallocation level price effect (RLPE) and the reallocation level labor effect (RLLE); and the final four terms are the typically minor interaction terms. The summation runs over all sectors *i*. The three-term form in (I.1) and the expanded form in (I.2) are algebraically equivalent.

B. Firm-Level Decomposition (Decker, dynamic Olley-Pakes)

3. We use the dynamic Olley–Pakes form of Melitz and Polanec (2015) and Decker et al. (2017) and applied in Hu and Ugur (2025). Within a sector, the employment-weighted mean productivity of continuing firms equals their unweighted mean plus the Olley–Pakes covariance between employment share and productivity; aggregating across sectors with weights w_s and adding entry and exit gives:

$$\Delta P_t = \sum_s w_s \left(\Delta \bar{p}_s^C + \Delta cov_s^C + ent_s + ext_s \right) \quad \text{(I.3)}$$

$$cov_s^C = P_s^C - \bar{p}_s^C, \quad ent_s = \theta_s^E (P_s^E - P_s^C), \quad ext_s = \theta_{s,t-1}^X (P_{s,t-1}^C - P_{s,t-1}^X) \quad \text{(I.4)}$$

where, for each sector s, w_s is turnover share, $\bar{p}_s^C$ is the unweighted mean of labor productivity for continuing firms, P_s^C is the employment-weighted productivity mean for continuing firms, $cov_s^C = P_s^C - \bar{p}_s^C$ is their difference, i.e., the Olley-Pakes covariance between a firm's employment share and its productivity; P_s^E and P_s^X are employment-weighted mean productivity levels for entering and exiting firms respectively; and θ_s^E and θ_s^X are employment shares for entering and exiting firms. The within-sector means and shares are employment-weighted, following the dynamic Olley–Pakes form of Melitz and Polanec (2015) and Decker and others (2017). Across sectors, however, the four components are aggregated with turnover weights w_s rather than the initial-year employment shares because employment is reported for only about 70–90 percent of firms in the dataset whereas turnover coverage is near-complete. Results are broadly robust to weighting scheme.

C. Capital and Labor Misallocation (Hsieh–Klenow)

4. We implement the gross-output version of the Hsieh and Klenow (2009) framework. Firm i in sector s produces with a Cobb–Douglas technology in capital, labor, and intermediates, with gross-output capital elasticity α_s, labor elasticity $\beta_s = 1 - \alpha_s - m_s$, and intermediate-input share m_s. Parameters are calibrated using national accounts data from Statistics Iceland. The log marginal revenue products of capital and labor are the log factor elasticity plus revenue per unit of the factor:

$$\ln MRPK_{is} = \ln \alpha_s + \ln Q_{is} - \ln K_{is}, \quad \ln MRPL_{is} = \ln \beta_s + \ln Q_{is} - \ln W_{is} \tag{II.5}$$

where Q_{is} is gross output (PPI-deflated operating turnover), K_{is} capital (PPI-deflated total assets), and $W_{is} = w_{is} L_{is}$ the wage bill (w_{is} the wage per worker and L_{is} is employment), all sourced from ORBIS. Because the elasticities enter only as additive constants, the within-sector dispersion of marginal returns is unaffected by them. Dispersion is computed within each Nace2-year observation and value-added-weighted up to the nine-sector grouping shown in the main text charts and the aggregate economy. Results are broadly robust to weighting scheme.

D. Olley–Pakes Decomposition

5. Aggregate productivity is the unweighted firm mean plus the covariance between size and productivity (Olley and Pakes, 1996):

$$\Phi_t = \bar{\phi}_t + \sum_i (s_{it} - \bar{s}_t)(\varphi_{it} - \bar{\varphi}_t) = \bar{\varphi}_t + cov(s_{it}, \varphi_{it}) \tag{II.6}$$

where Φ_t is aggregate (turnover-weighted) labor productivity; $\bar{\phi}_t$ is the weighted mean of firm-level productivity, s_{it} is firm i's share of sector turnover (output) and $\bar{s}_t$ its cross-firm mean; the second term is the covariance between firm size and productivity. A larger covariance means larger firms are more productive; a declining covariance signals deteriorating allocation. Results are broadly robust to weighting scheme.

E. Frontier Catch-Up (Griffith et al., 2004)

6. Firm productivity growth is regressed on the lagged gap to the frontier in error-correction form:

$$\Delta_h \ln A_{ist} = \beta \Delta_h \ln A^F_{s,t} + \alpha (\ln A^F_{s,t-h} - \ln A_{i,t-h}) + \delta' X_{it} + \eta_s + \tau_t + \varepsilon_{it} \quad \text{(II.7)}$$

where A_{ist} is firm labor productivity in sector *s*, A^F_s sector-*s* frontier productivity, X_{it} are firm controls (including age and size controls), and η_s and τ_t are sector and time fixed effects. Δ_h is the h-year difference operator, with h=3 in the baseline. The frontier is defined as the top 10 percent of the within-Iceland productivity distribution for the national frontier or the cross-country distribution for the European frontier. α is the catch-up coefficient – the error-correction speed at which laggards close the gap: $\alpha > 0$, and a larger α means faster convergence. β is the response to contemporaneous frontier growth.

F. Scaling Penalty Regression

7. For horizon *h*, the change in firm productivity is regressed on the change in employment, by sector *s* and pooled:

$$\Delta_h A_i = \gamma \Delta_h L_i + \beta' X_i + \delta_s + \varepsilon_i \quad \text{(II.8)}$$

where $\Delta_h \ln LP_i$ is the h-period change in firm *i*'s log labor productivity, $\Delta_h L_i$ the h-period change in its log employment, X_i firm controls (including initial period level of log labor productivity), δ_s is sector fixed effects. The scaling penalty is $\gamma < 0$: productivity falls as employment rises. Incumbents pool two baseline windows with firm-clustered (Liang–Zeger) standard errors; entrants pool the 2017 and 2018 cohorts at age 1→5. The regression is estimated separately by the nine-sector grouping and pooled across all sectors.