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Dutch Regional Productivity Heatmap

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Content

Foreword

Over the past decade, the increase in the number of hours worked gave the Dutch economy wind in its sails. In fact, this determined more than 80% of average economic growth over that period. A scant 20% of Dutch growth came from labour productivity growth, which even fell in the last two years.[1] Over the next decade, the number of hours worked will hardly increase anymore. This means almost all the wind will have to come from labour productivity growth. The fact that average annual productivity growth over 2014-2023 was only 0.4 per cent means that the Netherlands must pull out all the stops to increase that rate.[2]

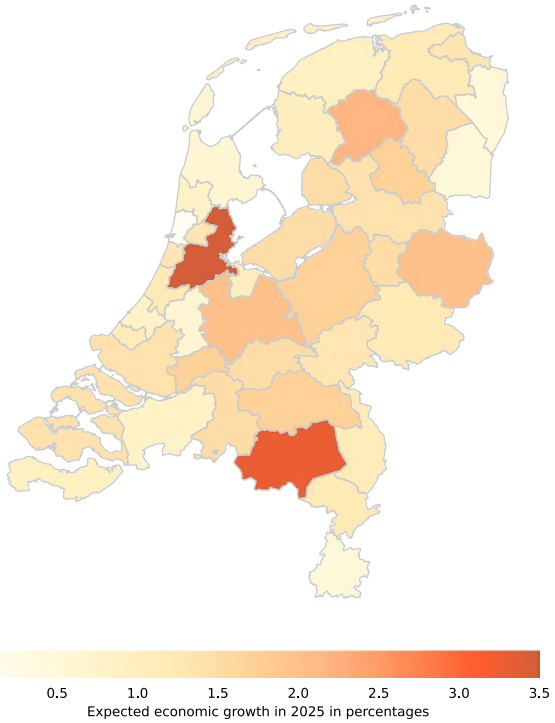
In doing so, it is not only important to look at macroeconomic drivers of labour productivity or sectoral developments, but also at regional developments. Inspired by the UK's Productivity Heatmap of the Productivity Institute,[3] we have made an overview for 40 Dutch regions.[4] We look at labour supply and labour productivity, as these two variables determine longer-term economic growth. For both growth drivers, we then look at underlying economic variables.

We find that there are significant regional productivity differences, although they are not yet growing at an alarming pace. In addition, the drivers of productivity are developing relatively evenly across the Netherlands.

Looking to the future, however, the differences in economic growth do widen. Regions where productivity conditions are favourable have higher growth potential in the future. This is visible in the regional growth forecast for 2025 in figure 1,[5] that shows that three of five fastest growing regions lie along the A2 motorway. The expected growth is 3.4% in Groot-Amsterdam, 3.2% in Brainport and 2.0% in Utrecht. Over the two years post Covid-19 for which data are already available, 2022 and 2023, Groot-Amsterdam and the Brainport were also the regions with the highest cumulative growth rates, i.e., 13.4% and 9.6% respectively. It is important that future growth in these regions is not too far out of step with others. For the sake of social cohesion, the regional differences should not become too great, as is the case in the United Kingdom, for example, where the London region is economically very far ahead.[6]

We hope the heatmap will provide insights that national and local governments can use to develop regional productivity agendas in addition to macro and sectoral ones. For companies working on their own productivity agenda, it is also relevant to know how the region where they are located in is doing compared to other regions. Indeed, competitors located in high-productivity regions may have an advantage because they can learn from others in regional ecosystems. By actively engaging in knowledge exchange in ecosystems in low-productivity regions as well, laggards can catch up.

Figure 1 Large differences in economic growth forecasts between regions



Source: Rabobank

Why regional productivity differences are important

Regional productivity differences hold significant importance for several reasons. Firstly, they **play a critical role in economic growth and development**. Regions with higher productivity levels experience greater economic expansion, improved living standards, and overall progress. Understanding these disparities enables policymakers to implement targeted strategies to boost productivity in areas where it is lacking.

Secondly, these differences **inform investment decisions**. Businesses leverage productivity data to identify which regions offer the best return on investment due to a more efficient and skilled workforce.

Furthermore, insights gained from examining productivity differences **assist in more effective resource allocation**, whether that involves improving low-productivity regions through targeted projects or channelling resources toward highly productive areas for optimal outcomes. High productivity levels also **impact labour market dynamics** by influencing wage levels, employment opportunities, and migration patterns, often attracting talent to regions with better economic conditions. On a broader scale, improving productivity can **enhance regional competitiveness**, contributing to a higher export capacity and a stronger global standing.

The Chicken, the Egg and the Productivity

Exploring the causes of regional productivity differences often presents a chicken-and-egg problem due to the interdependence of the factors involved.[8] Many elements are self-reinforcing, making it difficult to pinpoint primary drivers versus outcomes. For instance, access to resources can influence industrial composition, which then may lead to innovations that improve resource utilisation. Similarly, good infrastructure attracts investment, yet investment is necessary to enhance infrastructure, creating a feedback loop that perpetuates productivity differences. Moreover, a well-educated workforce facilitates technological adoption, yet regions prioritising technological advancements might naturally attract or cultivate a talented workforce, fostering a cycle of continuous improvement. This interrelationship extends to government policies and capital availability, wherein conducive policies attract capital, which in turn necessitates policy adaptation to sustain growth. The interplay between innovation and workforce skills also exemplifies this cycle: innovative regions develop strong educational systems to maintain a skilled workforce, while a skilled workforce enhances innovation through research and development. Given these complexities, understanding regional productivity dynamics requires a holistic view, considering both the history and context of the region to discern causal relationships effectively.

More productive regions also tend to be more resilient.[7] Regions with higher productivity frequently exhibit a higher employment-to-population ratio before recessions and tend to be more resilient during economic downturns. Typically, these regions experience a smaller drop in employment during crises and are more likely to fully recover afterward.

Lastly, **addressing these disparities is vital for social equity**, as persistent differences can lead to inequalities in income, employment, and quality of life, making it essential to promote regional balance for a more equitable society and social cohesion.

Why they exist

Multiple factors contribute to regional productivity differences. **Access to natural resources** is a primary factor; gas extraction explained the high productivity around Groningen (in the 'Groningse gasvelden'), and its phase-out is now showing-off in productivity statistics (see box on page 11). **The workforce's skills and education level** are significant drivers, as regions with a well-educated labour force tend to be more productive. **Capital availability** allows regions to invest in equipment and training, further bolstering productivity.

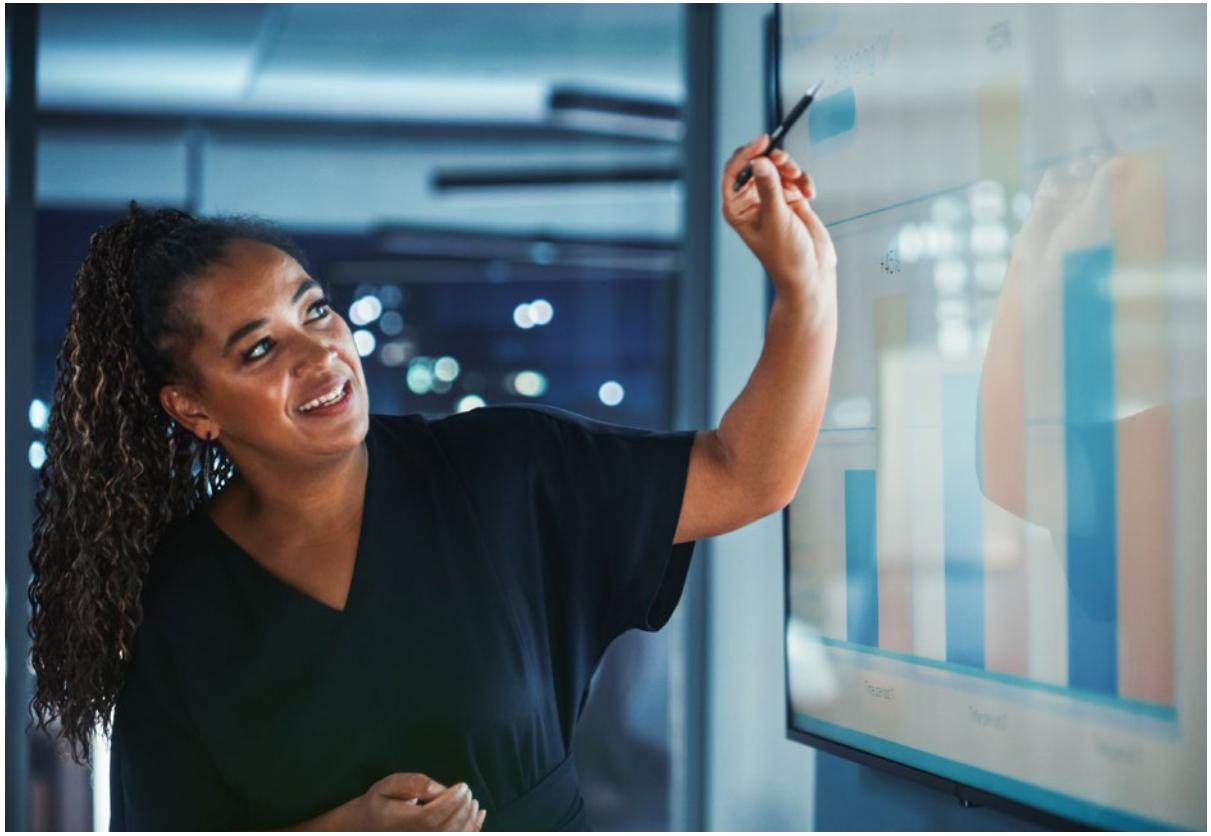
Government policies and incentives that support business growth can enhance productivity, while strong research and innovation frameworks propel regions forward by developing and implementing new ideas. **Cultural factors, geographic location, and proximity to major markets** also contribute to these disparities. **Infrastructure quality** – including transportation networks and communication systems – also plays a crucial role by facilitating efficient business operations and connectivity. **Technological adoption** further influences productivity; regions that integrate new technologies often enjoy increased efficiency and output. **Industrial composition** is another factor, with some industries, such as high-tech industries and finance, inherently possessing higher productivity than sectors like agriculture. The partnership of companies with **knowledge institutions** can also drive labour productivity, as it ensures that innovations and ideas from science are actually applied in companies. Understanding these elements aids in developing strategies to bridge productivity gaps and foster regional economic development.[9, 10, 11, 12]

What we did

Inspired by the Productivity Heatmap of the Productivity Institute,[13] we have made an overview for the 40 Dutch COROP regions. A COROP region is a division of the Netherlands for statistical purposes. It is equivalent of European NUTS 3 level, between provinces and municipalities.

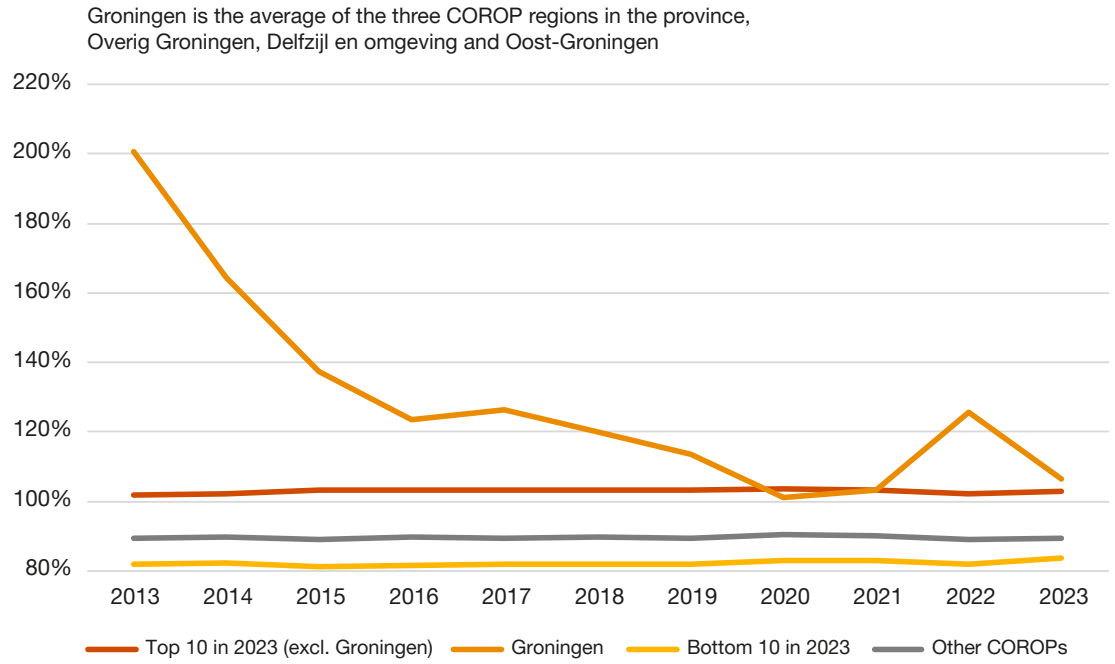
To effectively monitor and address these regional disparities, our productivity heatmap divides economic growth into two primary sources: labour supply and labour productivity. Growth of labour supply is fundamentally limited by demographics (i.e., ageing) and societal conditions (i.e., higher preference for part time jobs) and can only grow through population increases or shifts in participation rates and working hours. In contrast, the growth of labour productivity is potentially limitless, driven by innovation, technology, and efficiency improvements. By focusing on boosting labour productivity, regions can substantially enhance their economic output without being constrained by labour supply limitations.

We selected the indicators and the timeframe based on data availability, attempting to cover similar aspects as the productivity heatmap from the Productivity Institute. We utilise data from CBS, with all indicators normalised so that the region with the highest average receives a score of 1 and the one with the lowest receives a score of 0. Due to the Groningen region being an outlier,[14] we have set maximum and minimum values on the normalisation and the colouring of the heatmap. Specifically, there is a cap of 50% more than the second highest value, and similarly, a lower limit of 50% lower than the second lowest value. This adjustment particularly affects scores of Capital Intensity and R&D.



What the productivity difference between COROP regions is

Figure 2 Productivity (GVA per hour worked) differences between Dutch COROPs have been constant (numbers expressed as a percentage of national average), except for Groningen



Source: CBS, PwC analysis

Before looking at the sources of growth, it is worth taking a look at how productivity is developing at a regional level. When examining the productivity of the COROP regions, we see that that the top and bottom performers are developing at a remarkably similar pace. This trend suggests a balanced growth across different areas. However, an exception to this pattern is noticeable in Groningen (figure 2). The phase-out of gas extraction in the Groningse gas fields has significantly impacted the region's productivity, making it an outlier in the overall pictur. To examine whether this balanced growth is sustainable in the long run, it is essential to examine the drivers of labour productivity.

Relative disparities have not increased significantly in recent years, but absolute disparities do exist and cannot be ignored

Our analysis revealed significant productivity differences within the regions of the Netherlands. Regions that excel in growth drivers such as R&D, firm creation, skilled labour and capital use tend to exhibit higher productivity levels (table 1 and figure 3). This relationship underscores the importance of these drivers in enhancing regional economic performance and highlights the need for targeted strategies to bolster these factors across underperforming areas.

While regional differences in economic productivity and its drivers do exist within the Netherlands, it is crucial to acknowledge that these disparities are not currently expanding at an alarming rate. This relative stability is essential in maintaining a balanced national economy that benefits all areas, from bustling metropolitan centres to quieter rural communities. Yet, the level of labour productivity and GDP differs significantly across regions. In 2022 the GDP in Groot-Amsterdam was over 143bn euros, followed by Groot-Rijnmond and Utrecht (both almost 90bn euros) and the Brainport region (more than 50bn euros). In these four regions almost 40% of the Dutch GDP was realised. Similarly, the levels of labour productivity in euro per hour worked are significantly higher in some regions: in Groot-Amsterdam it is almost two and a half times higher than in the least productive regions.

Table 1 Productivity heatmap – Averages between 2013 and 2022

Source: CBS data, PwC analysis

The Netherlands has utilised its compact geography and robust infrastructure to maintain a relative distribution of growth and productivity across its regions. This sets it apart from countries like the United Kingdom, where regional disparities in economic performance are more pronounced.

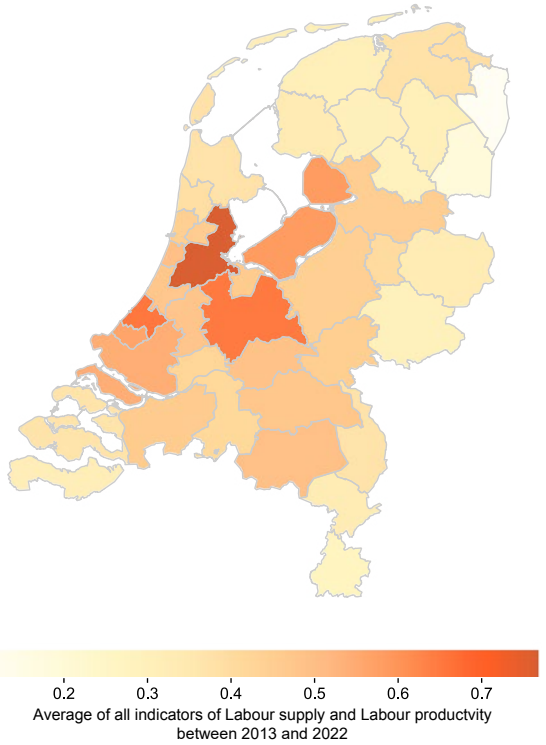
The Amsterdam metropolitan region, Utrecht, and Brainport Eindhoven are particularly noteworthy for their standout performance in terms of productivity and economic dynamism. These regions are all located along the highway A2 and benefit from a combination of factors, including high levels of investment, a concentration of skilled labour, and advanced infrastructure, all of which create a fertile environment for business growth and innovation. Amsterdam boasts a vibrant finance and tech sector, Utrecht serves as a hub for education and healthcare, and Brainport Eindhoven is renowned for its high-tech industry.

So even though relative disparities have not increased significantly in recent years, absolute disparities do exist and cannot be ignored. These must be prevented from increasing further. There is a real risk of this happening, as the better-performing regions also have better starting points for future growth (see box on page 4). Indeed, the projections indicate that the differences between regions along the A2 highway and other regions seem to increase in the future.

The agglomeration and concentration effects seen in these regions create a cycle of positive reinforcement.[15, 16] As businesses cluster, they draw in more skilled labour and business investment. This cycle of growth is supported by advancements in technology and infrastructure, further accelerating their economic development. However, while advantageous for these regions, such concentrated growth risks exacerbating regional imbalances if left unchecked.

Indeed, other regions are showing signs of lagging behind, primarily due to differing levels of capacity for structural growth. In the coming years, economic sectors important for regions such as Groot-Rijnmond and Groningen face significant challenges. They are transitioning from traditional, fossil-based industries, which are declining in size due to overcapacity, changing environmental policies and market demands.[17, 18]
This is particularly an issue in Groningen and less so in the Groot-Rijnmond because the latter has a more diversified economy. Industries important for these regions need to pivot towards new opportunities in sustainable energy, green tech and other emerging sectors. This reinvention is crucial not only for these regions' economic health but also for ensuring continued growth, preventing economic stagnation and maintaining the overall balance and productivity of the Dutch economy.

Figure 3 Groot-Amsterdam is best positioned for economic growth

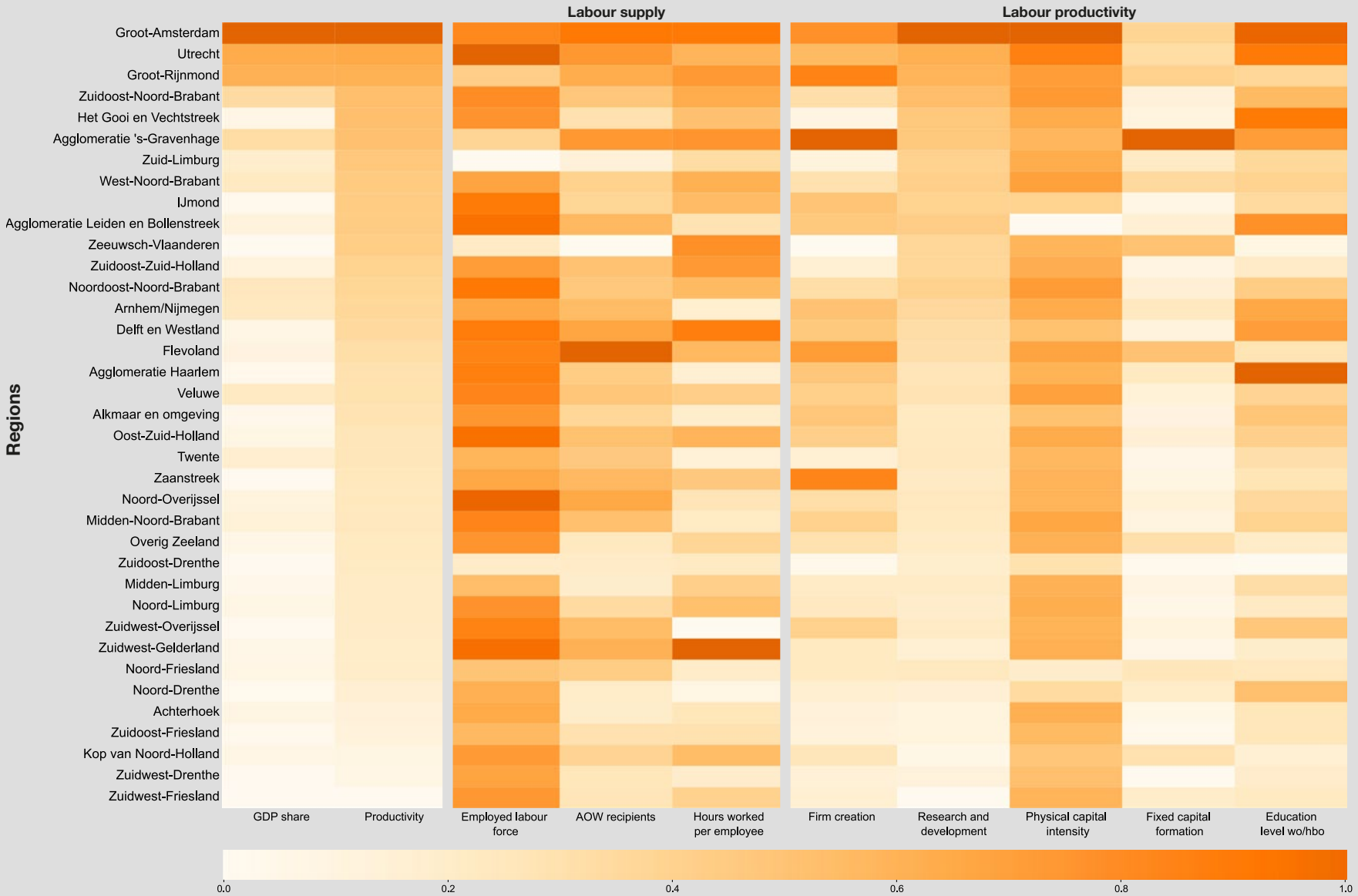


Source: CBS data, PwC analysis

Addressing these disparities requires targeted interventions to stimulate regional growth. The Dutch government and regional authorities must focus on fostering new industries that can provide sustainable employment and economic stability while taking into account the scarce resources available in the Dutch economy.[19] Investments in renewable energy, digital infrastructure, and skills development are essential to revitalising these areas. Moreover, encouraging entrepreneurship and innovation can create new opportunities for local economies. By providing the necessary resources and support, these regions can harness their unique strengths – such as renewable energy potential or regenerative agricultural products – to contribute to national economic growth.

Continued vigilance is necessary to prevent regional differences from widening, as the consequences of unchecked disparity could be significant. With this in mind, we created a heatmap expressing the change between 2013-2017 and 2018-2022.

Table 2 Productivity heatmap – Averages between 2013 and 2022 excluding Groningen



Source: CBS data, PwC analysis

Groningen's Gas Exit: Productivity Takes a 'Fuel' Turn

The Groningen region has long been an outlier in regional productivity statistics due to its substantial gas production. This natural resource has provided a significant economic boost, distinguishing Groningen from other regions within the Netherlands. However, as the phase-out of gas extraction progresses, the unique advantage that Groningen once held is diminishing. Groningen is already transitioning its economy, but the boost in productivity statistics will disappear in the coming years.

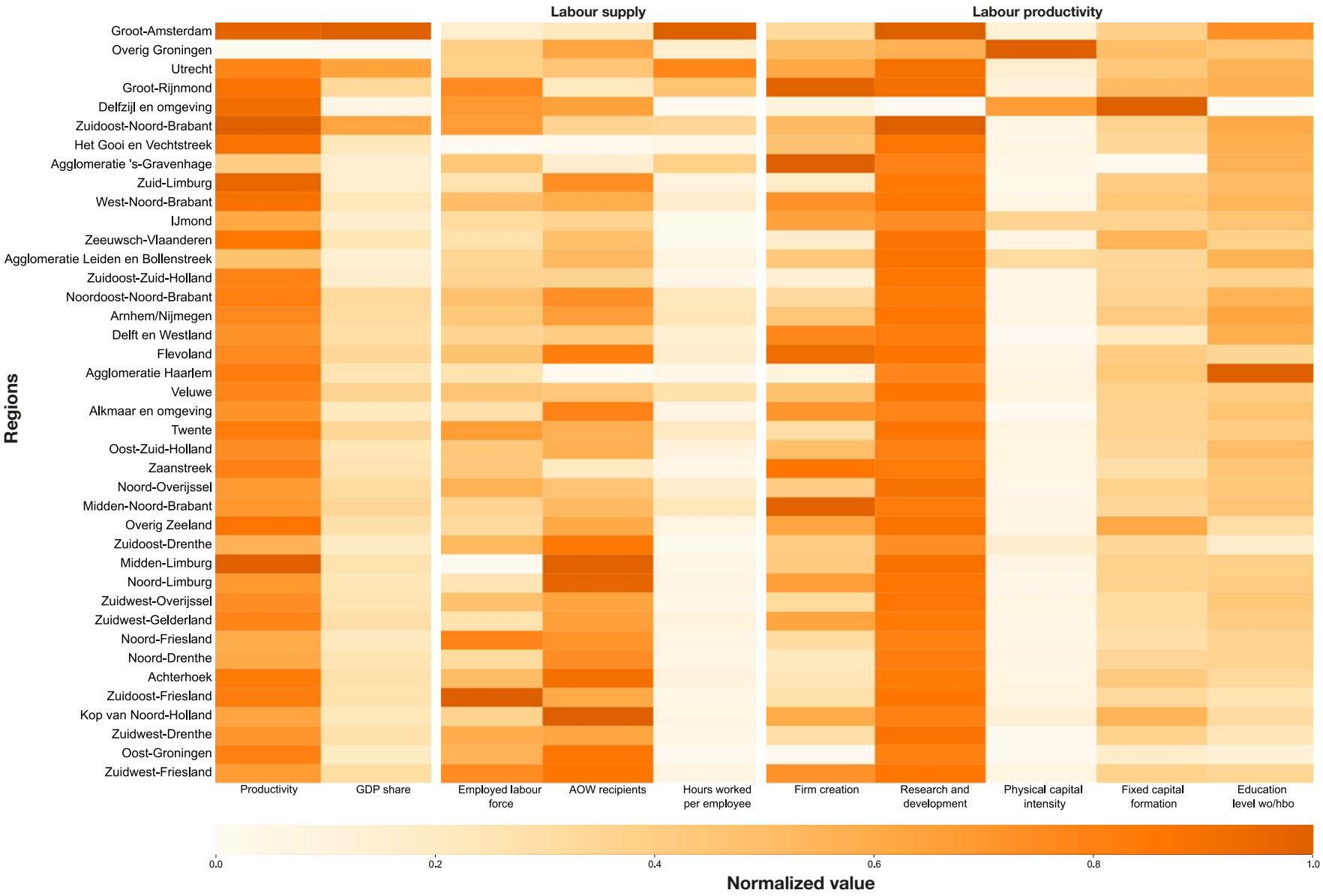
To maintain accurate and relevant insights, we have constructed a productivity heatmap that excludes the impact of gas production, allowing us to observe underlying economic dynamics more clearly. In this adjusted analysis, significant changes in capital intensity and research and development (R&D) investment become apparent. The removal of Groningen's gas-related surge reveals a more evenly distributed landscape of economic performance across the country.

Changes in productivity drivers are spread throughout the Netherlands

We found that there is no increasing divergence between lagging and top-performing regions. This is very important. Previously existing convergence in productivity across regions in Europe has significantly reduced.[20] This underscores the importance of preventing gaps from emerging, as it highlights the difficulty regions may face in catching up later once disparities become entrenched.

Productivity differences have a way of perpetuating themselves through a feedback loop that can be challenging to break. Regions with higher productivity tend to attract more qualified employees, who are drawn by better job opportunities, higher wages, and superior living conditions. This influx of skilled labour further boosts the region's productivity, creating a cycle of positive reinforcement. Additionally, regions experiencing higher productivity levels often have more resources to allocate toward research and development (R&D), further enhancing their competitive edge and capacity for innovation. This relationship can be seen in the heatmap on page 8 (table 1) and even more clearly when we exclude Groningen (table 2).

Table 3 Difference between (2018-2022)-(2013-2017), ordered by average productivity levels 2013-2022

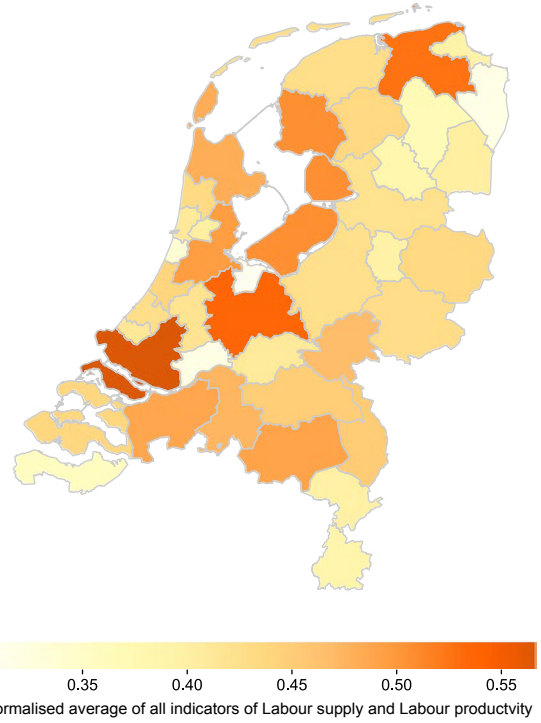


Source: CBS data, PwC analysis

An increase in regional economic disparity could undermine the Dutch broader economic success. By proactively preventing these imbalances, the nation can safeguard its traditionally equitable economic distribution while embracing innovation and sustainability.

Through collaborative efforts among national and local government, businesses and knowledge institutions, the Netherlands can ensure that all its regions have the capacity to thrive in the future economic landscape. The challenge lies in ensuring that policies are not merely about redistribution, but about empowering every region to reach its full potential. By understanding and addressing labour supply and productivity, and supporting regions under pressure to reinvent themselves, policymakers can foster a resilient and dynamic economy.

Figure 4 Change in economic growth drivers between 2013-2017 and 2018-2022 has been relatively spread



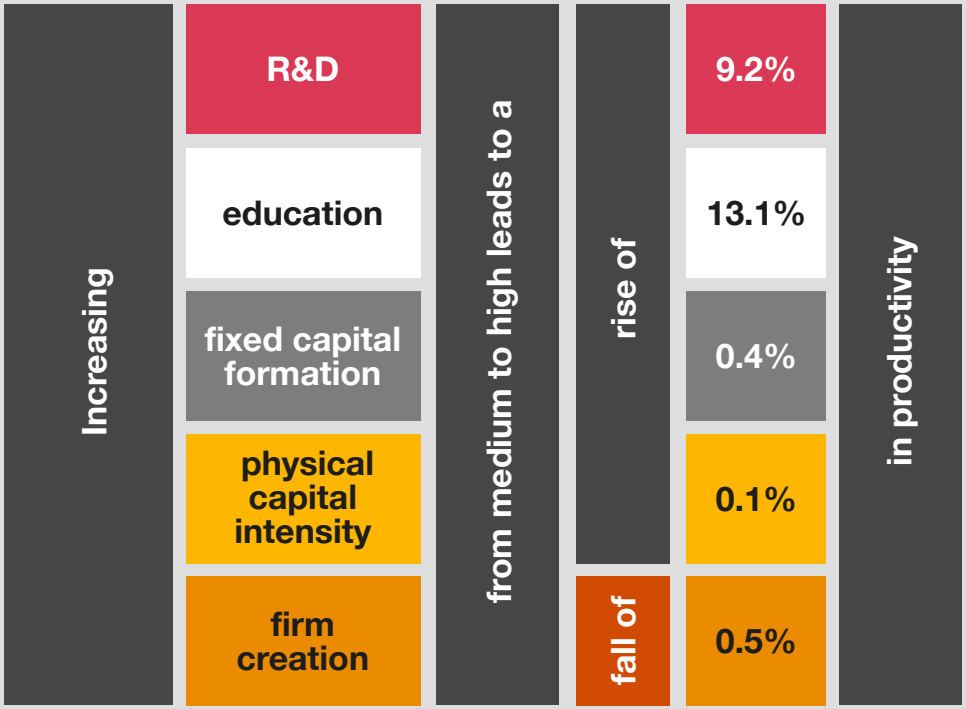
Source: CBS data, PwC analysis

We went one step further and conducted a regression analysis
To deepen our research, we conducted a regression analysis. The regression facilitates the interpretation of the results by quantifying the impact of each productivity driver by quantifying the visual findings of the productivity heatmap. While the regression allows us to further differentiate the drivers of productivity regarding their economic impact and statistical significance, it does not solve the continuous feedback loop (chicken-and-egg problem) described before. In other words, we are solely analysing the importance and type of relationship between productivity and its drivers, but we do not discern the causality of the relationship.

By quantifying the relationship between productivity and its drivers, we add another valuable layer of information about the relative importance of each driver. This information provides a foundation for economic policy making and underlines the importance of investment in specific areas. To make the quantitative analysis coherent, we align the variables in the regression with the input of the productivity heatmap. The aim of this statistical analysis is to understand the relationship between productivity and its drivers. To make the results comparable, we compare the change in productivity given that the variable of interest changes from medium to high within our sample.[21]

The results of the regression analysis highlight the importance of R&D and technological development and education for productivity growth. Increasing R&D investment from medium to high leads to a 9.2%% rise in labour productivity whereas an equal increase in education enhances labour productivity by 13.1%. In contrast, fixed capital formation and physical capital intensity are significant drivers of productivity, but to a much smaller economic extend. Specifically, moving from medium to high results in an increase of 0.4% for fixed capital formation and 0.1% in physical capital intensity (excluding Groningen).

Due to the (past) gas extraction in Groningen, the COROPs in the province are an outlier in physical capital intensity. We control for this by including an interaction term between a Groningen dummy and physical capital intensity. Indeed, the physical capital intensity for the COROPs in the province of Groningen have a negative relationship with labour productivity. In detail, moving from medium to high physical capital intensity in Groningen, leads to a decrease of 0.3% in labour productivity compared to the 0.1% rise for the rest of the Netherlands. This is likely due to Groningen experiencing a negative



impact on their gross value-added due to stopping the gas extraction. As the gas production in Groningen is phasing out, each COROP in the province of Groningen must redefine their industrial structure and invest in alternatives to increase labour productivity.

Lastly, an increase in the number of new businesses, after accounting for bankruptcies, surprisingly appears to reduce productivity. One possible rationale is that a large increase in the number of firms in one year, reflects a lower degree of firm maturity as a lot of young, not yet productive companies are created. Therefore, the immediate impact of firm dynamism might be related to the temporary lower productivity of less mature firms with the positive effects coming into effect in following years once companies become more profitable.

Appendix | Methodology and data

The productivity indicators included in the heatmap are:

R&D spending
Data on R&D expenditure (R&D expenditure on in-house activities, in million euros) was available for the period 2013-2022. Data was only available on a country-level, for different industries (SIC 2008). R&D data used in the analysis is therefore proxied, using data on the size of the sectors (first level of SIC 2008) for each COROP region. Additionally, to make R&D spending comparable across COROP regions, it is divided by total number of hours worked in that COROP region.

R&D expenditure, as presented in the heatmap, was averaged over 2013-2022 and normalised using min-max normalisation.

Firm creation
To compute the number of firms created per COROP region each year, we used data on the number of firms in each COROP region (available for 2015-2024) and bankruptcies per COROP region (available for 2009-2024). To calculate the number of firms created each year, we calculate the difference between the number of firms in year *t*-1 and year *t*, and then adjust this difference by adding the number of bankruptcies in the same year.

Firm creation, as presented in the heatmap, was averaged over 2015-2022 and normalised using min-max normalisation.

Employed labour force
The employed labour force was included in the heatmap as a percentage of the total population (between 15 and 75 years old). Data was available for 2013-2023, on a municipality level. The municipalities could be mapped to the COROP regions. Municipalities that no longer exist, for example, due to mergers with other municipalities, are not considered in the analysis.

The employed labour force, as presented in the heatmap, was the average percentage of employed persons in the population, for the years 2013 to 2023. This average was normalised using min-max normalisation.

Fixed capital formation
Data on fixed capital formation (in million euros) was available for the period 1995-2021, for the COROP regions. Fixed capital formation, as presented in the heatmap, was divided by the numbers of hours worked, averaged over 2013-2021 and normalised using min-max normalisation.

Physical capital intensity
Physical capital intensity was measured by using the percentage point contribution of physical capital to annual gross value-added growth. Data was available for the period 1996-2023, only on a national level. Since data was available per industry (first level, SIC 2008), we could proxy the physical capital intensity per COROP region by using data on the size of the sectors (first level of SIC 2008) for each COROP region.

Physical capital intensity, as presented in the heatmap, was averaged over 2013-2022 and normalised using min-max normalisation.

Hours worked per employee
The hours worked per employee was available for the years 1995 to 2022, on COROP-level. The number of hours worked per employee, as presented in the heatmap, is the average over the years 2013 to 2022, and was normalised using min-max normalisation.

Population with a hbo/wo degree
The population with a hbo or wo degree was included as a percentage of the total population. Data on education levels was available for the years 2013 to 2022.

Population with a hbo/wo degree, as presented in the heatmap, was averaged over 2013-2022, and was normalised using min-max normalisation.

Appendix | Results (regression)

Data

To make the quantitative analysis coherent, we align the variables in the regression with the input of the productivity heatmap. While the heatmaps year-averaged normalised data, the regression uses either uses the base form or the log-transformed version of the variables. This way, we can capture more variation in the data, which is crucial for correctly estimating the relationship between productivity and its drivers. We require a balanced dataset for the regression analysis. Therefore, the regression only includes data from 2015 to 2021 for all Dutch COROP regions based on the data available at CBS.

Methodology

The aim of this statistical analysis is to understand the relationship between labour productivity and its drivers. However, our statistical analysis does not necessarily imply causality. We created a fixed-effects regression that uses the log of productivity, as defined previously, as the outcome variable and several drivers of productivity as predictors. The regression specification is summarised below.

$$\begin{aligned} Log\ Productivity_{it} &= \beta_0 + \alpha_i \\ &+ \beta_1\, x\, Education\ (\%)_{it} + \beta_2\, x\, Firm\ Creation\ (\%)_{it} \\ &+ \beta_3\, x\, Physical\ Capital\ Intensity\ (\%)_{it} \\ &+ \beta_4\, x\, (Groningen\ x\, Physical\ Capital\ Intensity\ (\%)_{it}) \\ &+ \beta_5\, x\, Log\ Fixed\ Capital\ Formation_{it} \\ &+ \beta_6\, x\, Log\ R\&D_{it} + \varepsilon_{it}, \end{aligned}$$

where the subscript *i* indicates the COROP and *t* the year. Moreover, the variables in the regression follow the same definition as in the productivity heatmap. To ensure comparable regression results and follow the assumptions of the regression model, we log-transformed the variables productivity, R&D and fixed capital formation. This allows us to examine the elasticity between the mentioned drivers and productivity. The other drivers of productivity are defined in percentages. In our analysis, we examine the change in productivity as we move from a medium to a high level within each variable using a one SD increase from the median. This way, we have a consistent method of comparing the impact the predictor variables on labour productivity. In addition, we are including the term α_i. This captures the COROP-specific time-invariant factors influencing labour productivity. In other words, we are controlling for unobserved time-invariant heterogeneity (fixed-effects) in COROP regions. Examples of these factors include but are not limited to land distance to the sea and neighbouring countries, the physical size of the COROP, cultural differences and other local economic conditions. This allows us to focus on the main variables of interest.

As we can see in the heatmap on page 8, the three COROPs located in Groningen are clear outliers in physical capital intensity. Consequently, physical capital is not only a vital contributor to gross value-added growth in these regions, but it might also distort the statistical importance that physical capital intensity has on productivity for the other COROPs in the Netherlands. Therefore, we include an interaction term between physical capital intensity and a dummy that indicates whether a COROP is in Groningen or not. This way, we can estimate whether physical capital intensity has a statistically different impact in Groningen than in the rest of the Netherlands. Lastly, we include the term ε_{it} representing the cluster-robust error term of the regression and β_0, the global intercept. The former is necessary as the data shows signs of within-cluster heteroskedasticity and serial correlation. Moreover, the variables are not highly correlated and thus indicated no multicollinearity, see Table 4 and 5.

Results

Physical capital intensity:
To understand the impact of physical capital intensity, we need to first understand its definition. As discussed previously, we use the CBS definition of physical capital intensity as the percentage point contribution of physical capital to annual gross value-added growth. In other words, the variable describes how much physical capital contributes to the change in gross value-added per COROP. The emphasis is on change, as it can also be negative. In this case, physical capital intensity can have a negative impact on the annual growth of gross value added. This is important as there are structural differences between different COROP regions in the Netherlands, especially, between the gas producing regions in Groningen and the rest of the Netherlands. As discussed previously, we control for the COROPs Delfzijl en omgeving, Overig Groningen and Oost-Groningen by adding an interaction term for a COROP being located in the province of Groningen with the variable physical capital intensity.

The outcome shows that physical capital intensity is statistically significant both for the Groningen interaction term and the rest of the Netherlands. However, while the sign of the coefficient is positive for the rest of the Netherlands, it is negative for the Groningen interaction term.

At first glance, this seems counter-intuitive to economic theory. However, when analysing the industrial structure of Groningen, it is clear that the phasing out of the gas extraction has negatively impacted the gross value added. As the gas industry represented a highly productive capital-intensive industry, its phasing out will have a negative impact on physical capital's role in gross value-added growth and labour productivity consequently.

Table 4 Variance Inflation Factor

Education (%)	1.53
Firms Creation (%)	1.28
Physical Capital Intensity (%)	1.06
Log R&D	2.33
Log Fixed Capital Formation	2.05

Table 5 Correlation Matrix	Education	Firms Change (%)	Physical Capital Intensity (%)	Log R&D	Log Fixed Capital Formation
Education	1.00	0.30	0.09	0.23	0.13
Firms Creation (%)	0.30	1.00	0.08	0.32	0.06
Physical Capital Intensity (%)	0.09	0.08	1	-0.20	-0.04
R&D	0.23	0.32	-0.20	1	0.43
Log Fixed Capital Formation	0.14	0.06	-0.04	0.43	1

Endnotes

1 CBS (2025-03): Labour productivity in the Netherlands down again in 2024
2 CBS (2024-08): Labour productivity has risen less and less over the past 50 years
3 TPI Productivity Lab: The TPI Productivity Scorecards for English Regions and Devolved Nations
4 We used COROP regions. Each region consists of one or more contiguous municipalities in a province. The division of the Netherlands into 40 COROP areas is the equivalent of the European NUTS 3 level.
5 Rabobank (2025): Regioprognoses: in alle Nederlandse regio's groei verwacht; maar onzekerheid groot door geopolitieke situatie
6 Menukhin, O.; McKeogh, N.; Ortega-Argiles, R.; Sarsfield, W.; Watson, R. (2025): TPI UK ITL1 Scorecards, TPI Productivity Lab, The Productivity Institute, University of Manchester.
7 Tsvetkova, A. (2024): Forty years of productivity and labour market resilience in European regions.
8 Jibril, H., & Roper, S. (2022): Of chickens and eggs: Exporting, innovation novelty and productivity. ERC, Enterprise Research Centre.
9 Linders, G. J., Bulavskaya, T., Groot, H. D., & Paraguas, F. (2011): Determinants of regional productivity growth in Europe: an empirical analysis.
10 Kostarakos, I. (2023): Regional productivity growth in the EU: An assessment of recent developments (No. 05/2023). JRC Working Papers on Territorial Modelling and Analysis.
11 Marrocu, E., Paci, R., & Usai, S. (2013): Productivity growth in the old and new Europe: the role of agglomeration externalities. Journal of Regional Science, 53(3), 418-442.
12 Siller, M., Schatzer, T., Walde, J., & Tappeiner, G. (2021): What drives total factor productivity growth? An examination of spillover effects. Regional Studies, 55(6), 1129-1139.
13 Menukhin, O.; McKeogh, N.; Ortega-Argiles, R.; Sarsfield, W.; Watson, R. (2025): TPI UK ITL1 Scorecards, TPI Productivity Lab, The Productivity Institute, University of Manchester.
14 Groningen region refers tor to COROPs Overig Groningen, Delfzijn en omgeving and Oost-Groningen, although particularly the first two are outliers due to gas production.
15 Gorter, J., & Kok, S. (2009): Agglomeration economies in the Netherlands (No. 124). CPB Netherlands Bureau for Economic Policy Analysis.
16 Marrocu, E., Paci, R., & Usai, S. (2013): Productivity growth in the old and new Europe: the role of agglomeration externalities. Journal of Regional Science, 53(3), 418-442.
17 TNO (2024-09): Nederlandse gasproductie daalt verder in 2023
18 ING (2025-03): Some growth but minimal recovery for the Dutch chemical industry in 2025
19 PwC (2025-03): Which industries are future-proof, and which need action?
20 Kostarakos, I. (2023): Regional productivity growth in the EU: An assessment of recent developments (No. 05/2023). JRC Working Papers on Territorial Modelling and Analysis.
21 We define this as an increase of one standard deviation from the median.

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