Copenhagen Economics

COST AND VALUE OF REGULATORY DATA PROTECTION

Impact of EU spending on one additional year of regulatory data protection and implications of reducing incentives to develop and launch innovative medicines

Copenhagen Economics
May 2024

Background

Study on the impact of EU spending on one additional year of regulatory data protection and implications of reducing incentives to develop and launch innovative medicines

The European Union (EU) General Pharmaceutical Legislation (GPL) lays down provisions related to medicinal products authorisation and post-authorisation requirements, preauthorisation support schemes, regulatory incentives in terms of data and market protection, manufacturing and supply, and the European Medicines Agency (EMA).[1] The European Commission ("the Commission") has proposed revisions to the GPL[1], which aim to support innovation, access, and affordability of medicines. As part of this proposal, the Commission has suggested reducing the baseline regulatory data protection (RDP) period.

The Commission's communication around the revision frequently states that "*Topping up the Commission proposal with an additional year of regulatory data protection would come with a price tag of* ***EUR 1.23 billion*** *for health systems due to the delayed entry of generics.*"[2] This number is not part of the Commission's impact assessment[3] nor the proposed revision.[1]

Against this background, the European Federation of Pharmaceutical Industries and Associations (EFPIA) has commissioned Copenhagen Economics to:

- generate insights into the impact from spending 1.23 billion EUR per year in the EU on one additional year of RDP, both at the EU and member state level, and
- compile insights on the potential impact of reducing incentives (including RDP duration) to develop and launch innovative medicines on innovation in the EU and other implications for the EU, member states, patients, and the innovative pharmaceutical industry.

To do so, we have relied on extensive desk research to map existing evidence from the peer-reviewed and grey literature.

Copenhagen Economics, May 2024

Contents

Notes: 1) European Commission (2023a). / 2) For example European Commission (2024), page 2. / 3) European Commission (2023b).

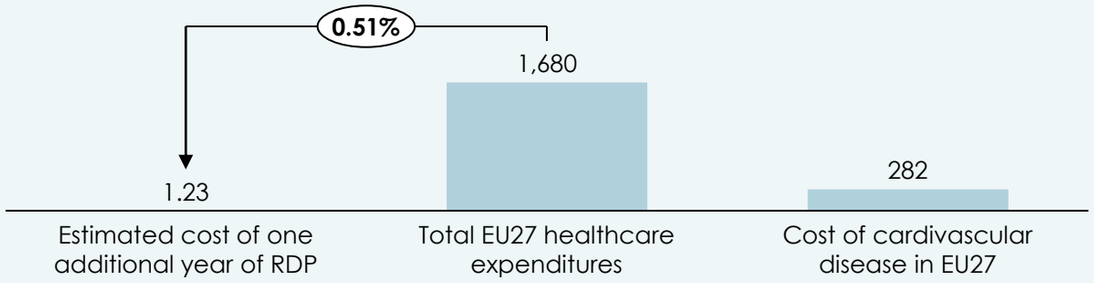
Executive summary (1/2)

What is small in terms of cost-savings for healthcare systems could be exponentially costly when it comes to attractiveness of Europe as a place to make investments

The Commission's estimated cost of **1.23 billion EUR per year for one additional year of RDP seems negligible** compared to healthcare expenditures at the EU and national levels as well as the disease burdens that innovative medicines seek to alleviate.

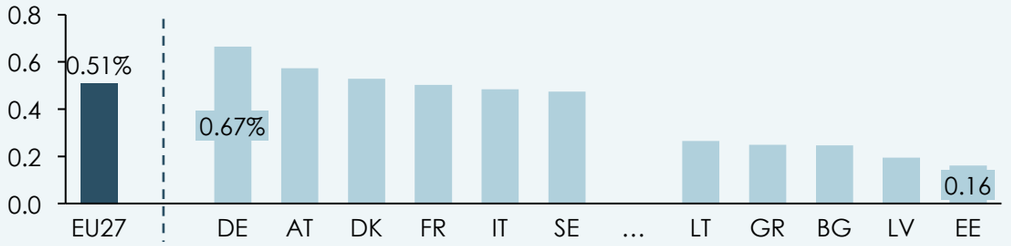
Estimated cost of one additional year of RDP vs. healthcare expenditures and the cost of cardiovascular disease in EU27

Billion EUR per year (top)



Estimated cost of one additional year of RDP relative to total pharmaceutical expenditures across the EU27

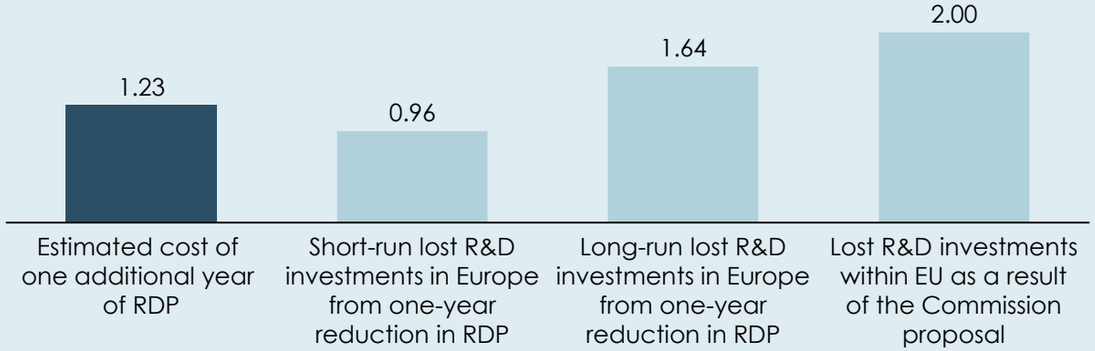
% of total pharmaceutical expenditure



Reducing RDP duration will result in **lost R&D investments** that exceed the estimated cost of one additional year of RDP and result in **fewer innovative medicines developed for patients**.

Estimated cost of one additional year of RDP across the EU27 vs. R&D investments lost in Europe

Billion EUR per year



Innovative medicines developed

Number of innovative medicines relying on RDP expected 2020-2035

Source: See notes on next pages. Some numbers are rounded for simplicity.

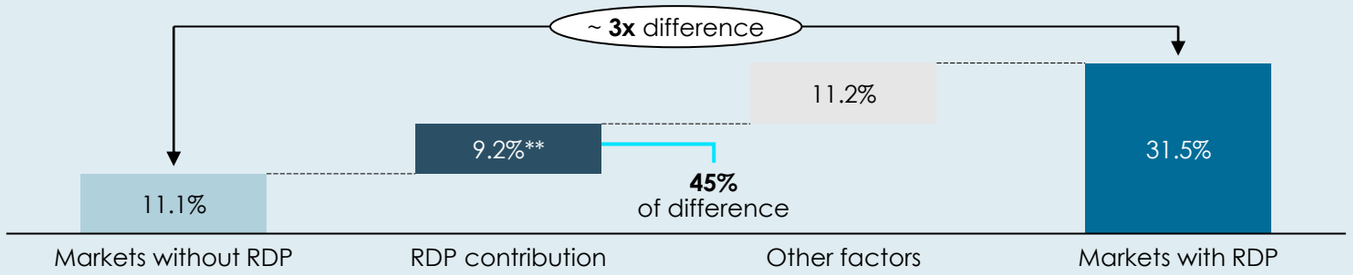
Executive summary (2/2)

What is small in terms of cost-savings for healthcare systems could be exponentially costly when it comes to attractiveness of Europe as a place to make investments

RDP is a **driver for availability of innovative medicines**, so reducing its duration is likely to **exacerbate the EU's inferior competitive position** compared to the US, **worsen the ex-ante business case** for investments in innovative medicines, and in the end **reduce innovative medicines available to patients**.

The link between RDP and availability of innovative treatments

Percentage availability and percentage point increase in availability of innovative medicines associated with RDP



Innovative medicines available

Share of innovative medicines available between 2012 and 2021 within 1 year from first global launch

The innovative pharmaceutical industry is a significant **contributor to the EU's economy**, it is important for the EU's **trade balance**, and it generates a substantial number of **high-productive jobs**.

105 billion EUR gross value added by the innovative pharmaceutical industry (2020)

270 billion EUR ~ extra-EU pharmaceutical exports (2023)

10.6 % of total extra-EU pharmaceutical exports as share of total exports (2023)

714,000 jobs in the pharmaceutical industry (2021)

Source: See notes on next pages.

1

IMPACT FROM SPENDING 1.23 BILLION EUR PER YEAR IN THE EU ON ONE ADDITIONAL YEAR OF RDP

1.1
IMPACT OF THE ESTIMATED COST AT THE EU LEVEL

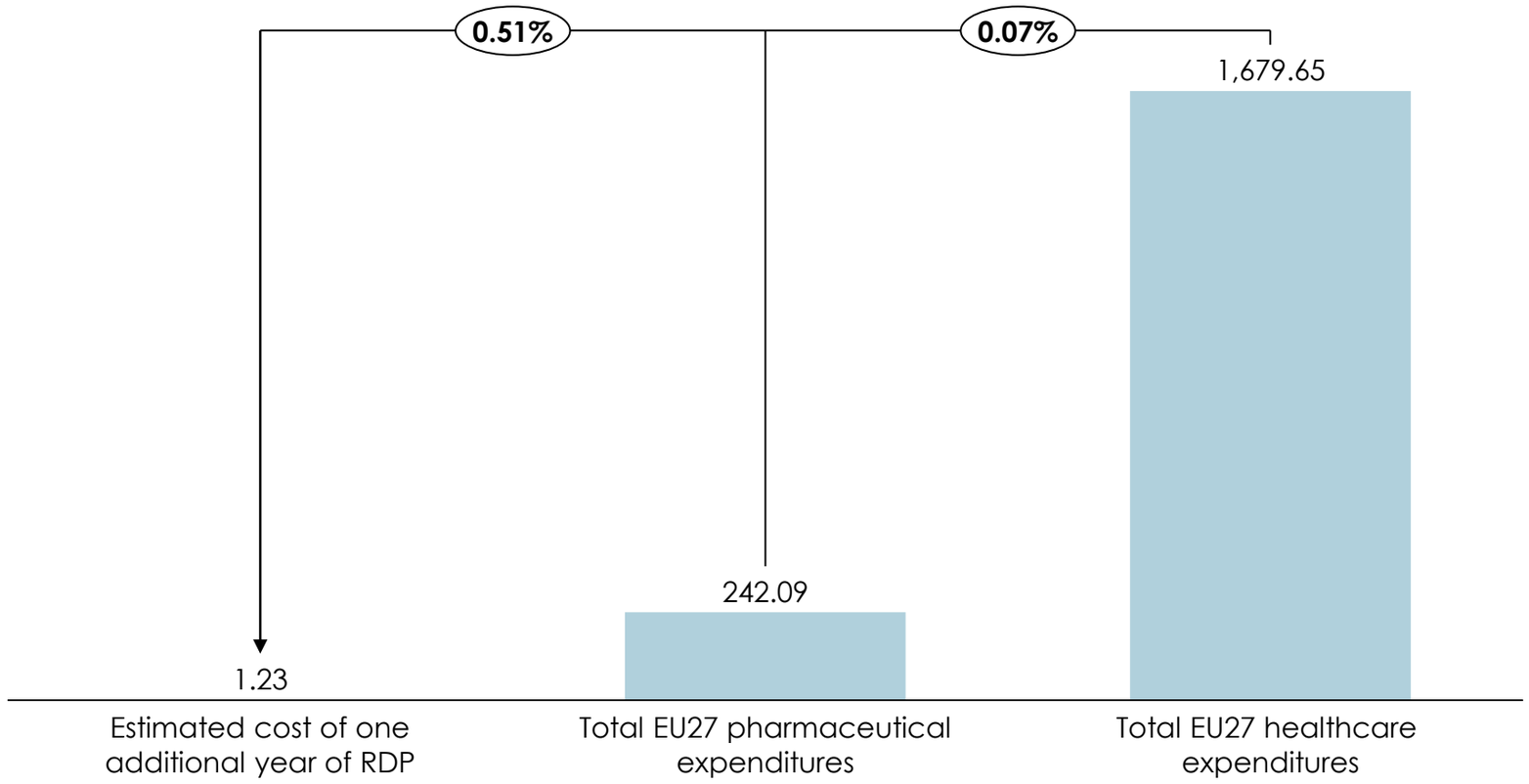
The estimated cost of one additional year of RDP seems negligible compared to EU pharmaceutical and healthcare expenditures

EU pharmaceutical expenditures is almost 200 times higher than the estimated cost of one additional year of RDP

- The European Commission estimates that the cost of one additional year of RDP amounts to 1.23 billion EUR.
- This estimated cost seems negligible compared to the total pharmaceutical and healthcare expenditures in the EU27.
- The estimated cost of 1.23 billion EUR per year for one additional year of RDP corresponds to 0.51% of total pharmaceutical expenditures and 0.07% of total healthcare expenditures in the EU27.

Estimated cost of one additional year of RDP vs. pharmaceutical and healthcare expenditures in the EU

Billion EUR per year



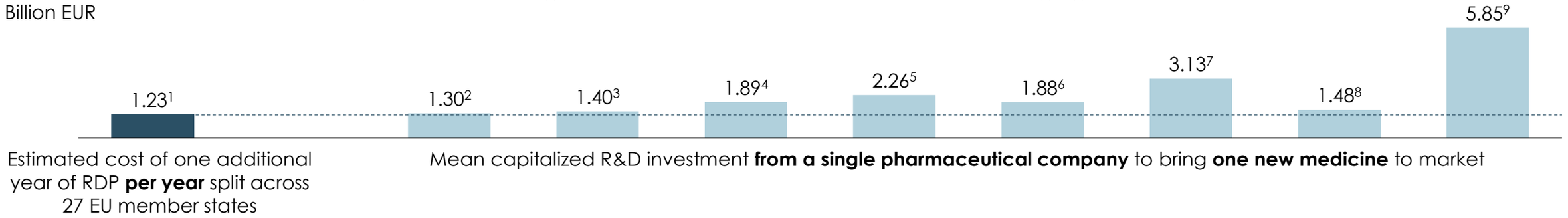
Source: European Commission (2024) and OECD (2024, webpage).

The estimated cost of 1.23 billion EUR is lower than the R&D investment needed to bring one innovative medicine to the market

Estimates of the mean cost of bringing one new medicine to the market range between 1.4 and 5.85 billion EUR

Estimated cost of one additional year of RDP vs. eight different estimates of the R&D cost of bringing one new medicine to market

Billion EUR



Notes: All estimates available in the peer-reviewed literature published in 2000 or later on R&D investments to bring one new medicine to the market (where disease area has not been specified). 1) European Commission (2024). We assume that the estimate is in 2023 or 2024 EUR values. / 2) Dimasi et. (2003). / 3) Adams and Brantner (2006). / 4) Adams and Brantner (2010). / 5) Paul et al. (2010). / 6) Mestre-Frandiz (2012). / 7) Dimasi et al. (2016). / 8) Wousters et al. (2020). / 9) Schumacher et al. (2023). We adjust the estimates to 2022 values using the US consumer price index (CPI), which is the same methodology applied in Wouters et al. (2020). We use December values in 2018 through 2022 to adjust the estimates from the Bureau of Economic Analysis (2024, webpage). We convert the estimate from USD to EUR using an average exchange rate in 2023 of 1.053 USD per EUR (European Central Bank, 2024, webpage). All estimates are capitalised.

Source: Copenhagen Economics based on European Commission (2024), Dimasi et. (2003), Adams and Brantner (2006), Adams and Brantner (2010), Paul et al. (2010), Mestre-Frandiz (2012), Dimasi et al. (2016), Wousters et al. (2020), Schumacher et al. (2023), Bureau of Economic Analysis (2024, webpage), and European Central Bank (2024, webpage).

Number of new chemical and biological entities brought to the market by Europe-based companies

74

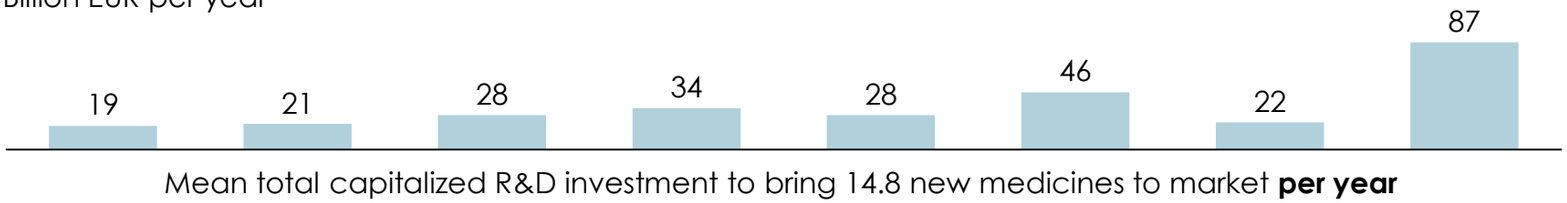
medicines between 2018 and 2022

~14.8

medicines per year on average[1]

Eight different estimates of the total R&D cost of bringing 14.8 new medicines to market by Europe-based companies

Billion EUR per year



Notes: We have converted the per-drug R&D investment estimate into the total annual R&D investment required to bring the average yearly number of new medicines to market by Europe-based companies. This was done by multiplying the estimates in top figure on this page by 14.8 (see EFPIA, 2023). The sequence of estimates is identical to the top figure. All estimates are capitalised.

Source: Copenhagen Economics based on EFPIA (2023), Dimasi et. (2003), Adams and Brantner (2006), Adams and Brantner (2010), Paul et al. (2010), Mestre-Frandiz (2012), Dimasi et al. (2016), Wousters et al. (2020), Schumacher et al. (2023), Bureau of Economic Analysis (2024, webpage), and European Central Bank (2024, webpage).

Notes: 1) EFPIA (2023).

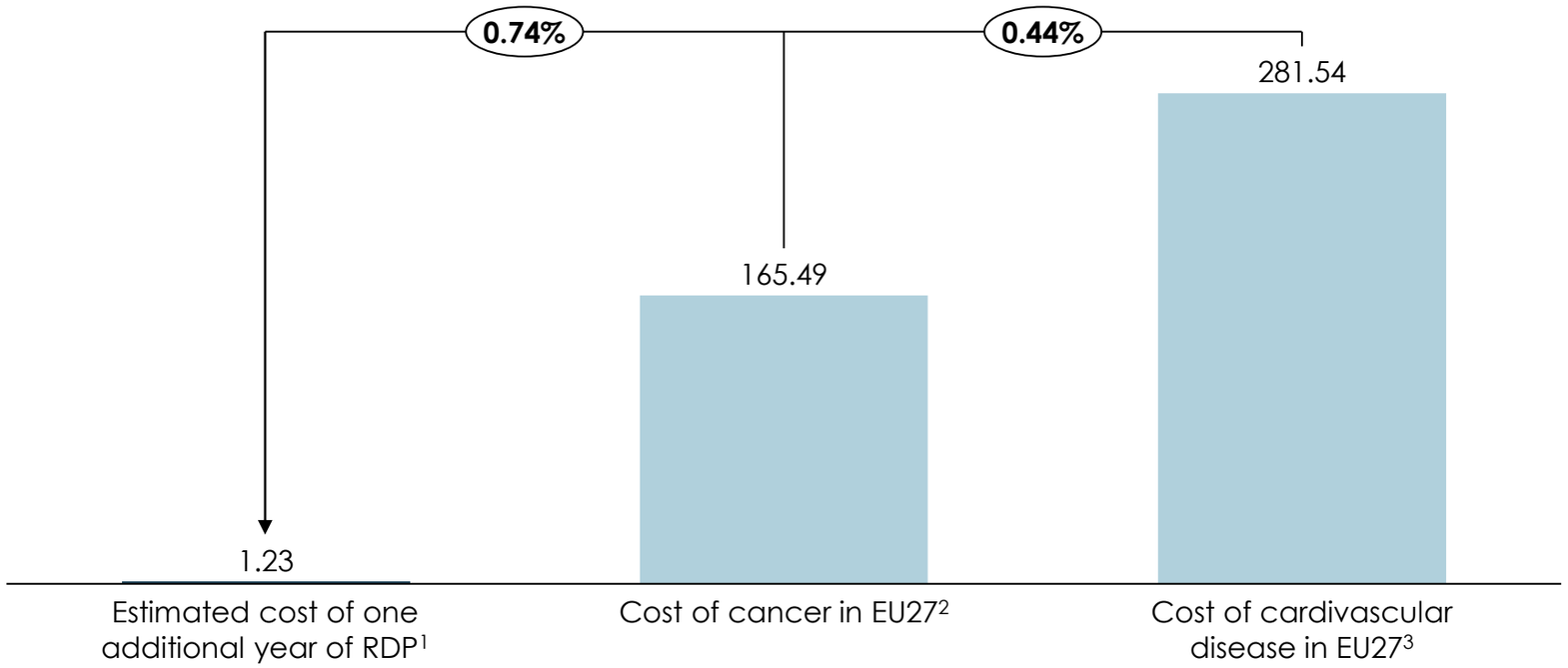
Innovative medicines help reduce the burden of severe diseases that impose a large cost burden in Europe – example from CVD and cancer

The estimated cost of one additional year of RDP is 0.44% of the yearly cost of cardiovascular disease in EU27

- The yearly cost of cancer in Europe is almost 200 billion EUR. The estimated cost of one additional year of RDP thus constitutes 0.74% of the yearly cost of cancer in EU27.
- The yearly cost of cardiovascular disease (CVD) in EU27 is close to 282 billion EUR. The estimated cost of one additional year of RDP thus constitutes 0.44% of the yearly cost of CVD in EU27.
- Shortening RDP will reduce incentives to invest in innovative medicines that can alleviate the patient burden and economic impact of these disease.

Estimated cost of one additional year of RDP vs. cost of CVD and cancer in EU27

Billion EUR per year



Notes: CVD = cardiovascular disease. Dolon (2023) estimate that 50 innovative medicines will be lost over the period 2020-2035 if the Commission proposal is implemented, i.e., fewer innovative medicines will be made available to mitigate disease burdens. / 1) European Commission (2024). We assume that the estimate is in 2023 or 2024 EUR values. / 2) Hofmarcher et al. (2020). The cost of cancer includes direct costs (health expenditures (excl. cancer drugs), cancer drugs, and informal care costs) and indirect costs (productivity loss from premature mortality and from morbidity). The cost estimate on the societal cost of cancer is in 2018 EUR. / 3) Luengo-Fernandez et al. (2023). The cost of CVD includes direct costs (primary care, outpatient care, A&E visit, hospitalisations, medications), institutional care (institutionalisation and home care), informal care, and productivity losses (due to mortality and morbidity). The cost estimate on the societal cost of CVD is in 2021 EUR.

Source: European Commission (2024), Hofmarche et al. (2020), and Luengo-Fernandez et al. (2023).

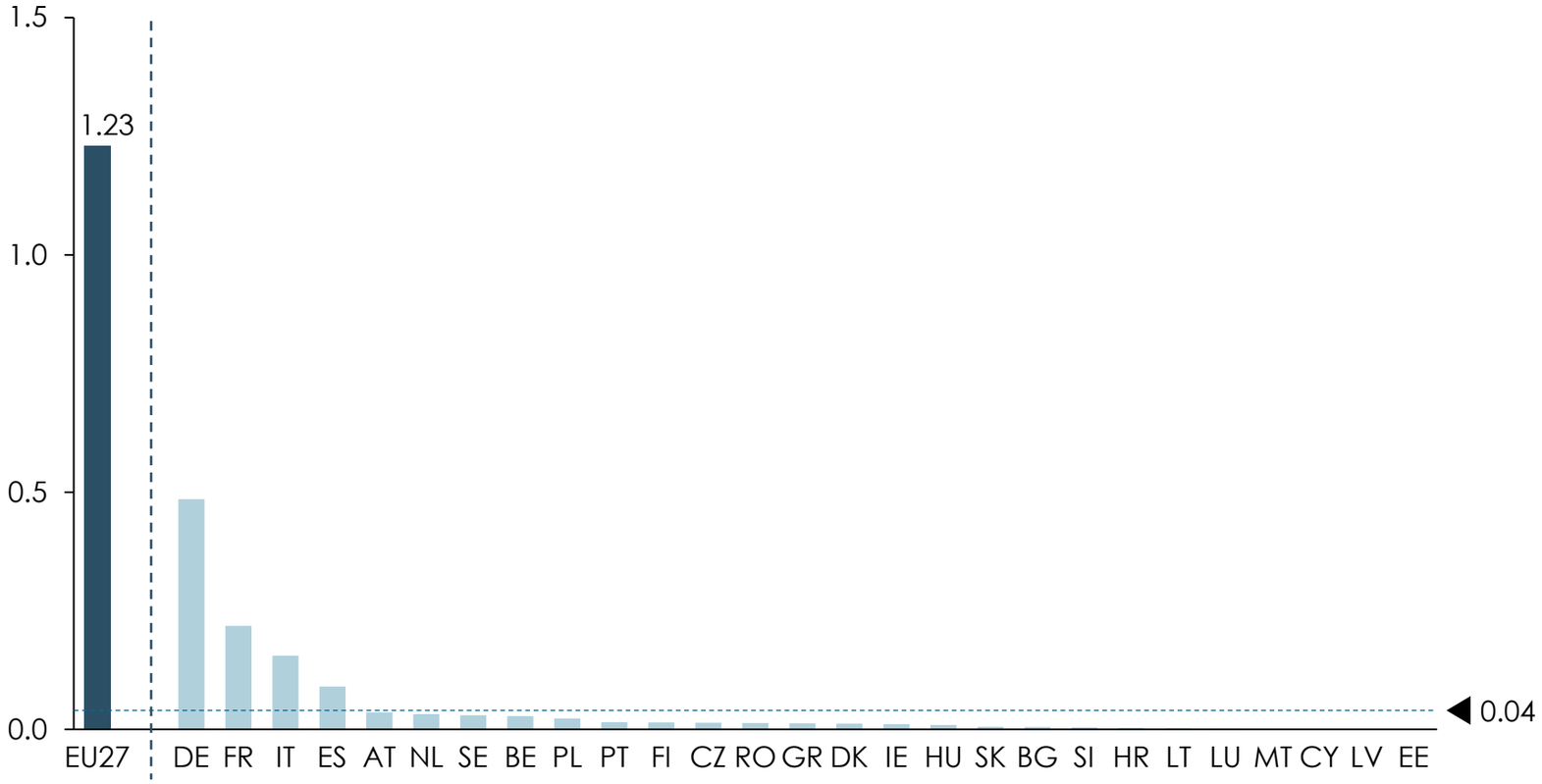
1.2
IMPACT OF THE ESTIMATED COST ON MEMBER STATES

One additional year of RDP will cost less than 40 million EUR (0.04 billion EUR) for 23 out of 27 EU member states

The four largest EU member states bear the largest share of the estimated cost of one additional year of RDP

- The estimated cost of 1.23 billion EUR per year for one additional year of RDP refers to the total expenditures across all 27 EU member states.
- Germany, France, Italy, and Spain bear the largest share ranging between 90 million EUR per year in Spain and 485 million EUR per year in Germany.
- The remaining 23 countries have an impact on healthcare expenditures below 40 million (0.04 billion) EUR per year.
- The estimates stem from a distribution algorithm we have developed. The algorithm is based on total pharmaceutical expenditure, share of innovative medicines available, and share of pharmaceutical expenditures spent on innovative medicines in each of the 27 EU member states, see Appendix A for detailed outline.

Estimated cost of one additional year of RDP across the EU27
EUR billion per year



Note: Latest observable value of pharmaceutical expenditures for each country and GDP data from 2021. We use regional averages on availability of innovative medicines for Cyprus, Luxembourg, and Malta due to lack of data.
Source: Copenhagen Economics based on European Commission (2024), OECD (2024, webpage) and PhRMA (2023), see Appendix A for methodological outline.

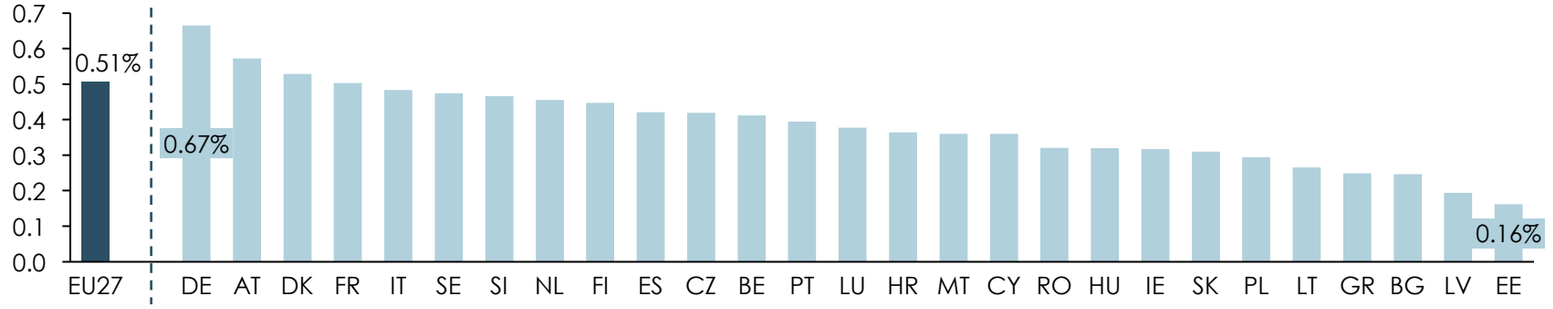
The estimated cost of one additional year of RDP imposes a negligible impact on EU member states' healthcare expenditure

The estimated cost of one additional year of RDP corresponds to 0.16-0.67% of total pharmaceutical expenditures and 0.02-0.10% of total healthcare expenditures across EU member states

- The estimated cost of one additional year of RDP ranges between 0.16% and 0.67% of EU member states' pharmaceutical expenditures. For the entire EU27, the estimated cost corresponds to 0.51% of total pharmaceutical expenditure, see the top figure.
- The estimated cost of one additional year of RDP ranges between 0.02% and 0.10% of EU member states' healthcare expenditures. For the entire EU27, the estimated cost corresponds to 0.07% of total healthcare expenditure, see the bottom figure.
- The difference between a high-income country like Germany that would spend 0.10% of their healthcare expenditures and a low-income country like Estonia that would only spend 0.02% of their healthcare expenditures on one additional year of RDP is driven by higher use of innovative medicines in Germany.
- Countries like Slovenia, Hungary, Malta, Romania, and Greece have a relatively large impact as percentage of total healthcare expenditures since these countries' pharmaceutical expenditures constitutes a large proportion of total healthcare expenditure.[1]

Estimated cost of one additional year of RDP relative to total pharmaceutical expenditures across the EU27

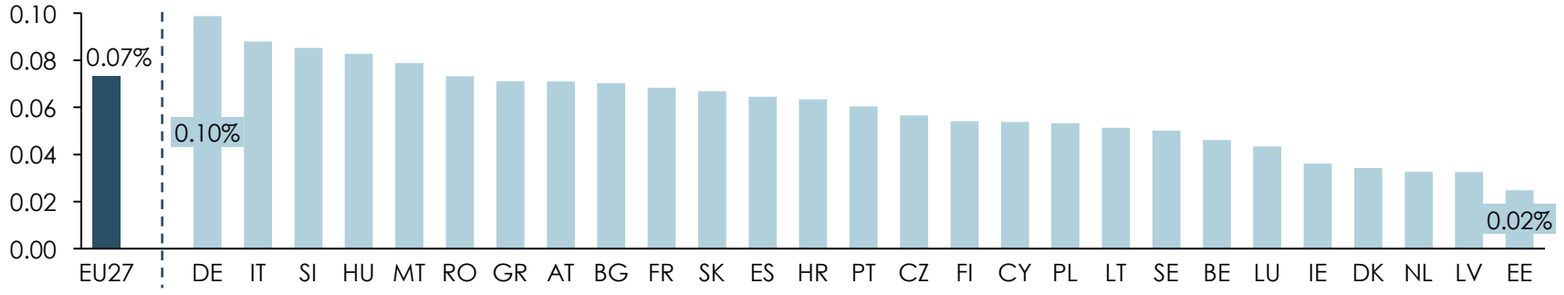
% of total pharmaceutical expenditures



Note: Pharmaceutical expenditures from 2021 in all countries except for Denmark, Italy, Luxembourg, Netherlands (2022), and Malta (2020).
Source: Copenhagen Economics based on European Commission (2024), OECD (2024, webpage) and PhRMA (2023), see Appendix A for methodological outline.

Estimated cost of one additional year of RDP relative to total healthcare expenditures across the EU27

% of total healthcare expenditures



Note: Healthcare expenditures from 2022 in all countries except for Croatia, Bulgaria, Cyprus, Romania (2021), and Malta (2020).
Source: Copenhagen Economics based on European Commission (2024), OECD (2024, webpage) and PhRMA (2023), see Appendix A for methodological outline.

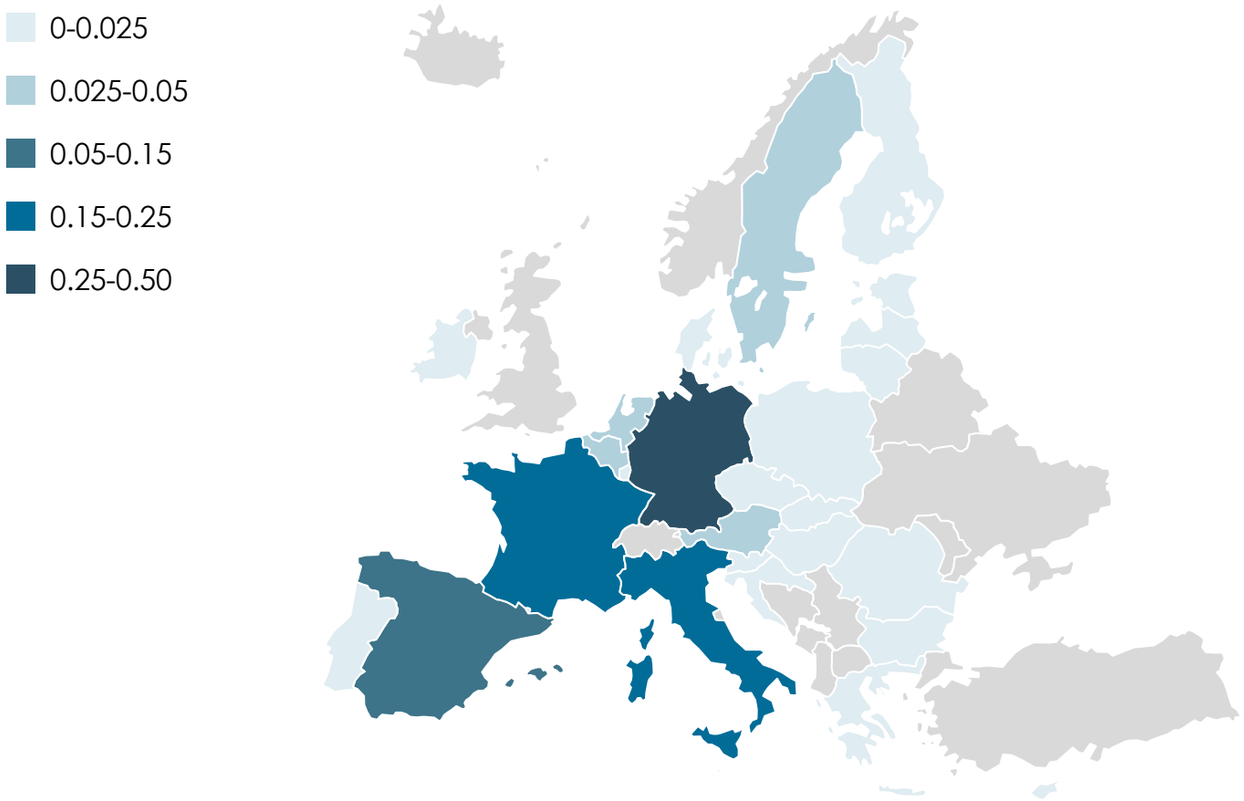
Notes: 1) OECD (2024, webpage).

The impact on health expenditures from one additional year of RDP is lowest in Eastern Europe

All Eastern European countries experience an impact below 25 million (0.025 billion) EUR per year

- Most European countries would face a relatively modest impact on healthcare expenditures from the estimated cost of one additional year of RDP, and in all of Eastern Europe, it would be below 25 million (0.025 billion) EUR per year.

Map on geographical split of the estimated cost of one additional year of RDP
EUR billion per year



Note: Latest observable value of pharmaceutical expenditures for each country and GDP data from 2021. We use regional averages on availability of innovative medicines for Cyprus, Luxembourg, and Malta due to lack of data.
Source: Copenhagen Economics based on OECD (2024, webpage) and PhRMA (2023), see Appendix A for methodological outline.

2
IMPACT OF REDUCING INCENTIVES ON INNOVATION AND OTHER IMPLICATIONS

2.1
IMPACT ON INNOVATION

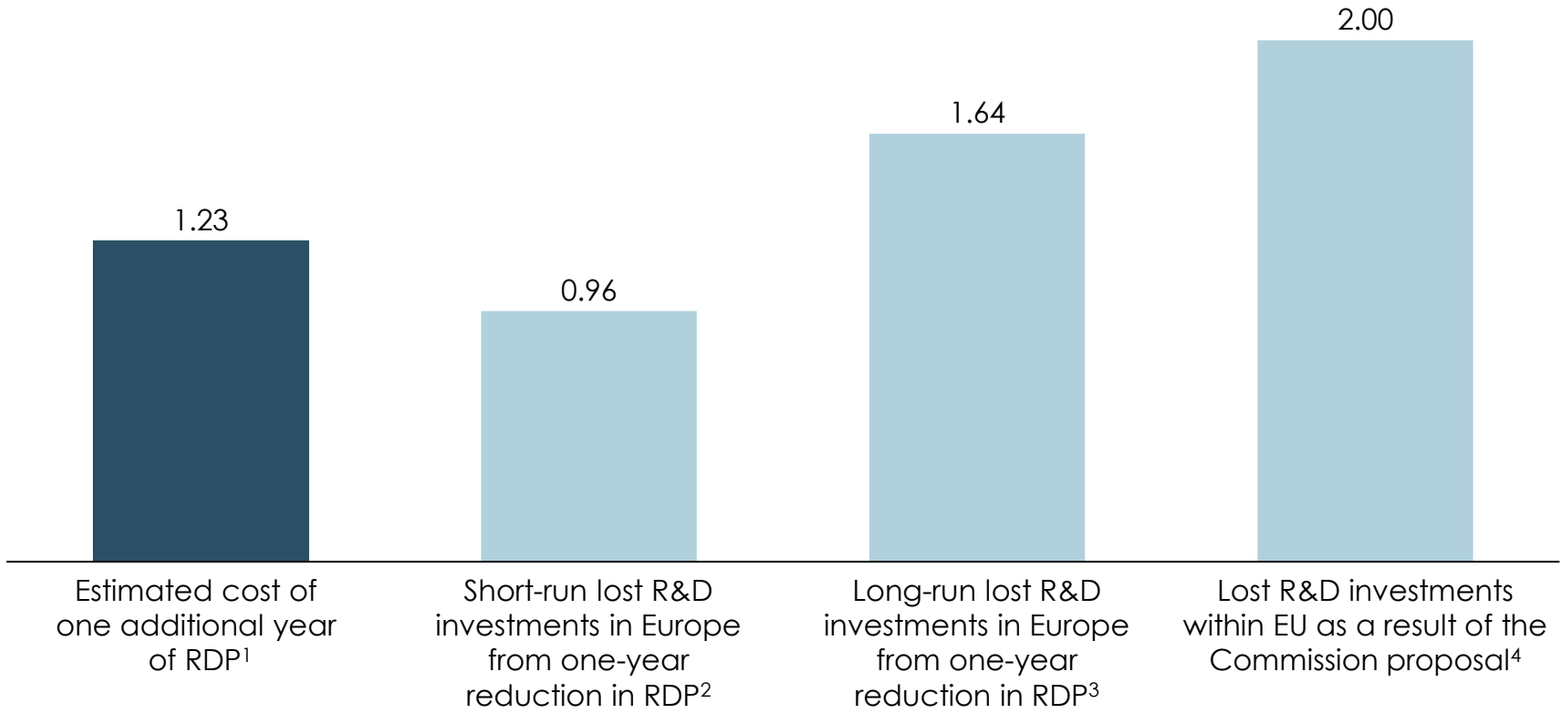
A reduction in the duration of RDP will result in lost R&D investments

Estimates on the yearly loss in R&D investments range between 0.96 and 2 billion EUR per year

- A recent study found that a one-year reduction in the mean effective protection period is associated with 6.97% lower pharmaceutical R&D investments in the short run.[1] We estimate that this will translate into 0.96 billion EUR lost per year as a direct result of reducing RDP duration by one year in the short run, see Appendix C.
- In the long run, the study[1] found a one-year reduction in the mean effective protection period is associated with 11.89% lower pharmaceutical R&D investments. We estimate that this will translate into 1.64 billion EUR lost per year as a direct result of reducing RDP duration by one year in the long run, see Appendix C.
- There is no clear definition of "shot run" and "long run" other than all inputs are variable in the long run. In this context, this would translate into a 10–15-year time horizon, which is the average time from patent application to regulatory approval.[2]
- A recent study found that 2 billion EUR in R&D investments will be lost within the EU as a result of the Commission proposal.[3] The key driver of this negative impact is the shortened duration of RDP. We find this to be consistent with the two other estimates on lost R&D investments from shortening RDP duration.

Estimated cost of one additional year of RDP vs. R&D investments lost in Europe

Billion EUR per year



Note: 1) European Commission (2024). We assume that the estimate is in 2023 or 2024 EUR values. / 2) Based on estimate from Copenhagen Economics (2018), pharmaceutical R&D spending in 2022 (EFPIA, 2023), and adjusting by share of medicines where RDP is the last protection to expire (31%) from IQVIA (2022). Copenhagen Economics (2018) applies econometric modelling using dynamic panel data modelling with system generalized method of moments (GMM) on data from 1996 to 2014 on 20 EU member states. See Appendix C for detailed outline of methodology. / 3) As in note 2, but using long-run estimate from the model (0.0697/(1-0.414)). See Appendix C for detailed outline of methodology. / 4) Dolon (2023).

Source: Copenhagen Economics based on European Commission (2024), Copenhagen Economics (2018), IQVIA (2022), and EFPIA (2023).

Notes: 1) Copenhagen Economics (2018), page 101. Based on econometric modelling using dynamic panel data modelling with system generalized method of moments (GMM) on data from 1996 to 2014 on 20 EU member states. A key driver for this result is that changing the effective protection period in other EU countries with which a given country trades will have a far more pronounced effect than the impact of changing the effective protection period within the country itself. / 2) Berdigaliyev and Aljofan (2020). / 3) Dolon (2023).

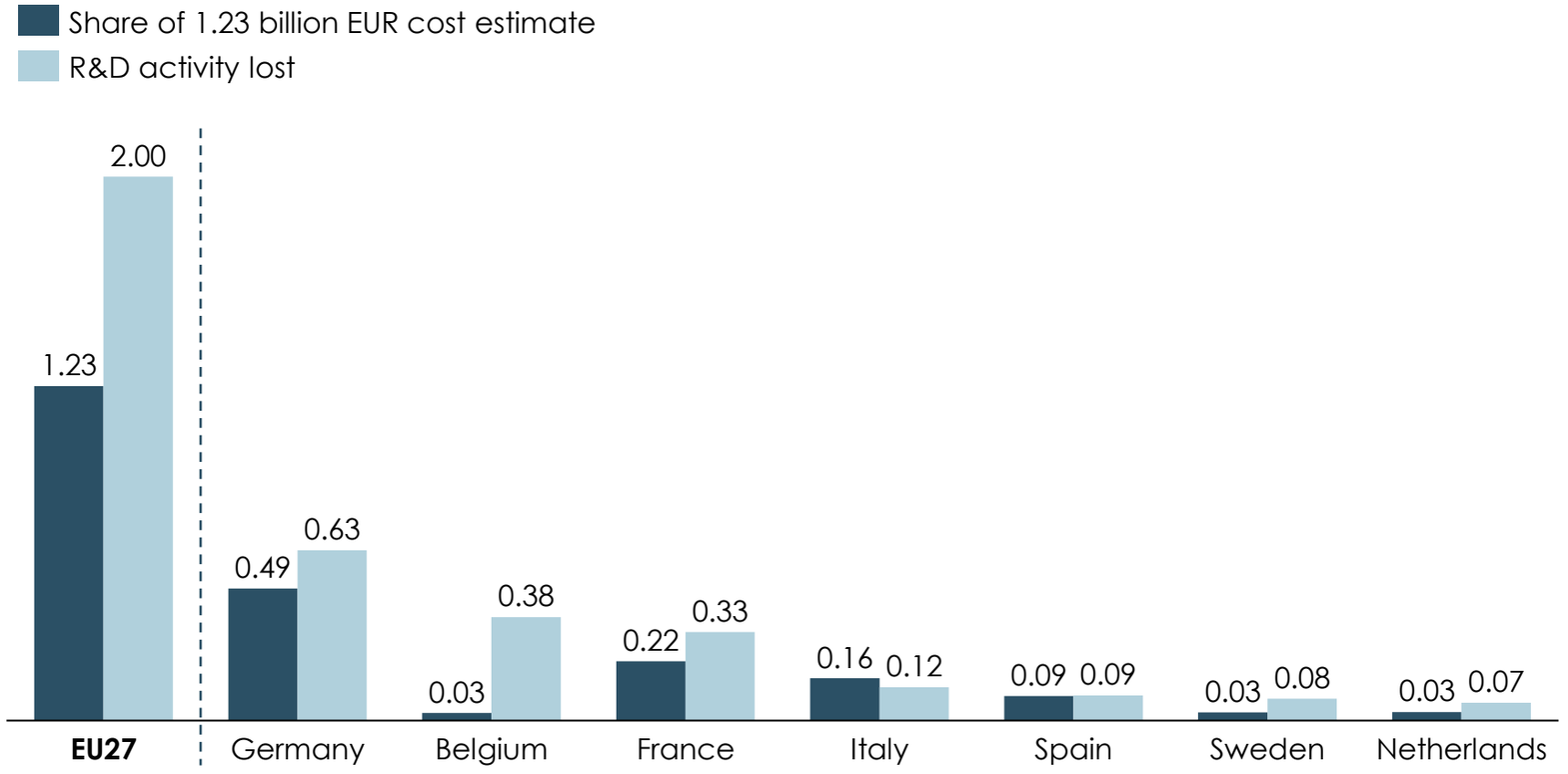
The lost R&D investments in EU member states from the Commission proposal are in line with or higher than the cost of one additional year of RDP

For example, 0.63 billion EUR in R&D investments is expected to be lost in Germany per year

- Many EU member states would lose more in R&D investments than their share of the estimated cost of one additional year of RDP.
- For example, Germany which bears the biggest share of the total cost, would lose 0.63 billion EUR in R&D investments compared to a cost of 0.49 billion EUR for one additional year of RDP.

Estimated cost of one additional year of RDP across the EU27 vs. R&D investments lost in selected EU27 countries

Billion EUR per year



Note: Point estimates on lost R&D investments lost are not available for the remaining EU-27 countries in Dolon (2023).
Source: Copenhagen Economics based on OECD (2024, webpage) and PhRMA (2023); Dolon (2023).

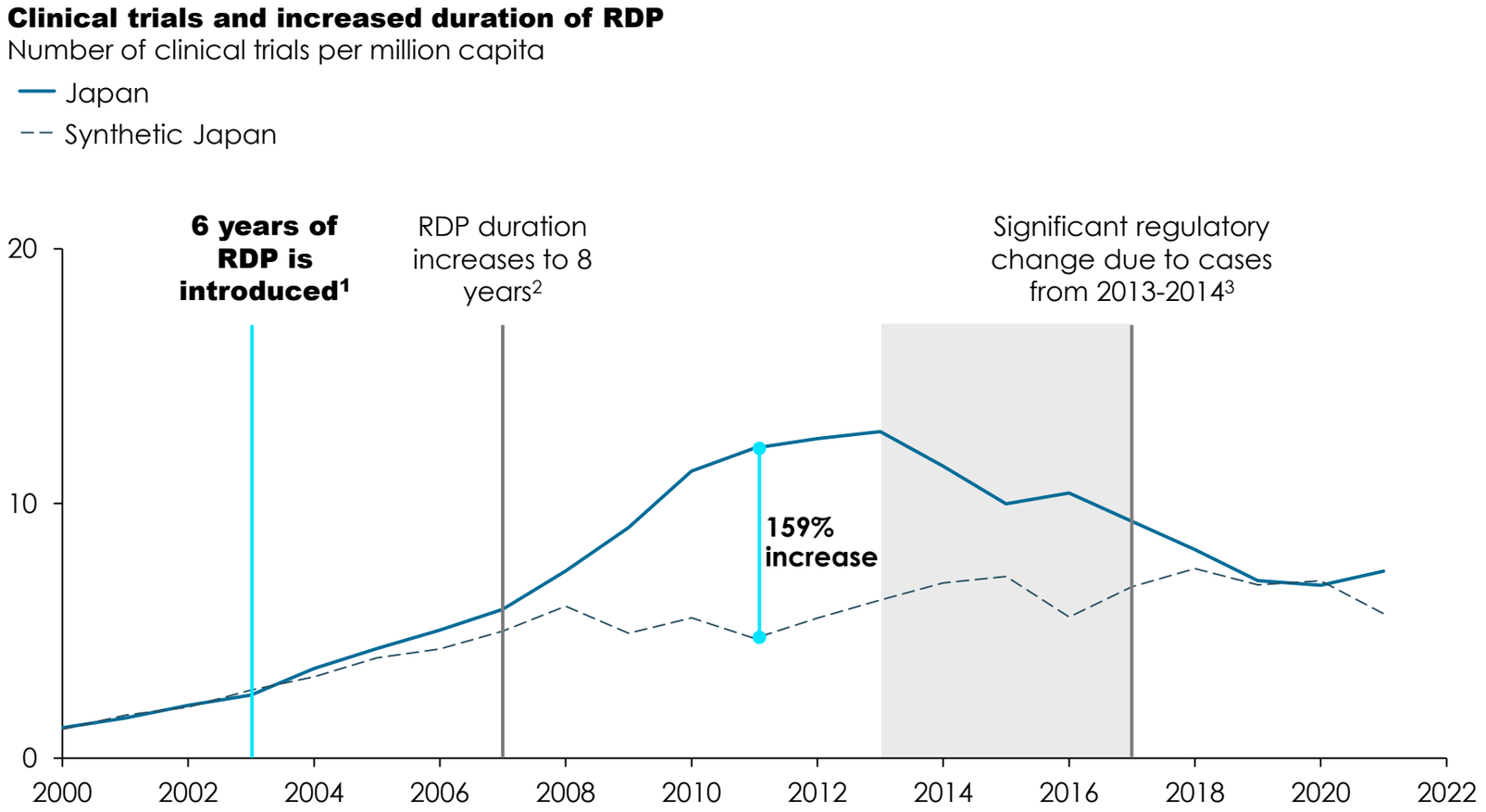
Case example: longer RDP duration in Japan was associated with an increase in R&D investments

The significant increase in clinical trials in Japan after the introduction of RDP exemplifies its importance for innovation

- Japan implemented six years of RDP in 2003, which increased to eight years in 2007.
- In the subsequent years, the number of clinical trials more than doubled.
- The estimated increase in number of trials is 159%, which corresponds to 7.47 more clinical trials per million capita in 2011. Given Japan's population of close to 128 million people in 2011[1], this amounts to 955 more clinical trials in 2011 with RDP implemented compared to Japan if RDP had not been implemented.
- Although the cost of clinical trials varies, estimates suggest that the mean actual outlay (without success rate adjustment or cost of capital) for clinical trials in phases 1, 2, and 3 are 52.9, 100.8, and 291.6 million USD (2018 values).[2]
- The large increase in clinical trials observed after the introduction of RDP in Japan thus translates into substantial investments.

Clinical trials and increased duration of RDP

Number of clinical trials per million capita



Notes: Based on synthetic control method where the counterfactual ("Synthetic Japan", dotted line) is estimated, i.e., the expected number of clinical trials per million capita in Japan if RDP had not been implemented. / 1) 2003, 6 years. / 2) 2007, to 8 years. / 3) Nakamura and Shibata (2020). Implementation of the Clinical Trials Act. Cases leading to change happened in 2013-2014.

Source: Copenhagen Economics (2023a) based on data from IQVIA, World Bank, WHO, and WGI.

Notes: 1) Statistics Bureau of Japan (2024, webpage). / 2) Wouters et al. (2020), eTable 4.

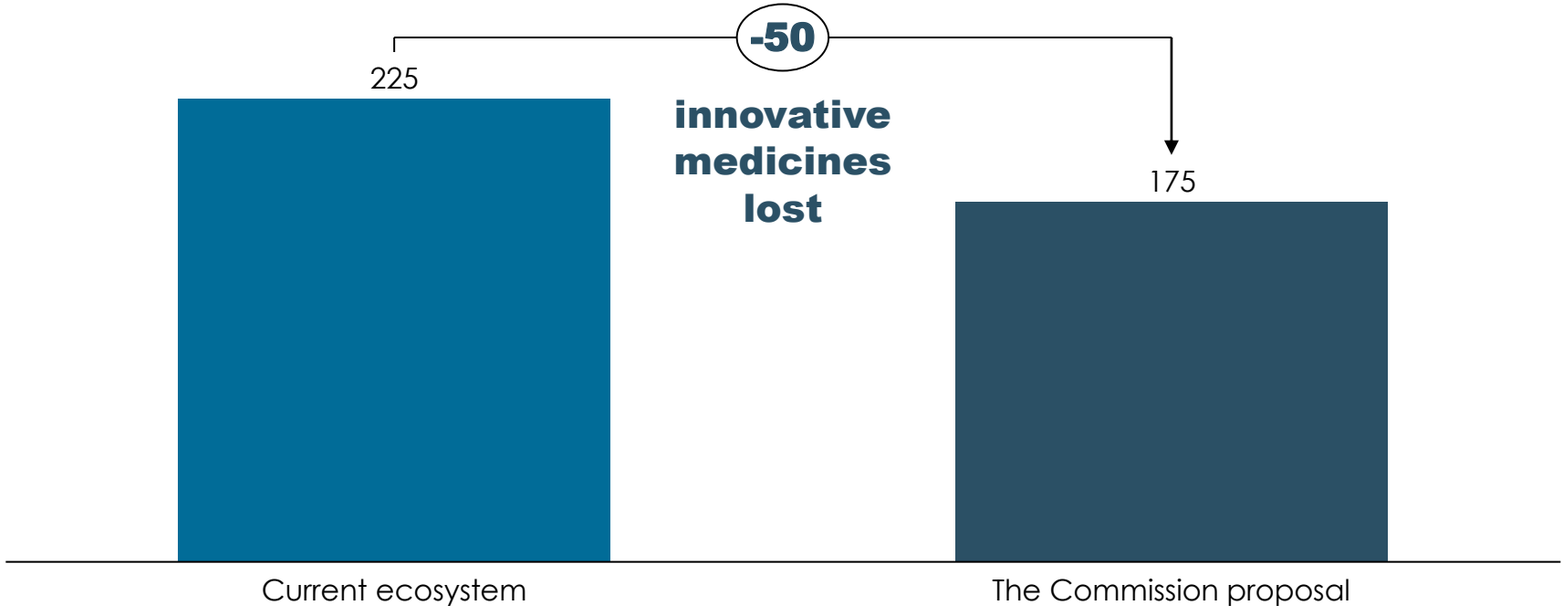
The Commission proposal will reduce the number of innovative medicines developed for patients

50 innovative medicines have been estimated to be lost from the Commission proposal

- The reduction in R&D investments will ultimately result in fewer innovative medicines being developed and launched.
- A recent study[1] estimates that 50 innovative medicines will be lost from the Commission proposal between 2020 and 2035, and the key driver for this reduction is the shortened duration of RDP.
- The reason for this decline is the worsening of the ex-ante business case to invest in the development of innovative medicines, see example of risk-adjusted net present value modelling (rNPV) in Appendix B, which was used to arrive at this estimate.

Number of innovative medicines lost with the Commission proposal

Number of innovative medicines relying on RDP expected 2020-2035



Note: Evaluation of potential impact of legislative changes as proposed by the Commission (including reducing the RDP period) based on risk-adjusted net present value modelling.
Source: Dolon (2023).

Notes: 1) Dolon (2023).

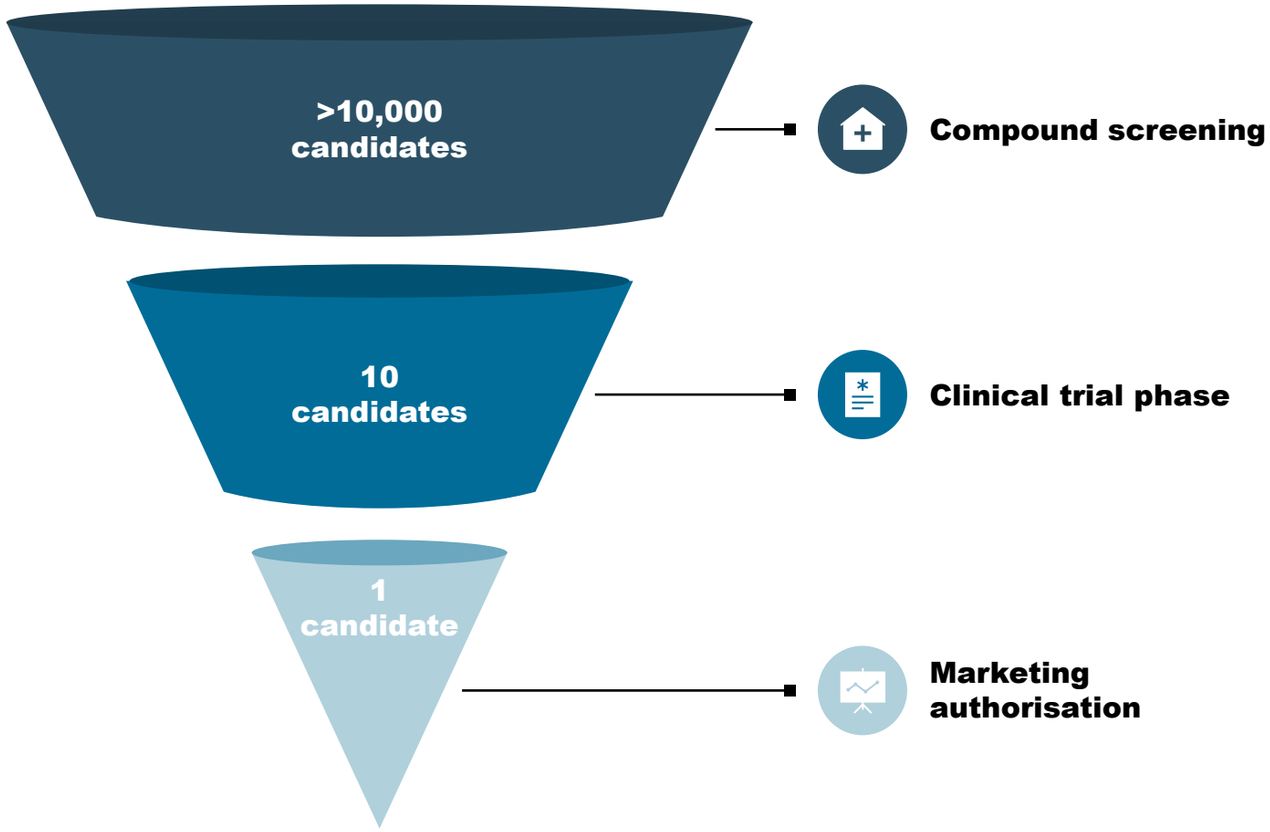
Increasing uncertainty about recouping the investment that goes into developing innovative medicines will worsen the ex-ante business case

Many resources go into development of medicine candidates that ultimately fail

- Medicine developers invest time and resources in multiple trials, with a high risk of failure. Increasing uncertainty about the possibility of recouping investments in many candidates on the one medicine that makes it to the market through reduced RDP thus affects the investment decision ex-ante. In Appendix B, we provide an illustrative example of this using risk-adjusted net present value modelling (rNPV), which is frequently used to make an ex-ante assessment of the economic feasibility of investing in new medicines.
- For each successful medicine development program, there is a trail of failed trials and missed opportunities.
- Once a candidate reaches phase 1, the average success rate in receiving a marketing authorisation is approximately 10%. This means that on average, out of 10 candidates that reach phase 1 across different diseases, only one will succeed and receive marketing authorisation.
- For each candidate that receives marketing authorisation, more than 10,000 candidates will have gone through compound screening.

Only 1 in 10,000 candidates in clinical development will eventually lead to an approved medicine

Number of candidates in each part of the medicine development cycle for each candidate that obtains MA



Source: Copenhagen Economics based on Sun et al. (2022).

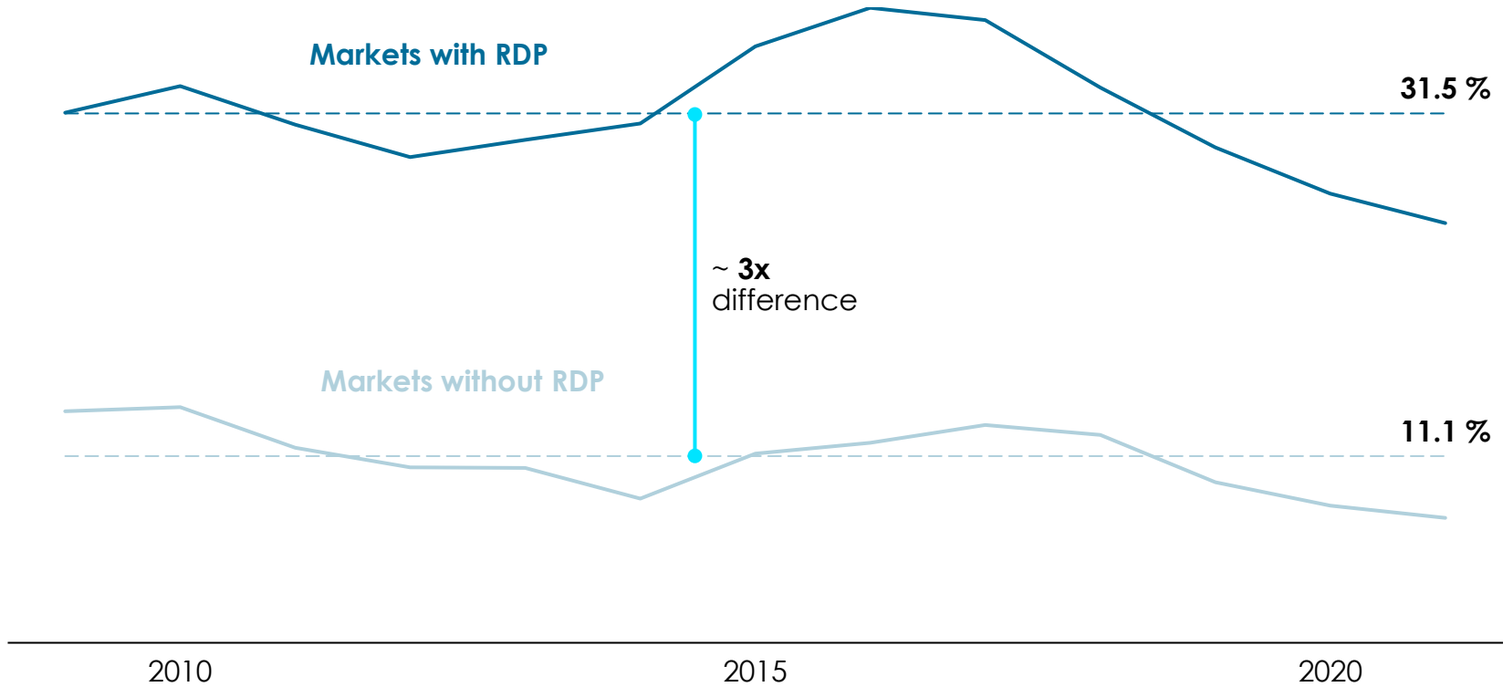
2.2
OTHER IMPACTS OF REDUCING INCENTIVES

RDP is important for availability and markets with RDP have on average access to three times more innovative medicines

Countries with RDP on average have 31.5% of innovative medicines available

- Patients in markets with RDP have higher availability of innovative medicine.
- Comparing 53 markets with and without RDP, the difference is threefold and stable across time.
- While other factors may be responsible for part of the threefold difference (see next page), this illustrates the importance of RDP for availability of innovative medicines.

Availability of innovative medicines
Percent of innovative medicines available[1]



Note: 1) Share of innovative medicines approved out of all innovative medicines launched globally in the last 5 years. Analysis based on 53 markets. Total averages are across markets and years.
Source: Copenhagen Economics (2023b) based on data from IQVIA.

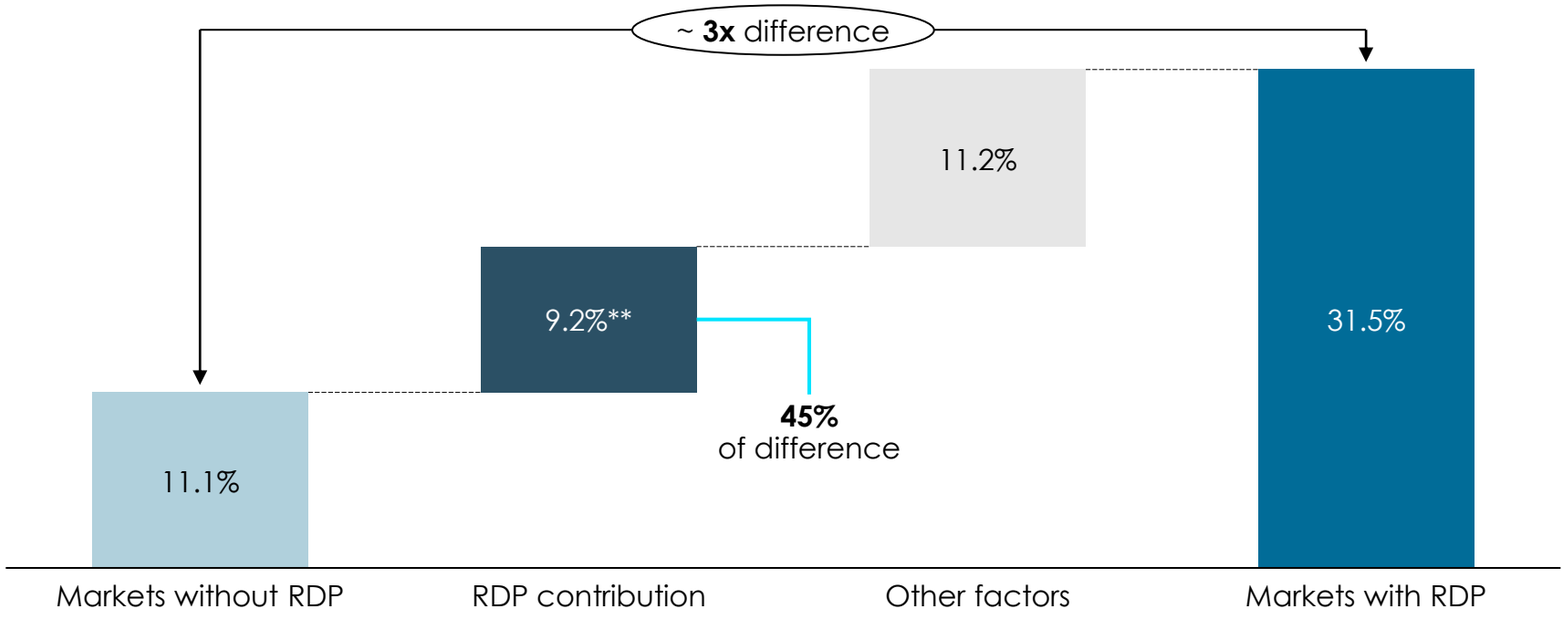
The link between RDP and availability of innovative medicines is clear, and RDP drives roughly 45% of the difference in availability of innovative medicines between countries with and without RDP

9.2%-percentage points of the difference between markets with and without RDP can be attributed to RDP

- The link between RDP and availability of innovative medicines is clear as demonstrated from data analysis of 53 markets.
- RDP is associated with 9.2%-points higher availability, corresponding to 45% of the difference.
- In practical terms, this means almost half of the difference in availability between markets with and without RDP can be attributed to RDP.

The link between RDP and availability of innovative treatments

Percentage availability and percentage point increase in availability of innovative medicines associated with RDP



Notes: 1) Estimate on 9.2%-points stems from from dynamic panel data model using system generalized method of moments (GMM). The estimate is significant at the 5% level (**), p = 0.018. The analysis is based on a statistical dynamic panel data (DPD) model, covering 53 developed and developing markets over a period of 11 years. The model contains data on RDP, size of the population, GDP per capita, healthcare expenditure, and more. Arellano-Bond tests, Sargan test, Hansen test, and difference-in-Hansen tests all hold.

Source: Copenhagen Economics (2023b) based on data from IQVIA, WHO and World Bank.

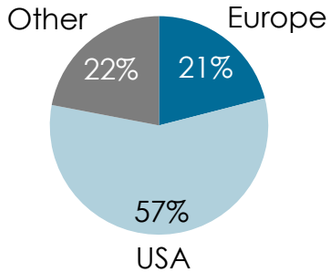
Reducing RDP duration will likely exacerbate the EU's inferior competitive attractiveness for launch vis-à-vis the USA

Already today, new medicines are launched later and at a lower rate in Europe than in the US

- New medicines are launched later and at a lower rate in Europe than in the US, which is likely to worsen with shortened duration of RDP.
- Only 21% of new medicines with global launch are launched first in Europe, see the left-most top figure. This is less than half of the number of medicines launched first in the USA.
- Europe's inferior position is evident from the 24 months from global to local launch in Europe, which is six times longer than the four months in the USA, see right-most top figure.
- 15% of innovative medicines are available within one year in Europe compared to 78% in the US.
- Importantly, the market access and competitive position in Europe is worsening with 43% of innovative medicines being launched between 2008 and 2017 compared to only 39% between 2012 and 2021. This contrasts with the US where the share has increased from 81% to 85%.
- Dolon (2023) find that launch is already financially unsustainable (negative return on investment) in countries covering 6% and 8% of the EU population for large companies in prevalent and rare diseases (respectively), or 21% and 38% for SMEs.[1]

Innovative medicines launched first

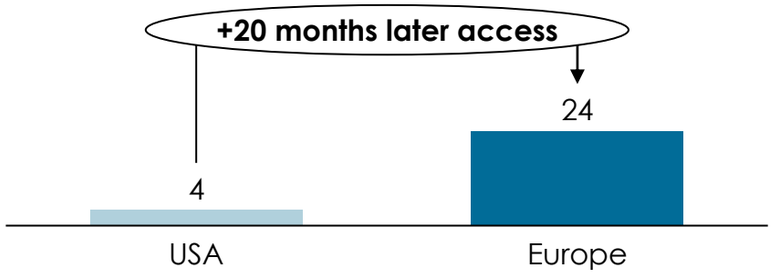
Share of new medicines with global first launch



Note: Europe = EU27 (excl. Luxembourg) + Switzerland and the UK.
Source: PhRMA (2023).

Time to launch

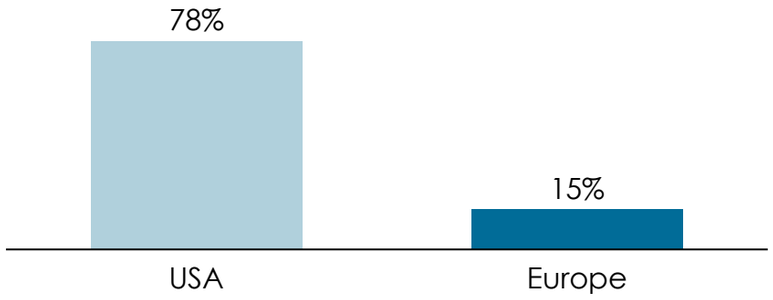
Average months from global launch to local launch



Note: Europe = EU27 (excl. Malta, Ireland, Republic of Cyprus, and Luxembourg) + UK, Norway, Switzerland, Turkey, Bosnia, Belarus, and Serbia.
Source: PhRMA (2023).

Innovative medicines available, 1 year

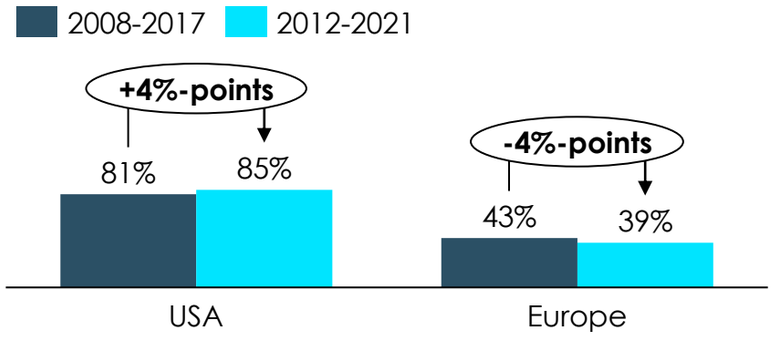
Share of innovative medicines available within 1 year



Note: 2012-2021. Europe = EU27 (excl. Luxembourg) + Switzerland and the UK.
Source: PhRMA (2023).

Innovative medicines available, total

Share of innovative medicines available in total



Note: Europe = EU27 (excl. Malta, Ireland, Republic of Cyprus, and Luxembourg) + UK, Norway, Switzerland, Turkey, Bosnia, Belarus, and Serbia.
Source: PhRMA (2023).

Notes: 1) Dolon (2023).

2.3
ADDITIONAL VALUE GENERATED BY THE PHARMACEUTICAL INDUSTRY

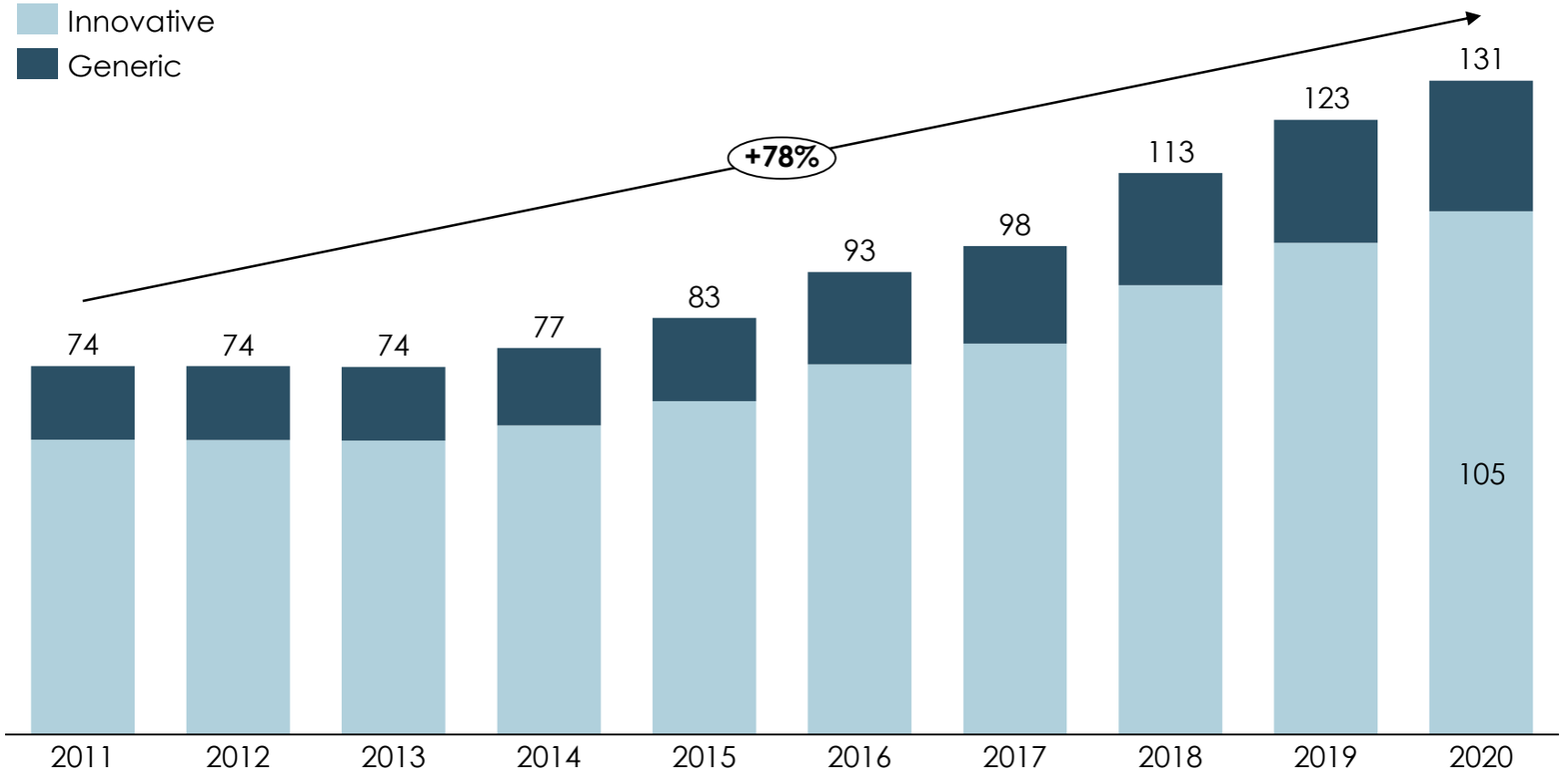
The gross value added by the innovative pharmaceutical industry amounted to 105 billion EUR in 2020

GVA contribution has increased by 78% from 2011 to 2020 and is mainly driven by the innovative industry

- Gross value added (GVA) contribution from the pharmaceutical industry has increased by 78% from 74 billion EUR in 2011 to 131 billion EUR in 2020.
- GVA contribution is mainly driven by the innovative pharmaceutical industry, which accounts for 80% of total GVA.[1]
- Additionally, the GVA intensity is higher in the innovative industry than in the generic industry due to higher remuneration of the two components of GVA, labour and capital. One euro spent in the innovative industry yields a GVA contribution of 0.51 euro while one euro spent in the generic industry yields 0.38 euro in GVA contribution.[1]

Gross value added from the pharmaceutical innovative and generic industry, EU27

Billion euro at current prices



Note: We have calculated the split between innovative and generic industry using an 80/20 split from Copenhagen Economics (2023c). The figure covers only NACE Industry Code C21. In addition, the pharmaceutical industry partly overlaps with other industries. However, these overlaps are not accounted for in this report. The 2020 number is pending revision.

Source: Copenhagen Economics based on Copenhagen Economics (2023c), see Appendix D for split between innovative and generic industry.

1) See Appendix D and Copenhagen Economics (2023c).

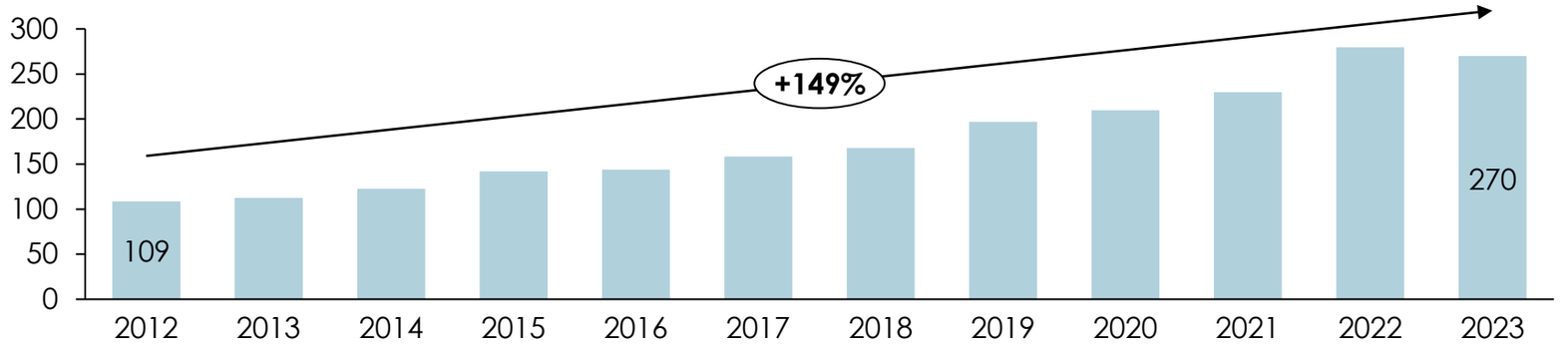
Extra-EU pharmaceutical exports amounted to 270 billion EUR in 2023 and have increased by 149% since 2012

The share of total exports has increased from 6.1% in 2012 to 10.6% in 2023

- Extra-EU pharmaceutical exports have increased by from 109 billion EUR in 2012 to 270 billion EUR in 2023, i.e., a 149% increase, see top figure.
- Pharmaceutical exports has grown from 6.1% of all extra-EU exports in 2012 to 10.6% in 2023, see bottom figure. Pharmaceutical exports have thus become increasingly important for the EU trade balance during the last decade.

Extra-EU pharmaceutical exports

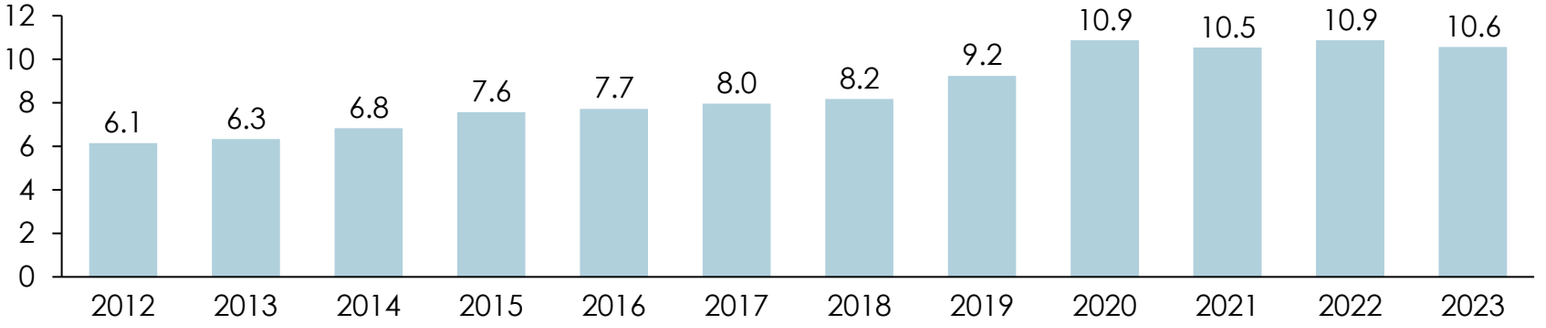
Billion EUR



Note: Includes extra-EU exports from all EU27 countries.
Source: EUROSTAT (2024, webpage). See also Copenhagen Economics (2024).

Extra-EU pharmaceutical exports as share of total extra-EU exports

%



Note: Includes extra-EU exports from all EU27 countries.
Source: Copenhagen Economics based on data from EUROSTAT (2024, webpage). See also Copenhagen Economics (2024).

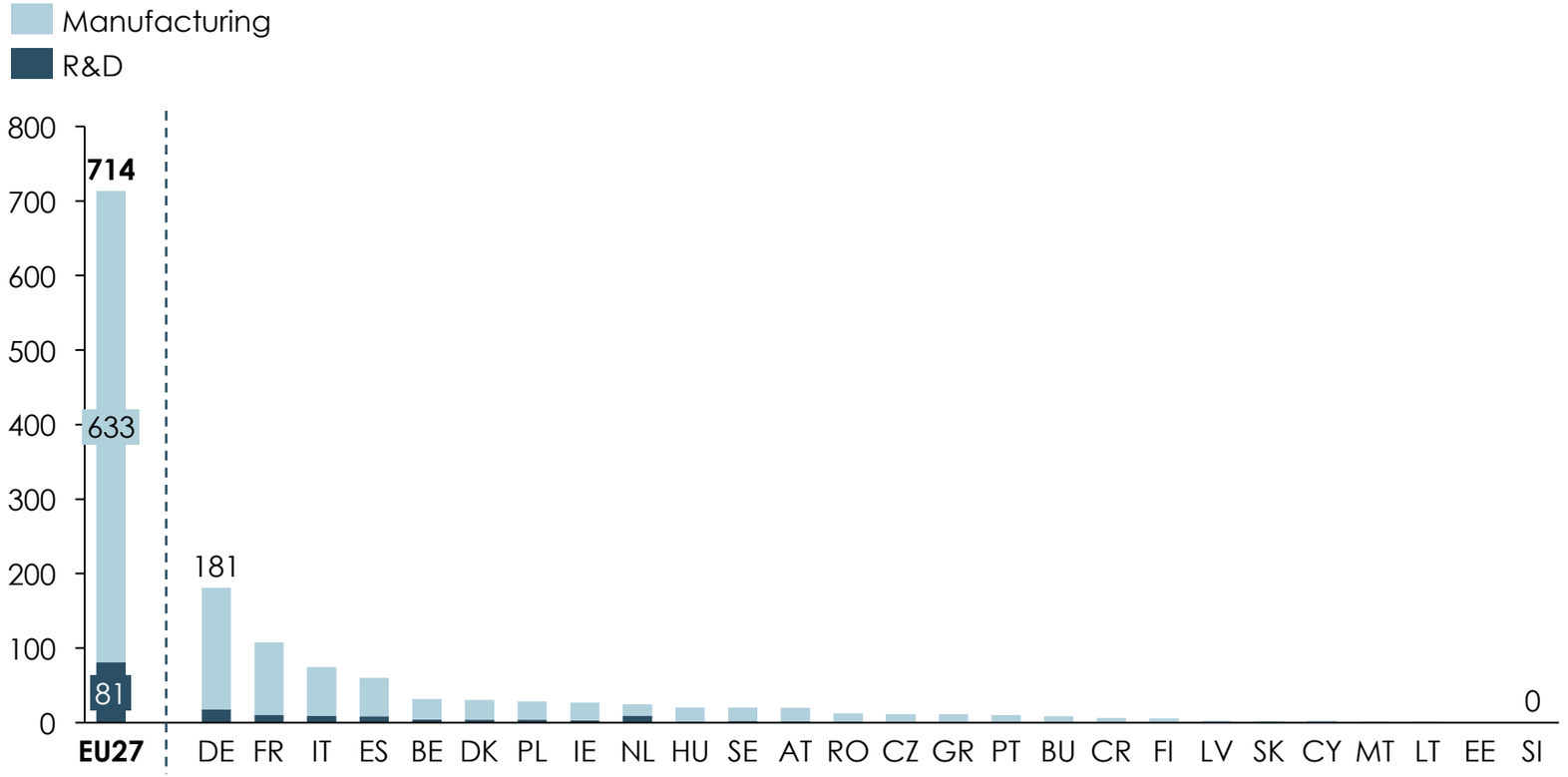
The pharmaceutical industry supported 714,000 jobs in EU27 in 2021

Germany has the biggest pharmaceutical sector measured by employment in the EU27 with 181,000 jobs

- The pharmaceutical industry supported 714,000 jobs in EU27 in 2021.
- Most of these jobs are in Western European countries with Germany as the largest place of employment with 181,000 jobs.
- Most jobs are in manufacturing, but more than 80,000 people were employed in R&D.

Employment in the pharmaceutical industry in 2021

Thousand persons employed



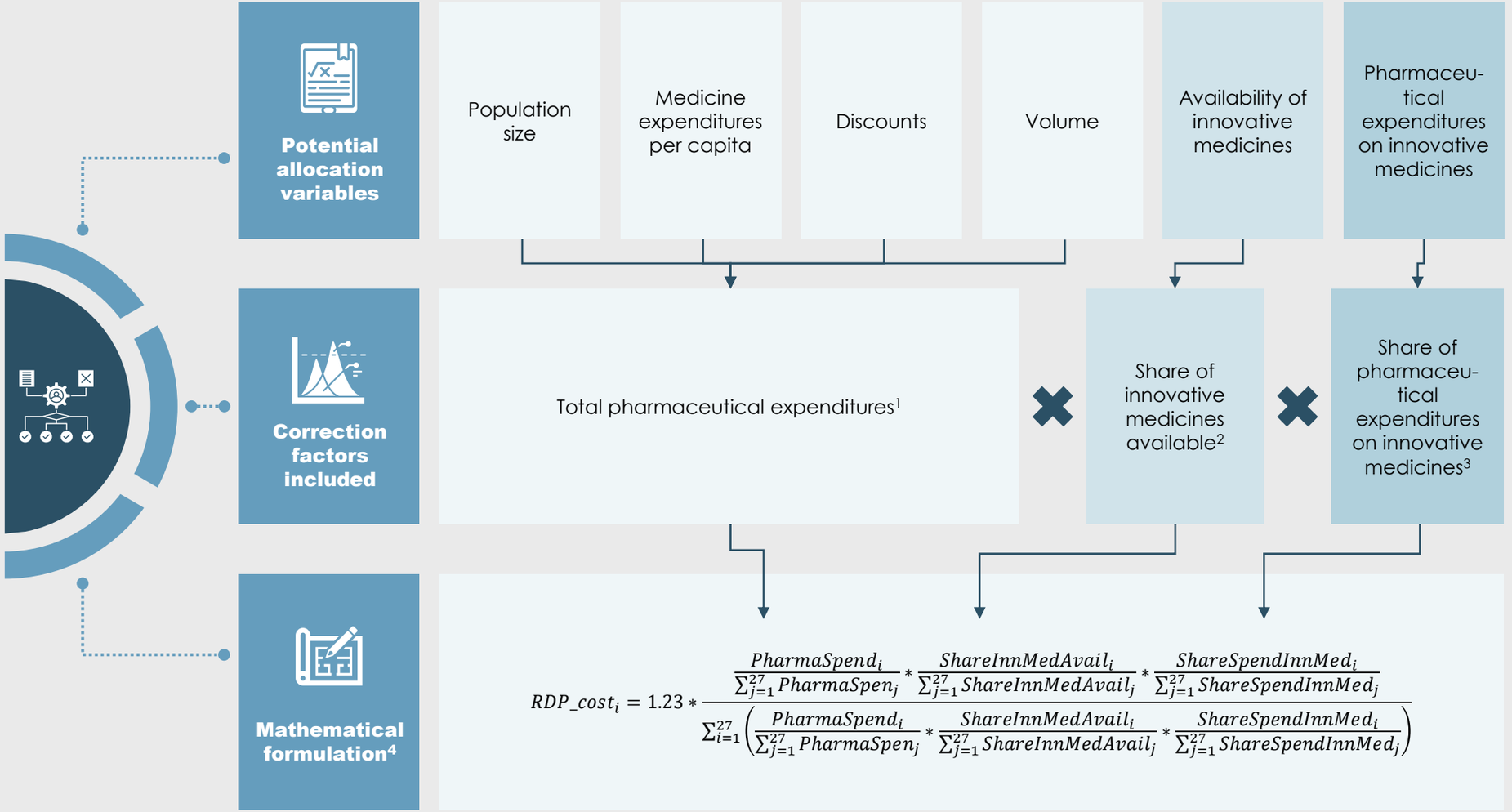
Note: Luxembourg is excluded due to missing data in manufacturing and R&D employment. Zero values indicate less than 500 employees. Czech Rep, Cyprus and Estonia only shows data for manufacturing employment. Lithuania and Slovenia only show data for R&D employment. The sum for EU27 is reported by Eurostat and is greater than the sum reported data for available member states. The sum is therefore valid as it contains confidential data from member states that do not have publicly available data. 1) 2020 data is used for manufacturing.

Source: EUROSTAT (2024, webpage).

APPENDICES AND REFERENCES

Appendix A

We have developed a distribution algorithm to estimate the country split by accounting for several key influencing factors



Step by step procedure:

- We have calculated pharmaceutical expenditures in 2021 and healthcare expenditures in 2022 by multiplying the expenditures as share of GDP from OECD (2024, webpage) with the relevant GDP for each country.[1]
- We have calculated three correction factors using
  - pharmaceutical expenditures of country *i* as pharmaceutical expenditures in country *i* divided by total pharmaceutical expenditures in EU27.
  - the share of innovative medicines available in country *i* as the share in country *i* divided by the sum of all shares in the EU27.[2]
  - the share of expenditures on innovative medicines by dividing the share in country *i* with the sum of all shares in the EU27.[3]
- To get the share of the cost of an additional year of RDP in each country, we have multiplied the 1.23 billion EUR cost estimate with the three correction factors, and then divided it with an adjustment factor so all shares sum to 1.23 billion EUR.[4]

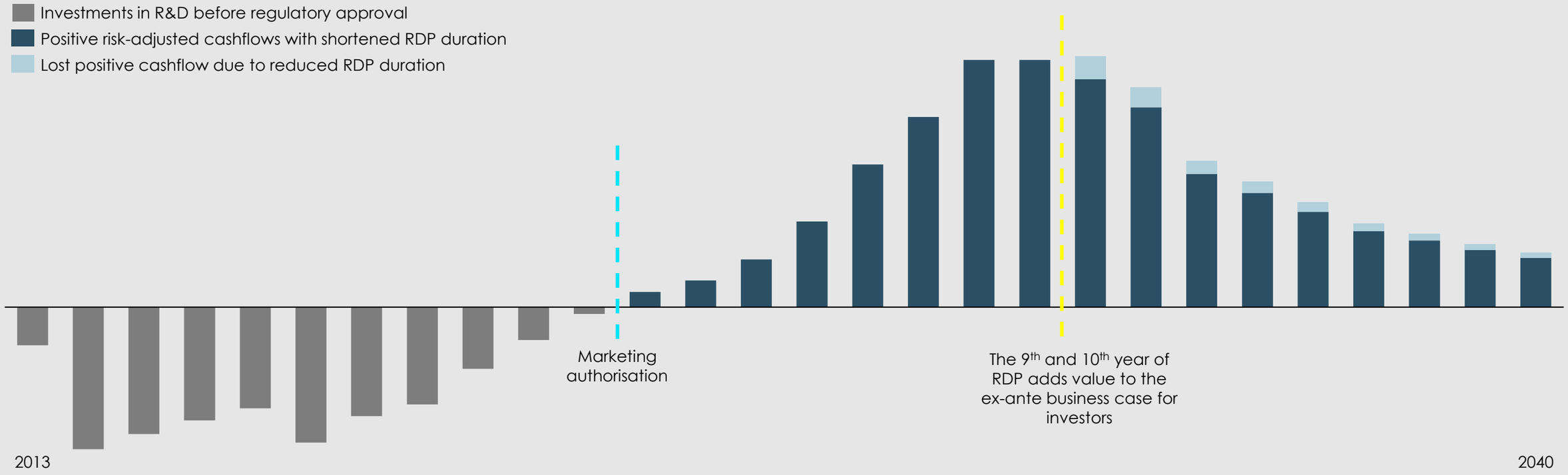
Notes: 1) OECD (2024, webpage). / 2) PhRMA (2023). / 3) Copenhagen Economics based on data from IQVIA. / 4) The adjustment factor $\sum_{i=1}^{27}\left(\frac{PharmaSpend_i}{\sum_{j=1}^{27} PharmaSpen_j} * \frac{ShareInnMedAvail_i}{\sum_{j=1}^{27} ShareInnMedAvail_j} * \frac{ShareSpendInnMed_i}{\sum_{j=1}^{27} ShareSpendInnMed_j}\right)$ is constant for all countries and is used to ensure that the sum of country shares are equal to the total EU estimate.

Appendix B

A key underlying driver for R&D lost is that shortening RDP duration will make the development of innovative medicines less attractive for investors – deep dive on underlying drivers

Risk-adjusted net present value (rNPV) model of shortened duration of RDP

Risk-adjusted net present value, in million EUR



Note: Illustrative example based on dummy data and a hypothetical time period.
Source: Copenhagen Economics.

Appendix C

Outline of methodology in 2018 study and estimation of impact from shortening RDP duration by one year

A study from 2018[1] demonstrated that a one-year decrease in the mean effective protection period in other EU countries is associated with a 6.97% decrease in pharmaceutical R&D in the short run. Below, we make a high-level outline of the methodology in the study and our methodology for estimating the impact from shortening RDP duration specifically by one year. For a detailed outline of the methodology in the 2018 study, see Copenhagen Economics (2018), p. 92-101.

The 2018 study demonstrates the impact on pharmaceutical R&D from reducing the mean effective protection period by one year

The 2018 study[1] is based on econometric analysis of data from 1996 to 2014 on 20 EU member states. As a result, the estimates can be interpreted as the within-EU effects of market protection on pharmaceutical R&D spending. The analysis utilises a dynamic panel data (DPD) model with system generalised method of moments (GMM) based on seminal work by Arellano and Bond[2] and Arellano and Bover[3], and further refined by Blundell and Bond.[4]

The DPD model estimated is the following:

$$(1)\ \log(RD\_spend_{it}) = \alpha * \log(RD\_spend_{i,t-1}) + \beta * effective\_protection_{it} + \boldsymbol{\delta} * \boldsymbol{X}_{it} + \eta_i + \nu_t + \varepsilon_{it},$$

where RD_spend_{it} is total pharmaceutical R&D spending in market $i = 1, \dots, N$ at time $t = 0, \dots, T$ and $effective\_protection$ is the mean effective protection period in a given year for the other EU countries with which a given country trades, weighted by the fraction of total pharmaceutical exports that country received from the country of interest. $\boldsymbol{X}$ are control variables, η are market time-invariant fixed effects, ν are year dummies, and ε is the error term. The estimate of β is the short-run effect of the weighted mean effective market protection on pharmaceutical R&D spending, and $\beta/(1-\alpha)$ is the corresponding long-run effect.

From the DPD with system GMM, the study finds that $\beta = 0.0697$ $(p < 0.05)$ and $\alpha = 0.414$ $(p < 0.01)$. This implies that the estimated short-run effect of decreasing the weighted mean effective protection period by one year is 6.97% and the long-run effect is 11.89% $(0.0697/(1-0.414))$.

The main findings of this part of the 2018 study are that:

- The average *effective protection period for medicinal products in the EU countries with which a given country trades* the most has a *positive significant effect on the level of domestic spending on pharmaceutical R&D*; i.e. the protection period provided in markets where companies sell their products seems to have a positive impact on domestic spending on pharmaceutical R&D.[5]
- The average *domestic* effective protection period does not have a statistically significant effect on the level of *domestic* spending on pharmaceutical R&D; i.e. the protection period in a given country does not determine the spending on pharmaceutical R&D in said country.[5]

These results combined imply that while the effective protection period in a given country does *not* have a significant effect on pharmaceutical R&D spending in the same country, the mean effective protection period in other countries (e.g., all other EU countries) *is* associated with a significant effect on R&D spending.

We use the estimates from the 2018 study to quantify the impact from shortening RDP duration by one year

To arrive at an estimate of the impact on pharmaceutical R&D spending from shortening RDP duration by one year, we use two estimates from the grey literature:

- Total pharmaceutical R&D spending amounts to 44.5 billion EUR (2022)[6]
- RDP is the last protection to expire for 31% of innovative medicines[7]

Our estimate of the monetary short-run reduction in pharmaceutical R&D from shortening RDP duration by one year is thus 0.0697 * 44.5 * 0.31 = 0.9615 billion EUR. Our estimate of the monetary long-run reduction in pharmaceutical R&D from shortening RDP duration by one year is 0.1189 * 44.5 * 0.31 = 1.6408 billion EUR.

Two sources of potential imprecision of the estimates are worth noticing, each of which go in different directions. We use a fixed estimate for yearly pharmaceutical R&D spending (44.5 billion EUR[5]). This number has increased over time[5] and would thus likely increase going forward all else equal. This implies that our estimates of lost R&D spending are conservatively estimated and could be higher. On the other hand, while RDP is the last protection to expire for 31% of innovative medicines, reducing RDP duration by one year may not imply a full year less of protection. E.g., if RDP is the last protection to expire for a specific medicine, market protection for that medicine may have expired, e.g., 8 months before RDP does, so shortening RDP duration by one year will result in 8 months of lost protection. Attributing a full year of lost protection from shortening RDP duration by one year may thus imply that our estimates of lost R&D spending are overestimated and could be lower.

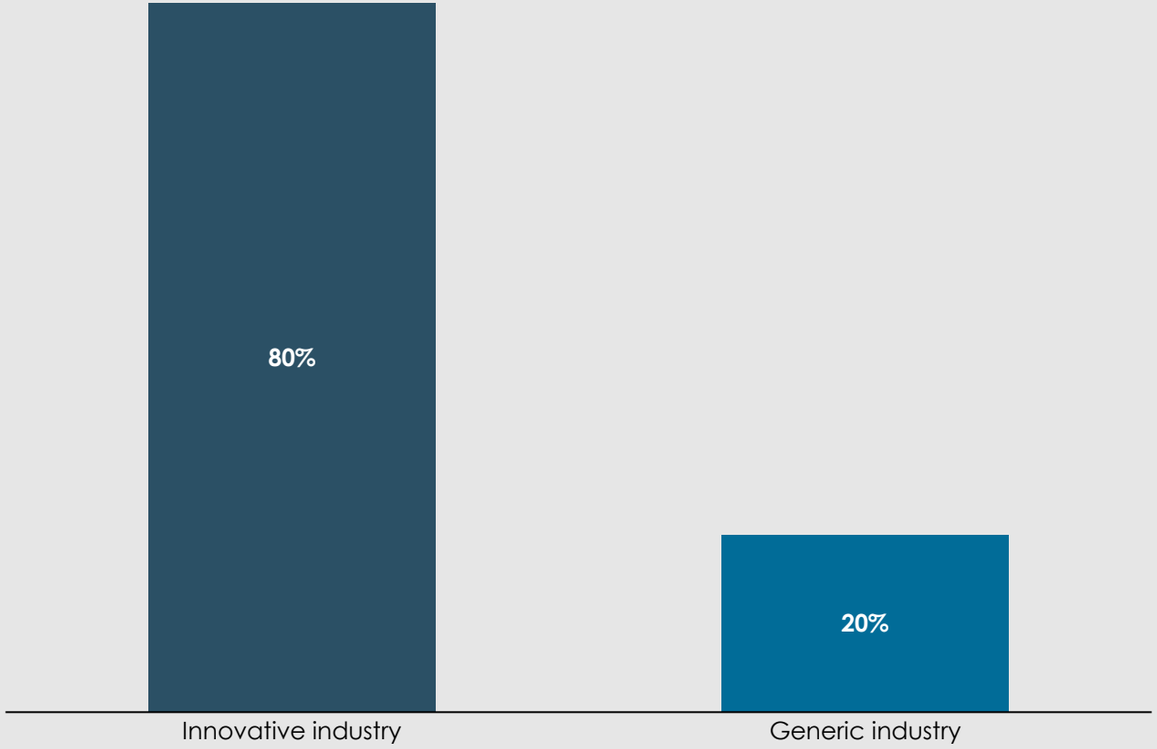
Notes: 1) Copenhagen Economics (2018). / 2) Arellano and Bond (1991). / 3) Arellano and Bover (1995). / 4) Blundell and Bond (1998). / 5) Copenhagen Economics (2018), page 100. / 6) EFPIA (2023). / 7) IQVIA (2022).

Appendix D

The innovative industry accounts for 80% of pharmaceutical GVA in the European Union

The majority of GVA stems from the innovative industry

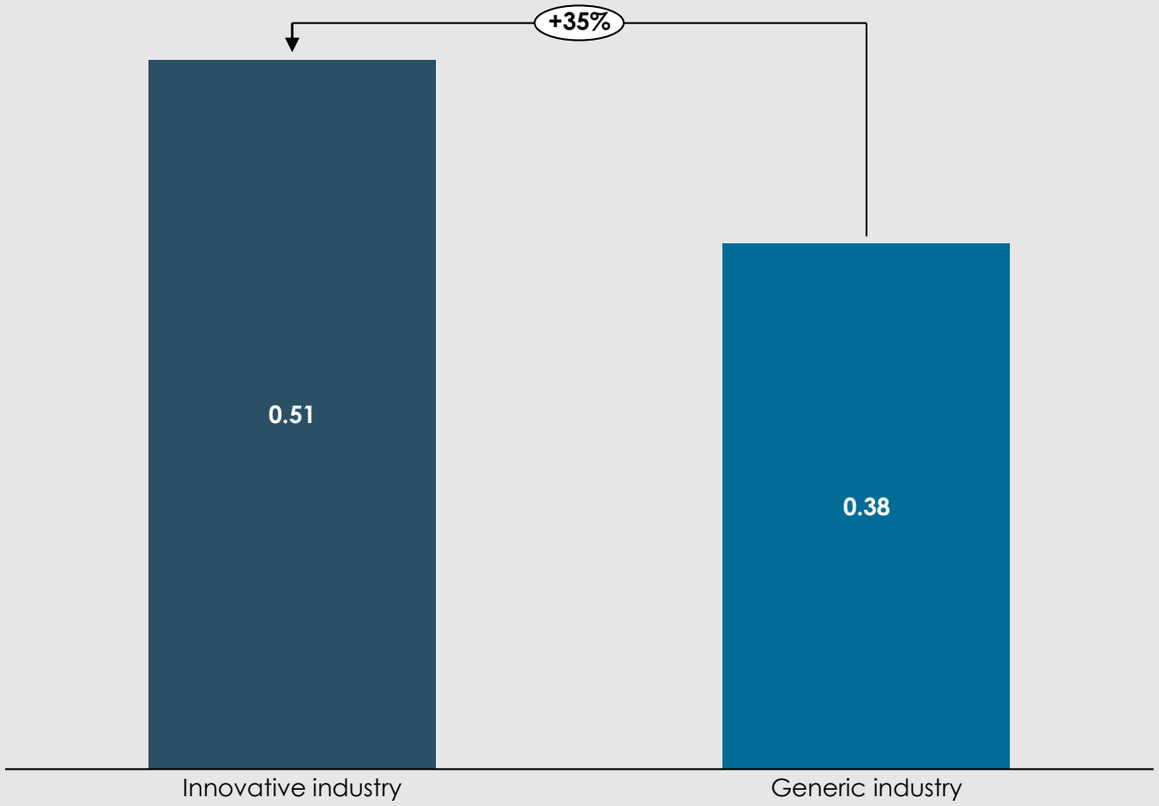
Share of pharmaceutical GVA by subindustry (%)



Source: Copenhagen Economics (2023c).

The innovative industry boasts the highest GVA intensity

GVA per EUR production by subindustry (EUR)



Source: Copenhagen Economics (2023c).

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