

**Communication of the BIPT Council
of 21 May 2024
regarding a price comparison study on the single-piece
tariffs 2020-2023 for priority and non-priority letter
post as well as the 2 kg package as offered by the
universal service provider**

TABLE OF CONTENTS

1. Executive summary.....	3
2. Context.....	4
3. Tariff comparison.....	5
3.1. Existing benchmarks.....	5
3.1.1. <i>Deutsche Post</i>	5
3.1.2. <i>The European Commission</i>	7
3.1.3. <i>The ERGP</i>	7
3.2. Data collection BIPT benchmark and consultation with postal operators.....	7
3.3. D+1 priority letter post.....	8
3.3.1. <i>Nominal rates</i>	8
3.3.2. <i>Rates with adjustment for purchasing power</i>	10
3.4. Non-priority (> D +1) letter post.....	11
3.4.1. <i>Nominal rates</i>	11
3.4.2. <i>Rates with adjustment for purchasing power</i>	12
3.5. 2 kg parcels.....	13
3.5.1. <i>Nominal rates</i>	13
3.5.2. <i>Rates with adjustment for purchasing power</i>	13
3.6. Conclusion.....	14
4. Regression analysis.....	15
4.1. Introduction.....	15
4.2. The variable to be explained: priority and non-priority postage stamp rate for the years 2020 to 2023 included.....	16
4.3. Possible explanatory variables.....	20
4.3.1. <i>Variables included</i>	21
4.3.2. <i>Policy variables</i>	22
4.4. Model and estimation method.....	22
4.4.1. <i>Specification</i>	22
4.5. Alternative models to take into account the policy variables.....	24
4.6. Outcomes.....	25
4.6.1. <i>Deviations between the nominal rates and values predicted by the model for all countries</i>	25
4.6.2. <i>Focus on Belgium: table with deviation of the rates for Belgium and the model prediction</i>	26
4.7. Conclusion.....	28
5. Annexes.....	30
5.1. References.....	30
5.2. Data set comments and adjustments.....	30
5.3. Estimation.....	32
5.3.1. <i>Interpretation of outliers</i>	32
5.4. Estimated regression model.....	33

1. Executive summary

1. The sharp price increases of bpost's postal products since 2018 meant for small users, have been raising questions with the BIPT about the basis of those price increases from even before the coming into effect of the Act of 26 January 2018 on postal services. This study stems from that concern and its purpose is to put the Belgian prices (and their evolution) in an international context, based on a European comparative price study, which was completed with a regression analysis. A regression analysis is a statistical method that examines whether one or more variables (in this case: certain characteristics of a country) are related to another variable (in this case: the rate used in a country). The study thus examines whether differences in postal rates between Belgium and other European countries can be explained by country-specific characteristics.
2. As no complete international benchmark is available and for lack of available data to carry out a comparative study for the entire European territory, the BIPT has taken the initiative to collect data from the ERGP¹ members, Switzerland and the United Kingdom among others. That way a source database of postal rates and descriptive market data has been created for 34 European countries. Based on that the BIPT finds that for domestic priority postage stamps Belgium has the third highest rate in 2023 in nominal terms on the European country list. Non-priority postage stamps take seventh place, whereas our country takes eleventh place for domestic 2 kg parcels. When the difference in purchasing power between the various countries is neutralised, the Belgian situation improves a little in most cases, resulting in a sixth, eighth and tenth place respectively. In relative terms the difference with the median, which bpost exceeds in each case, is also relatively the largest for the priority stamp..
3. The robust regression subsequently performed based on the rates, takes account of the differences between the analysed European countries regarding per capita volume, average cost of labour per hour, differences in delivery times and maximum weight allowed and finally the country's size and population density. Apart from the basic regression model three alternative models for both priority and non-priority postage stamps were used, to examine the impact of the government being a shareholder (if that is the case) in the postal operators, the possible existence of services of general economic interest and the existence (if applicable) of both a non-priority and priority postage stamp.
4. The result of those regression analyses, which take utmost account of the context in which the rates have been set, shows as far as Belgium is concerned that there is nevertheless a significant deviation for the priority postage stamp, in the sense that the predicted value which can be expected by the models consistently turns out to be substantially lower than the nominal rate. Therefore, considering the specific Belgian context, a lower priority rate would be expected. To remedy this situation a proactive policy is recommended. Notably a price cap mechanism whereby the rates' cost orientation is effectively verified in accordance with the Postal Directive requirements. At the moment there is no significant deviation for non-priority postage, but the deviation did strongly increase between 2020 and 2023 (meaning the predicted value is not significantly lower (yet) than the nominal rate, but the gap continues to widen). If that tendency continues, there will probably also be a significant deviation for non-priority in the future.

¹ 'European Regulators Group for Postal Services (ERGP)' is a body that advises the European Commission.

2. Context

5. Since 2018 bpost has carried through large price increases in the small users' basket, i.e. both national and international standard letters and parcels for private persons and small professionals. Especially in the case of domestic postage those increases are very marked, even when keeping in mind that those products show sharp drops in volume. For instance the single-piece price of a priority postage stamp, which was 0.79 euro in 2017, rose to 2.27 euro in January 2024 (i.e. +187%). For non-priority postage stamps, which were introduced in 2019, the increase was from 0.95 euro in 2019 to 1.46 euro in January 2024 (i.e. +54%).
6. Those price increases occurred within the framework of the Act of 26 January 2018 on postal services ("the Postal Act"). In 2017 already the BIPT criticised in an opinion² the draft of the new Postal Act and its price cap formula, warning against important price increases. Before that time the price cap consisted of a compensation for inflation and a quality bonus; if that cap was respected, conformity with the legal tariff principle of affordability was assumed.
7. The price cap in the current Postal Act differs from the previous one in two ways. Firstly, in addition to a compensation for inflation there is a compensation for volume decreases (Art. 19, § 1, 1^o, of the Postal Act). Secondly (Article 18, § 4, of that Postal Act), if the price cap is observed, conformity with the cost orientation principle is now also assumed by law. The BIPT's other criticism concerning this price regulation regarded the compensation for volume decreases. The fact of the matter is that this methodology, which implies that volume decreases regarding the small users' basket that can be compensated directly and completely, is linked only indirectly to the underlying costs and is therefore not a good criterion to enforce the cost orientation principle. Finally, knowing that the price increase in 2017 had been refused because of the lack of cost orientation, there were serious doubts whether the basic rate on which further increases were allowed, was already cost oriented.
8. As the BIPT has been indicating in its price decisions since 2018, this price cap mechanism turned out to be insufficiently capable of verifying the conformity with the cost orientation principle. Doubts can also be expressed about the affordability principle considering the discrepancy since 2018 between the evolution of the general price level and that of the products in the small users' basket and especially the postage stamps.
9. Following those annual findings the BIPT again discussed this issue in 2022 in a report addressed to the Minister in charge of postal services among other things, in which apart from the legal issue mentioned above, which allows large price increases, reference was also made to existing European comparative benchmarks regarding postal rate setting. Based on that and using publicly available information regarding 2020 a regression analysis was established, which tried to link the various rates to country-specific circumstances such as per capita volume, population density, size of the country, average wages, etc. In addition the report discussed extra checks regarding affordability of postal services, which take place notably in the United Kingdom and Portugal. Finally the report included proposals for an improved price cap formula by means of a direct link to the underlying costs or a separate review thereof.
10. In an reaction to that report [dated 20 July 2022] the Minister invited the BIPT to further develop the European comparative price study including the regression analysis. The present study therefore examines whether differences in postal rates between Belgium and other European countries can be explained by country-specific characteristics. To perform that task the BIPT collaborated with Mr Kris Boudt, Finance and Econometrics Professor at Ghent University, Vrije Universiteit Brussel and Vrije Universiteit Amsterdam. In the context of this task the BIPT also consulted a number of postal operators (namely bpost, GLS and PostNL). The aim was to gather input from large operators who can provide insight into the drivers of distribution costs.

² [Opinion of the BIPT Council of 19 October 2017 on the bill regarding postal services | BIPT](#)

3. Tariff comparison

3.1. Existing benchmarks

3.1.1. Deutsche Post

11. The 'Letter Prices in Europe' study³ is an international comparative study that is already in its 22nd edition. The starting point is a comparison of the nominal price of a standard postage stamp for the fastest form of national letter post⁴, as applicable on 1 April 2023 in the EU27 countries, the United Kingdom and the EFTA countries⁵. In addition, the prices of international letter post traffic are examined as well but we will not go into those further here.

12. Next, a number of elements are added to the analysis, namely:

1. inflation;
2. purchasing power parity;
3. the number of minutes someone with an average working wage has to work in order to earn a stamp;
4. labour costs (given the labour-intensive nature of postal activities).

13. Elements 2 and 3 concern explanatory factors on the demand side and constitute a measure of the affordability of a priority postage stamp. The latter element nuances prices depending on a supply characteristic, just as the public subsidies factor could do.

All of the above elements are first considered separately and then consolidated into an overall result.

14. Germany is, of course, at the heart of this study. Our eastern neighbour comes out of the comparison as a country where a very reasonable rate is applied. On the basis of the consolidated result, only three countries are doing better. The worst off are customers in Denmark and Italy.

15. Overall, Belgium ranks unfavourably in the group of 31 countries:

- Nominal price: 3rd most expensive (2.17 euro vs. on average 1.33 euro, the price is 63% higher than average)
- Nominal price increase compared to 2018: 4th largest increase (149% vs. 57% on average)
- Actual price increase compared to 2013: 7th largest increase (146% vs. 89% on average)
- Prices adjusted according to labour costs: 12th position (2.08 euro vs. on average 1.72 euro).

16. In terms of affordability, these are the results for our country:

- Nominal price following a PPP adjustment: 5th most expensive (2.17 euro vs. 1.5 euro on average). The study specifically states: "*Belgium and the Czech Republic also recorded significant increases in the stamp prices following a purchasing power adjustment. In this*

³ The most recent version is that of 26 April 2023: [DHL Group | Apr 26, 2023: Germany has the fourth-lowest letter postage rate in Europe \(dpdhl.com\)](https://www.dpdhl.com/en/press-releases/2023/germany-has-the-fourth-lowest-letter-postage-rate-in-europe)

⁴ It is ensured that the products examined are as similar as possible. This is usually a "D+1" delivery. Prices include VAT, if applicable.

⁵ Iceland, Norway and Switzerland.

calculation, the postal rate of the Belgian bpost is 2.17 euro, i.e. 0.30 euro more than in the previous study."

- Number of minutes that have to be worked to earn a stamp: 15th position (3.96 minutes vs. on average 4.7 minutes).

17. In the consolidated result, taking into account all the elements, Belgium ranks 7th.

18. The following considerations can be made with regard to the international comparison of Deutsche Post:

- The affordability of a stamp in Belgium still does not seem to be too bad according to the result area "*number of minutes that have to be worked to earn a stamp*". This method seems attractive because of the simplicity of the concept, but does not take into account the tax burden in the countries examined. Gross wages are therefore not a good measure of net purchasing power. In addition, it would still have to be weighed in terms of how many letters are sent on average per year in order to determine and compare costs on an annual basis. The PPP method (Purchasing Power Parity) is well established and may be a better measure of affordability. Following the PPP correction, our country is found to be in the most expensive quartile. Moreover, the evolution is unfavourable.
- The non-priority postage stamp, which is popular in Belgium, does not come into focus. An international comparison of this type of postage stamp is difficult in any case as this type of service is offered only in a more limited number of countries (and few neighbouring countries). On the other hand, Deutsche Post's study takes into account, for example, the Spanish non-priority postage stamp, since the priority postage stamp can be traced there, which is not in line with the characteristics of the national letter post traffic specified by Deutsche Post which is the subject of the analysis.
- Abstraction is made of the weight⁶ and dimension quality characteristics.
- There are occasional references to the size of a country as an underlying factor why a stamp could be cheaper, but a potentially more important element is the design/structure of a country in terms of morphology and degree of urbanization. Such issues are difficult to quantify, but could be highlighted in the study to nuance the results.
- Not only does a benchmark consist of current prices (snapshot), but the evolution of prices is also taken into account. The indicators '*price developments 2018-2023*' and '*inflation-adjusted change in letter prices 2013-2022*', however, relate to a different period and cannot be compared 1 to 1 consequently.
- The adjustment in relation to labour costs creates an incomplete picture as volumes are not taken into account. The unit costs should be taken into account rather than labour costs as such.
- Deutsche Post uses averages as a central benchmark, but as there are some outliers in the data set, it would be better to work with the median as the central measure. After all, the median is not distorted by some outliers.⁷

⁶ The BIPT therefore adds the maximum weight to this benchmark in its annual price decision itself.

⁷ This is also the adjustment introduced by the BIPT in this benchmark in its annual price decision.

3.1.2. The European Commission

19. In 2018⁸, the European Commission took the initiative to compare prices for the international shipment of certain parcel categories (and heavy letters) and to make the results available via a portal. As far as letter post items below 500 grams are concerned, the European Commission does not have any comparative material available and as far as we know there are no plans to ensure this in the future.
20. For telecom, for example, the Commission carries out an extensive comparative analysis of the prices of the national tariff plans every year. Based on that study a similar approach could be encouraged.

3.1.3. The ERGP

21. The ERGP itself does not carry out comparative studies; such a methodology does not exist at present, except for a simple display of the rates within the 'Core Indicators'⁹ annual report. If a regulator (national regulatory authority or NRA) wishes to benchmark itself, the available ERGP data regarding tariffs can be used or tariff and other information can be requested from the other NRAs by the NRA in question.
22. The ERGP could collect data in a more structured way and develop a methodology to allow NRAs to conduct their own analyses on this basis. The already existing annual Core Indicators Report seems to be the appropriate instrument to integrate this.

3.2. Data collection BIPT benchmark and consultation with postal operators

23. In view of the limited availability of international comparative studies and in the light of the imperfections in the methodology of Deutsche Post's reference study, the BIPT has launched a benchmark under its own management with the aim of checking price competitiveness in an international context.
24. First of all, a survey was sent to the ERGP members as well as to British and Swiss regulators on 16 January 2023. The following items were probed:
 - Domestic tariffs¹⁰ of the universal service provider or designated operator for each year (on 1 January) within the period 2020-2023, with regard to:
 - Priority postage stamp (20 grams and 50 grams (if applicable) or in exceptional cases 100 grams where this is the lowest threshold);
 - Non-priority postage stamp (20 grams and 50 grams (if applicable) or in exceptional cases 100 grams if this is the lowest threshold)¹¹;
 - Priority 2 kg parcel.

⁸ As of 2019, postal operators providing cross-border parcel delivery services within Europe, have to comply with the obligations resulting from the new EU Regulation 2018/644 of 18 April 2018 on cross-border parcel delivery services.

⁹ Core Indicators report 2021:

<https://ec.europa.eu/docsroom/documents/48634>

¹⁰ If a currency other than the euro is used, it was asked to use the exchange rates of 01/07/2021, as is the case for the ERGP's Core Indicators Report.

¹¹ Delivery times were sounded out as well.

- The possible existence of a compensation for a service of general economic interest (SGEI) or a net cost compensation with regard to letters or parcels. This was a simple yes/no question for the years 2020 and 2021.
25. By 2 March 2023, this resulted in information regarding 34 countries¹², with the aim of creating the widest possible benchmark of European countries.
26. The following information was also added for each country¹³:
- Per capita volume of letter post and parcels¹⁴ from the ERGP Core Indicators Report (2020 and 2021);
 - Hourly labour costs in euro coming from Eurostat (2020-2022)¹⁵;
 - Size of the country;
 - Population density of the country.
27. The addition of other data to explain the outliers such as Terrain Ruggedness Index - to take account of the country's inhospitality - was also tried out but did not provide any added value. Subsequently, together with professor Kris Boudt a methodology was developed regarding a regression analysis - a statistical technique for analysing data in which there is (possibly) a specific coherence - based on these data. The design and proposal of the methodology was then presented to operators bpost, GLS and PostNL on 26 April 2023. The aim of this meeting was to gather input and insights regarding the data intended and the model, and this with major operators who can provide insights on the drivers of distribution costs. For example, operators were specifically asked whether they have any other publicly available data that could affect the cost of distribution. Subsequently, questions were raised by the operators concerned, but no further input was provided. At the request of bpost, an additional meeting was held with them on 9 June 2023. However, before making comments, bpost would like to see detailed results first. A draft report containing the methodology as well as preliminary results was shared with bpost on 8 August 2023. Bpost's response was received on 28 September 2023. These were in particular the comments and subsequent amendments set out in Annex 5.2.

3.3. D+1 priority letter post

3.3.1. Nominal rates

28. Figure 1 below shows the nominal priority tariff of a stamp for domestic delivery within 27 European countries (where available). As the weight limit in Belgium is 50 grams, as opposed to the more common limit of 20 grams, both tariffs for 20 and 50 grams were probed and included. This results in two rates for the Netherlands, Norway (although only D+3 under section 3.4) and Portugal, one for 20 grams and one for 50 grams. We note that bpost itself, with the letter of 12 May 2022 in response to the preliminary study, indicated that the average letter processed in Belgium weighs less than 20 grams. In addition, in countries such as Switzerland, Denmark and the United Kingdom¹⁶, the weight limit is even 100 grams. In the

¹² AT, BE, BG, CH, CY, CZ, DE, DK, EE, EL, ES, FI, FR, HR, HU, IE, IT, LT, LU, LV, ME, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, TR and UK

¹³ For countries where the data was not available via Eurostat or the ERGP, this was requested from the regulator in question.

¹⁴ As the parcel segment is often more competitive, the per capita volume of the parcels was multiplied by the market share of the universal service provider or designated operator. This ultimately resulted in a more limited data set.

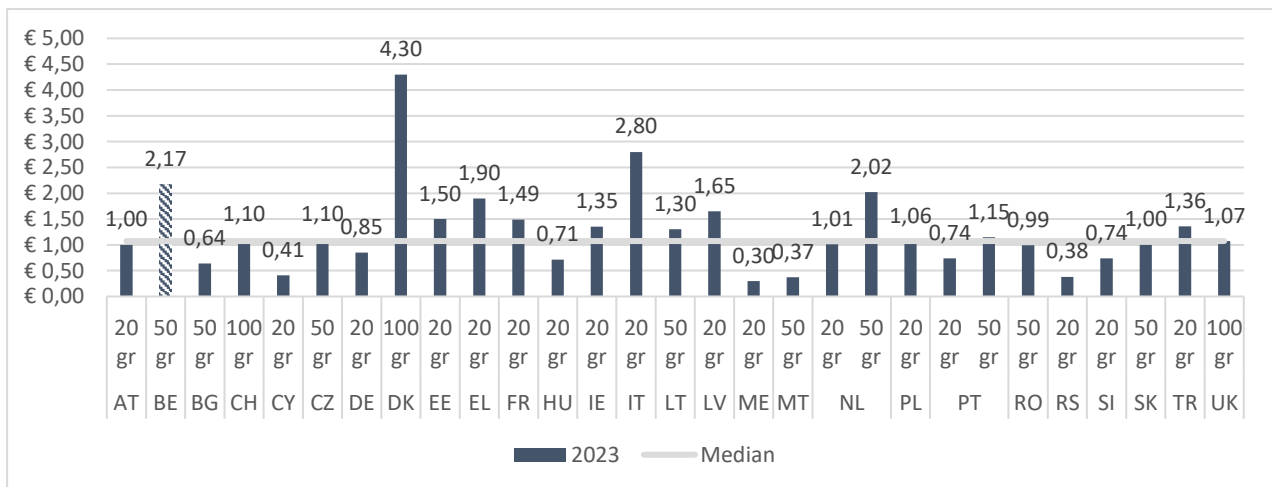
¹⁵ For CH, TR and the UK a couple of years were missing and an estimate was made based on the previous difference (ratio) compared to BE.

¹⁶ For your information, in the United Kingdom there is also a letter post delivery six days a week, including on Saturday.

absence of D+1 priority anno 2023, countries such as Croatia, Finland, Norway, Spain¹⁷ and Sweden are missing. Luxembourg is also missing, as there are no D+1 criteria to be met by Luxemburgse Post (although this is in fact a D+1 delivery). These countries are therefore not included in Figure 1, but are included in the regression analysis under Section 4, as this is the only and therefore fastest alternative to send a letter.

29. Of these 27 countries, we see that Belgium has the third highest rate in 2023. Only in Denmark and Italy do we see an even higher rate. In Denmark, the 4.3 euro outlier is partly explained by the fact that priority postage was removed from the universal service¹⁸, which also means that the rate includes VAT (at a 25% rate¹⁹). The median, represented by the grey line in Figure 1 below, for this series is 1.07 euro, which is 1.1 euro lower than the rate charged by bpost in 2023.

Figure 1. Comparison of domestic D+1 priority rates in Europe for 20 and 50 grams (nominal, 2023)



Source: BIPT

30. If we look at the rate increase of the countries, for which there was a D+1 priority stamp in both 2020 and 2023²⁰, we see that the median increase is 0.2 euro. In half of these countries, the rate increase between these two snapshots was thus below 20 euro cent. In this regard, Belgium has the second largest increase (96 euro cent), after Greece (1.18 euro). It is striking that in Denmark, with the highest priority rate, the tariff increase is 'only' 40 cent. In Italy, with the second highest rate, we do not even see an increase between 2020 and 2023. These countries already had very high D+1 tariffs in 2020.

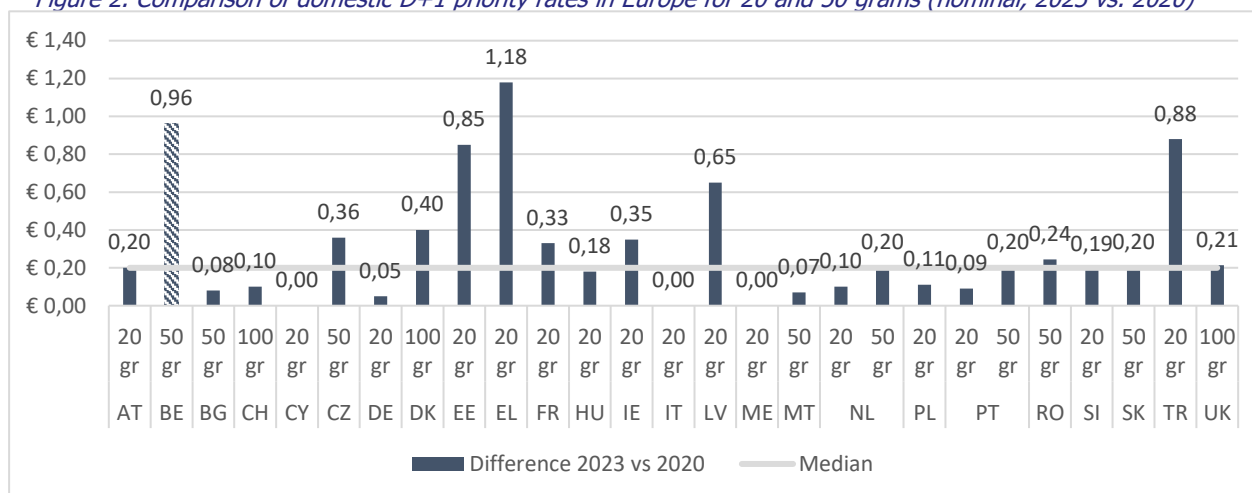
¹⁷ The priority alternative in Spain already contains a supplementary service, namely track and trace.

¹⁸ Before the abolition of the universal service in Denmark was on the table: <https://www.parcelandpostaltechnologyinternational.com/news/mail/postnord-denmark-to-end-its-universal-postal-service.html#:~:text=Due%20to%20a%20change%20in,processes%20will%20be%20carried%20out>.

¹⁹ 0.86 euro out of the 4.3 euro rate is thus VAT.

²⁰ Lithuania is missing from Figure 2 as well, as since 2023 the weight limit has been 50 grams instead of 20 grams previously.

Figure 2. Comparison of domestic D+1 priority rates in Europe for 20 and 50 grams (nominal, 2023 vs. 2020)

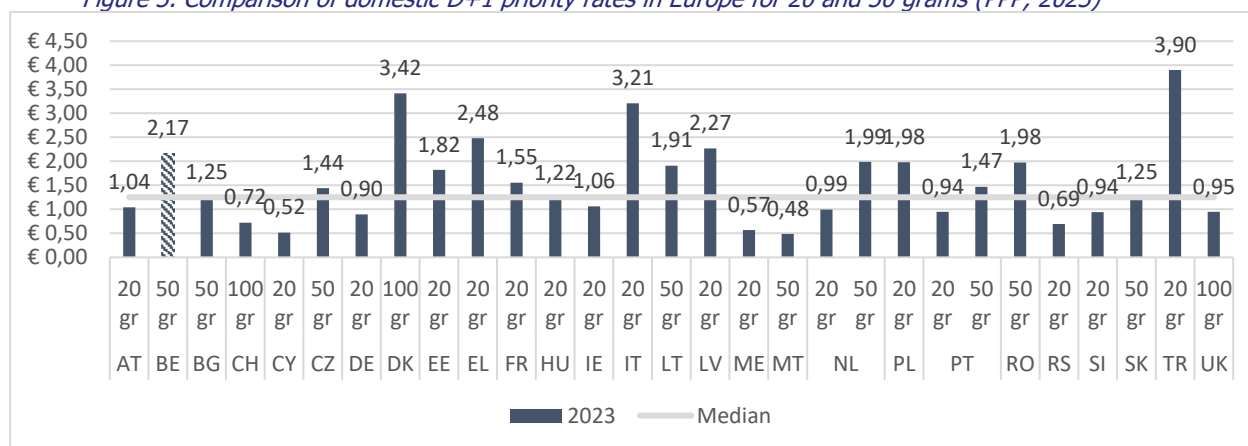


Source: BIPT

3.3.2. Rates with adjustment for purchasing power

31. If the same comparison is made in terms of purchasing power parity (PPP)²¹, thus taking into account the differences in the overall price level between countries, Belgium's ranking is seen to improve slightly. For instance, it no longer occupies the third place, but the sixth place. Turkey, Greece and Latvia also have a higher D+1 rate, i.e. after purchasing power adjustment. Nevertheless, 21 countries continue to have a lower rate. In this case, the median is 1.25 euro, or 92 cent lower than the Belgian priority rate.

Figure 3. Comparison of domestic D+1 priority rates in Europe for 20 and 50 grams (PPP, 2023)



²¹ A purchasing power parity between two countries indicates how much of one country's currency you need to spend in order to be able to purchase the same as with a unit of the currency in the other country. In this comparison, we used the Belgian purchasing power as a benchmark based on the Eurostat data for 2022 (<https://ec.europa.eu/eurostat/databrowser/view/tec00120/default/table?lang=en>)

3.4. Non-priority (> D +1) letter post

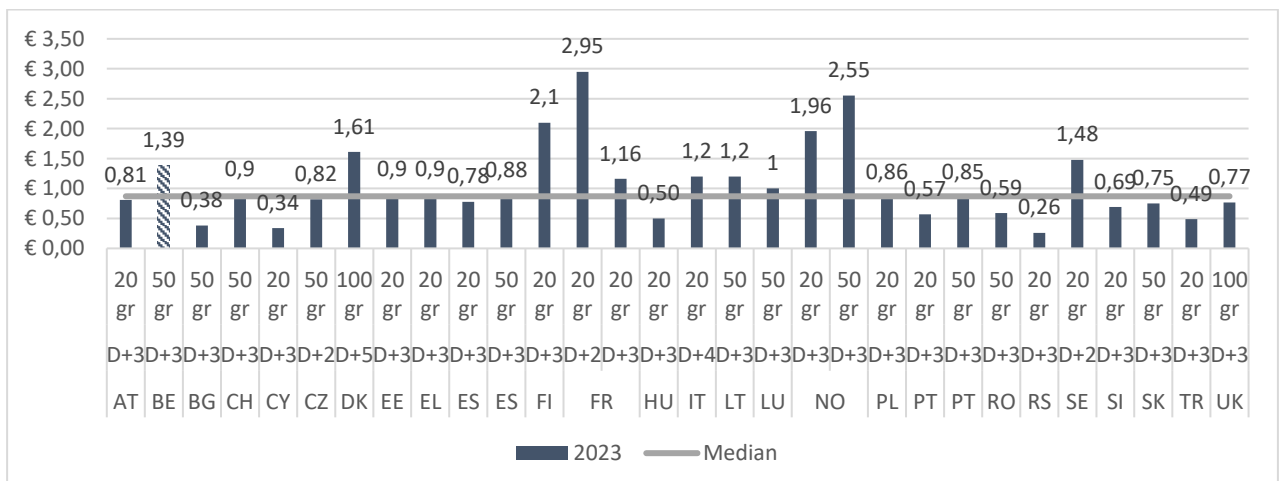
3.4.1. Nominal rates

32. In this section, specific attention is paid to the rates of domestic stamps with a maximum delivery time of more than one working day. Although Norway (D+3), Finland and Sweden (both D+2) indicated that they actually label their stamps as priority postage, we still include them in this section since the delivery time is more than one working day. As a reminder, we also include the Luxembourg stamp here, because there is no D+1 (but a D+3) requirement, although D+1 is the reality in practice. This way we arrive at 28 countries and 30 tariffs (in Norway there are two weight classes (20 and 50 grams) and in France two non-priority speeds (currently D+2 and D+3)).

33. The most common non-priority postage stamp is clearly the one with a delivery time of three working days maximum (D+3). In the Czech Republic and Sweden this is D+2, while in France D+2 can be opted for in addition to a D+3. Deviations in the other direction can be found in Denmark (D+5) and Italy (D+4).

34. The Belgian non-priority postage (50 grams, D+3 at 1.39 euro) is the seventh highest rate in Figure 4. Higher in the ranking is the 20 grams, D+2 from France (at 2.95 euro), the 20 grams, D+3 from Norway (at 1.96 euro), the 50 grams, D+3 from Norway (at 2.55 euro), the 20 grams, D+3 from Finland (at 2.1 euro), the 100 grams, D+5 from Denmark (at 1.61 euro) and the 20 grams, D+2 from Sweden (at 1.48 euro). The median for this series is 0.87 euro. The complexity due to differences in, for example, delivery times and weight already indicate the need for a regression analysis in order to achieve a correct comparison.

Figure 4. Comparison of domestic non-priority rates (> D+1) in Europe for 20 and 50 grams (nominal, 2023)

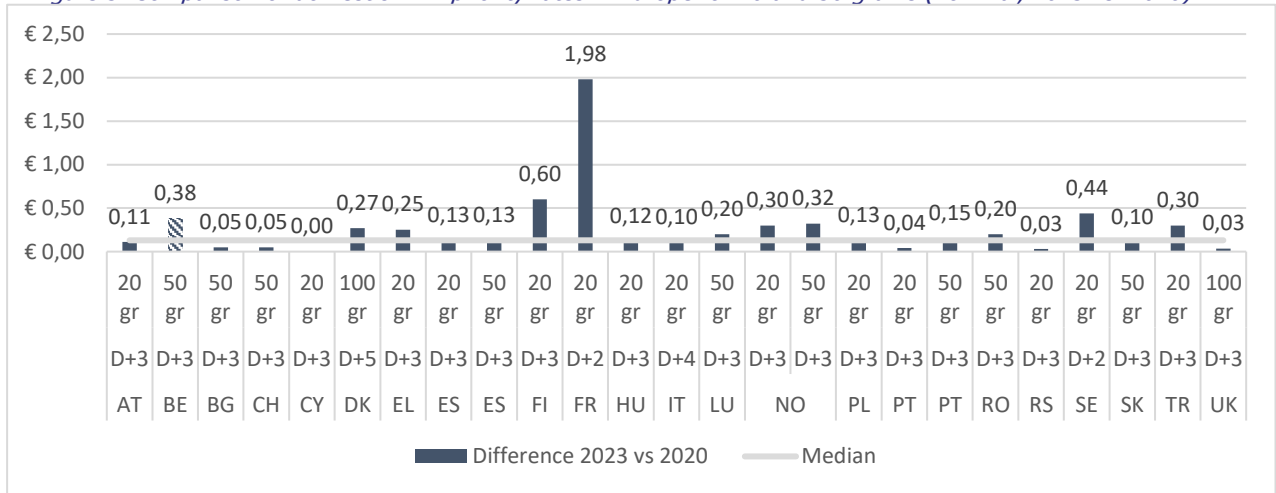


Source: BIPT

35. When we compare the rates of 2023 with those of 2020 in Figure 5, as we did before for the priority postage stamp, we notice that the increases are more moderate. For instance, the median is 'only' 0.13 euro. That is not illogical, as non-priority letter post is being placed on the market more and more often to counter the increasing cost of distribution (due to generally decreasing letter volumes). Volumes can be bundled over several days in this way. The obvious outlier here is the D+2 in France, which experienced an increase of almost 2 euro (1.98 euro to be exact) between 2020 and 2023. This D+2 essentially takes over the role of a (physical)

priority delivery, given that from 2023 the D+1 (at 1.49 euro) concerns a hybrid item, sent electronically to be printed and distributed locally. After Finland (+0.6 euro), Sweden (+0.44 euro), Belgium (+0.38 euro) has the fourth biggest increase.

Figure 5. Comparison of domestic D+1 priority rates in Europe for 20 and 50 grams (nominal, 2023 vs. 2020)

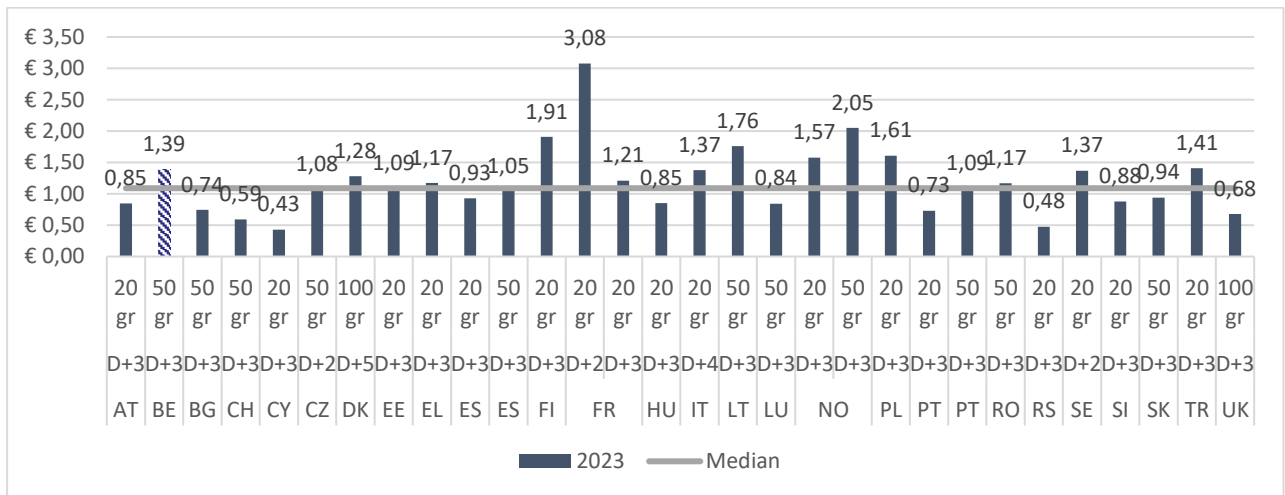


Source: BIPT

3.4.2. Rates with adjustment for purchasing power

36. The purchasing power parity adjustment yields a limited difference, swapping the seventh for the eighth position. In this case, the median increases from 0.87 euro to 1.09 euro however. Yet, the Belgian non-priority rate is still 30 cent higher than this median.

Figure 6. Comparison of domestic non-priority rates (> D+1) in Europe for 20 and 50 grams (PPP, 2023)



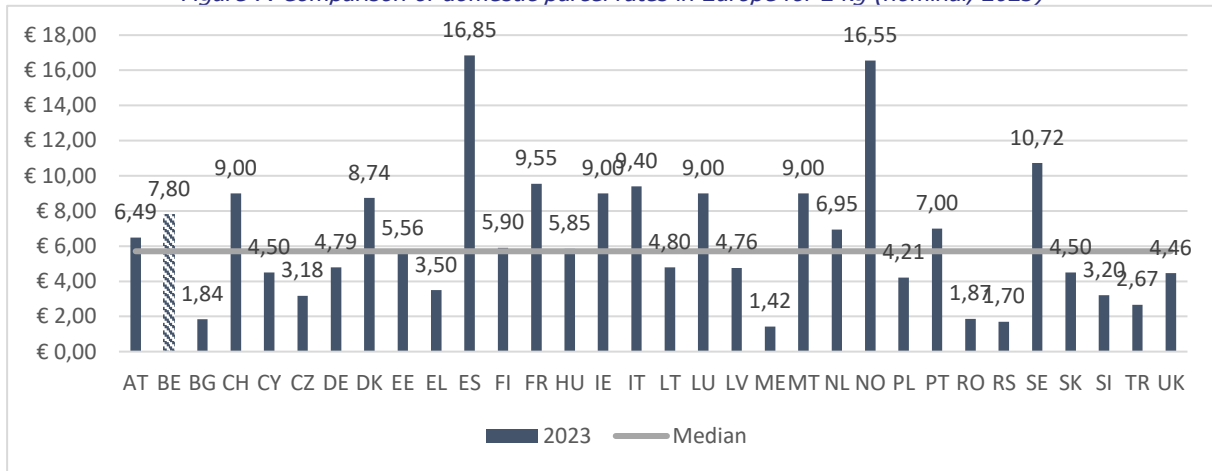
Source: BIPT

3.5. 2 kg parcels

3.5.1. Nominal rates

37. For a domestic 2 kg parcel, we see very different rates in nominal terms^{22,23}, ranging from 1.42 euro in Montenegro to 16.85 euro in Spain. Within this group of 32 countries, the Belgian rate is the eleventh highest. With 7.8 euro²⁴, bpost is just over 2 euro above the median of 5.71 euro.

Figure 7. Comparison of domestic parcel rates in Europe for 2 kg (nominal, 2023)

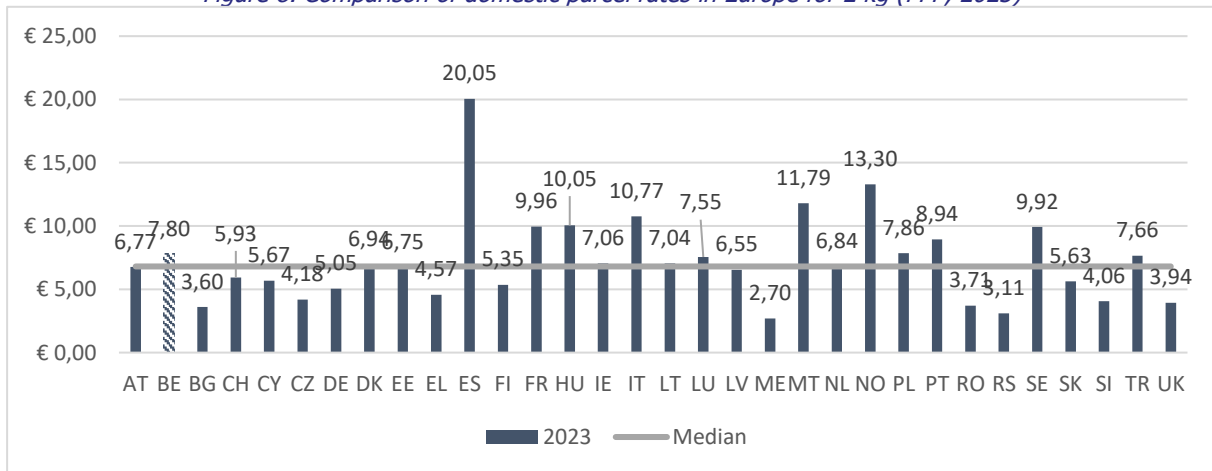


Source: BIPT

3.5.2. Rates with adjustment for purchasing power

38. Taking into account the differences in purchasing power, the discrepancy between the two extremes remains. The median (6.81 euro) is certainly approaching the rate of bpost (7.8 euro) whose rate in this list ranks tenth.

Figure 8. Comparison of domestic parcel rates in Europe for 2 kg (PPP, 2023)



Source: BIPT

²² AGCOM indicated that the Italian tariff had yet to be approved.

²³ These strongly varying tariffs also make it difficult to compare the tariff increases between 2020 and 2023.

²⁴ Purchased at the counter and upon delivery of the parcel at home, this rate can be reduced further by purchasing the label online and choosing delivery at a postal point.

3.6. Conclusion

39. The BIPT notes that in 2023, compared to the European countries examined, the rates in Belgium:

- are the third highest in nominal terms for the domestic priority postage stamp;
- are ranked seventh for the non-priority postage stamp;
- rank eleventh for a 2 kg domestic parcel.

40. When the difference in purchasing power between the various countries is neutralised, the Belgian situation improves a little in most cases, resulting in a sixth, eighth and tenth place respectively. In relative terms the difference with the median, which bpost exceeds in each case, is also the biggest for the priority postage stamp.

4. Regression analysis

4.1. Introduction

41. This section discusses the robust regression analysis performed by Mr Kris Boudt, Finance and Econometrics Professor at Ghent University, Vrije Universiteit Brussel and Vrije Universiteit Amsterdam. The general research question to which an answer was sought was: are postal tariffs in Belgium at a level comparable to that of other European countries when taking into account country-specific characteristics that may affect postal tariffs?
42. A data-based answer to this question requires a methodology that allows this international comparison to be carried out and in this way to put the price increases, in particular with regard to stamps, in perspective. Specifically, it concerns the domestic rates of priority and non-priority stamps (20, 50 and in some cases 100 grams). The comparison takes place in the base set, as clarified in Section 3.2 and Annex 5.2 which deals with the data collection, against the EU27 countries and the United Kingdom, and takes into account differences between countries in volume per capita, average hourly labour costs, differences in delivery time and allowed maximum weight, the area and population density of the country.
43. Comparable research on determinants of postal tariffs in Europe is scarce. Claes and Vergote (2015) investigate determinants of price differences between countries for parcel mail. Deutsche Post (2023) publishes the nominal rates of a stamp in the various EU countries. This shows that Belgium has the third highest rate in 2023 for a priority postage stamp (2.17 euro), and has a higher rate than its neighbours Germany (0.85 euro), France (1.43 euro)²⁵, Luxembourg (1 euro) and the Netherlands (1.01 euro). The study also indicates that higher labour costs in Belgium may explain the higher rate in Belgium.
44. This study aims to propose a methodology for comparing postal tariffs. The proposed methodology is based on the assumption that postal tariffs reflect cost and mark-up, and that their determinants affect prices in a similar way in the sample. In this way, an assessment can be made of whether a tariff is divergent in a particular country.
45. The methodology is based on a longitudinal regression analysis. Such a regression analysis requires a specification of the model as well as an estimation method to arrive at a calibration of the regression coefficients. A focus is on the presence of outliers in the tariffs for which the declaration is country-specific, such as a country with difficult delivery conditions due to the presence of many islands and/or mountainous areas.
46. These outliers have a great influence on the classical least squares estimator, which tries to describe all observations as best as possible (including the outliers). The solution is to work with robust regression methods, where the calibration of the regression parameters aims to achieve the best possible description of the majority of the data points. This technique of robust regression is completely data-driven.
47. The analysis discussion and the results are limited to the (priority and non-priority) letter item, because the complexity of the parcel segment requires additional data. For example, the national per capita volume should be adjusted for the market share of the universal service provider in each individual country. However, this information is not publicly available in all areas. Indeed, unlike the letter post segment, the market share of the universal service provider within the more competitive parcel segment varies considerably from country to country. When looking at 2021, however, both the possible explanatory variables 'labour cost' and 'population density' were found to be significant. This opens the door for further examination in this direction.

²⁵ Since 2023, this regards a hybrid priority delivery in France (digitally transmitted, locally printed and distributed).

48. The structure of this analysis is as follows:

- Section 4.2 shows the data and discusses the evolution in rates without taking account of the explanatory variables;
- Section 4.3 gives an overview of the above variables;
- Section 4.4 describes the regression model and estimation method;
- Section 4.5 shows the results;
- Section 4.6 gives the conclusion.

4.2. The variable to be explained: priority and non-priority postage stamp rate for the years 2020 to 2023 included

49. In Table 1 below we give an overview of the evolution of the rates for the priority and non-priority postage stamp for the years 2020 to 2023 included.

50. We already see strong heterogeneity in tariff adjustments for priority and non-priority postage stamps. This indicates that determinants and/or exposures to those determinants differ between the two types of postage stamps. We will therefore use a separate model for the respective types. A possible explanation for the difference is that in Belgium priority items are subject to a separate distribution route every other working day.²⁶

Table 1. Tariff evolution domestic priority and non-priority postage stamp in Belgium

	2020	2021	2022	2023
Priority tariff Belgium (EUR)	1.21	1.60	1.89	2.17
<i>Year-on-year relative increase</i>		32.23%	18.13%	14.81%
<i>Cumulative increase since 2020</i>		32.23%	56.20%	79.34%
Non-priority tariff Belgium (EUR)	1.01	1.10	1.19	1.39
<i>Year-on-year relative increase</i>		8.91%	8.18%	16.81%
<i>Cumulative increase since 2020</i>		8.91%	17.82%	37.62%

Source: BIPT / Editor: Kris Boudt

51. On the basis of only the Belgian data, we do not have enough information. The working hypothesis is that the pricing system in Belgium follows a model common to the one used in the - former - EU28 countries (the choice for EU27 with the addition of the United Kingdom is discussed in Annex 5.2). We therefore extend the tariff data for Belgium for priority and non-priority postage stamps to those of the comparable products in those countries.

52. Within this selection²⁷ we see that Belgium belongs to the group of countries with higher nominal values for the postage stamp for both priority and non-priority: the fourth highest rate for priority in 2023 (after the partly mountainous or island-rich countries DK, FI, IT) and also the fourth highest rate for non-priority.

²⁶ The bpost 'coureg' round with all items (except the newspapers already delivered in the early morning), both priority and non-priority, takes place only on alternating working days (per zone). For priority items, specific point-to-point distribution routes must therefore be carried out on the intermediate working days.

²⁷ In this context, some postage stamps with a delivery time of more than one working day have also been added in the priority analysis, as is the case for example in Spain and Finland, considering that this is the only alternative. This explains why, for example, Belgium ranks fourth (following not only Denmark and Italy but also Finland) in this list, compared to third place in the comparison above.

Table 2. Value and ranking of rates for priority and non-priority stamps in the EU28 countries in 2020 and 2023

	prior.2020	rank	prior.2023	rank	nonprior.2020	rank	nonprior.2023	rank
AT	0.800	15	1.000	17	0.700	12	0.810	15
BE	1.210	5	2.170	4	1.010	5	1.390	4
BG	0.560	25	0.640	26	0.330	23	0.380	23
CY	0.410	28	0.410	27	0.340	22	0.340	24
CZ	0.740	20	1.100	13	NA	NA	0.820	14
DE	0.800	15	0.850	21	NA	NA	NA	NA
DK	3.900	1	4.300	1	1.340	2	1.610	2
EE	0.650	22	1.500	8	NA	NA	0.900	9
EL	0.720	21	1.900	6	0.650	14	0.900	9
ES 1	0.650	22	0.780	22	0.650	14	0.780	16
ES 2	NA	NA	NA	NA	0.750	9	0.880	11
FI	3.000	2	3.670	2	1.500	1	2.100	1
FR 1	1.160	6	NA	NA	0.970	6	NA	NA
FR 2	NA	NA	NA	NA	NA	NA	1.160	7
FR 3	NA	NA	NA	NA	0.950	7	NA	NA
HR	0.870	13	NA	NA	0.410	19	NA	NA
HU	0.530	27	0.711	25	0.380	21	0.497	22
IE	1.000	8	1.350	10	NA	NA	NA	NA
IT	2.800	3	2.800	3	1.100	3	1.200	5
LT 1	NA	NA	1.300	11	0.490	18	NA	NA
LT 2	NA	NA	NA	NA	NA	NA	1.200	5
LU	0.800	15	1.000	17	0.800	8	1.000	8
LV	1.000	8	1.650	7	NA	NA	NA	NA
MT	0.300	29	0.370	28	NA	NA	NA	NA
NL 1	0.910	12	1.010	16	NA	NA	NA	NA
NL 2	1.820	4	2.020	5	NA	NA	NA	NA
PL	0.950	10	1.060	15	0.730	11	0.860	12
PT 1	0.650	22	0.740	23	0.530	17	0.570	21
PT 2	0.950	10	1.150	12	0.700	12	0.850	13
RO	0.750	19	0.995	20	0.390	20	0.589	20
SE	1.040	7	1.480	9	1.040	4	1.480	3
SI	0.550	26	0.740	23	NA	NA	0.690	19
SK	0.800	15	1.000	17	0.650	14	0.750	18
UK	0.859	14	1.073	14	0.735	10	0.768	17

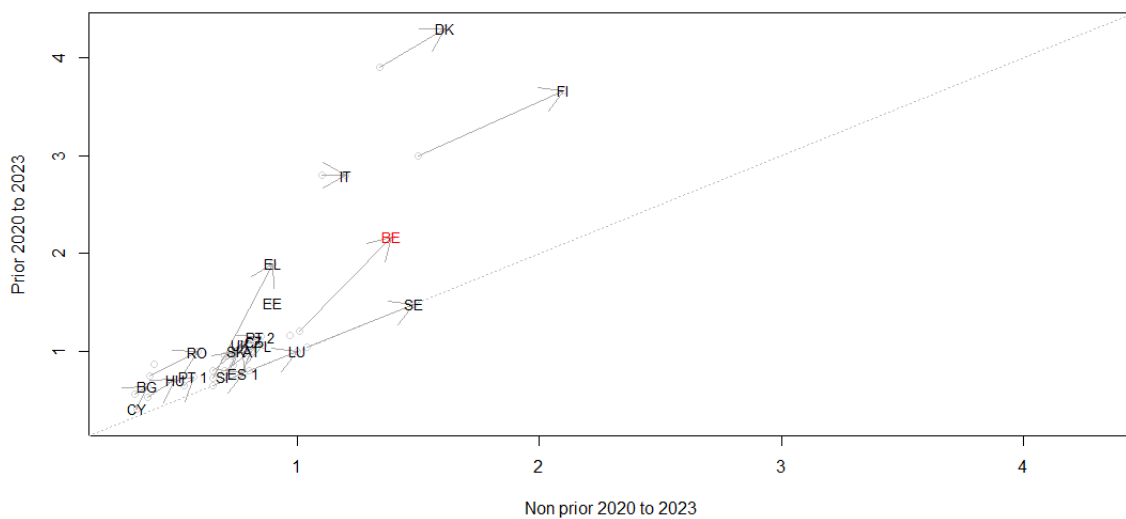
Source: BIPT / Editor: Kris Boudt

53. In the figures below we show the link between the evolution of priority and non-priority postage for the countries where the rates are available for both 2020 and 2023. We show the evolution in two ways.

54. First we present in Figure 9 the initial situation in 2020 and the final situation in 2023 per country, and we connect those points with an arrow. The countries that position themselves on the first bisector, being the 45° line departing from the origin, are the countries for which the prices of the priority and the non-priority postage stamp increased in the exact same way between 2020 and 2023 (in terms of percentage). Where the gradient is higher than 45° (as in Belgium), the rate for priority postage stamps has increased relatively more than that of non-priority, and vice versa in case the gradient is lower than 45°. Next, in Figure 10, we present the relative price change as well. Finally, we will examine whether there is a link between the initial rate and the relative price increase. In case of convergence in tariffs, you would expect low tariffs to increase more than high rates.

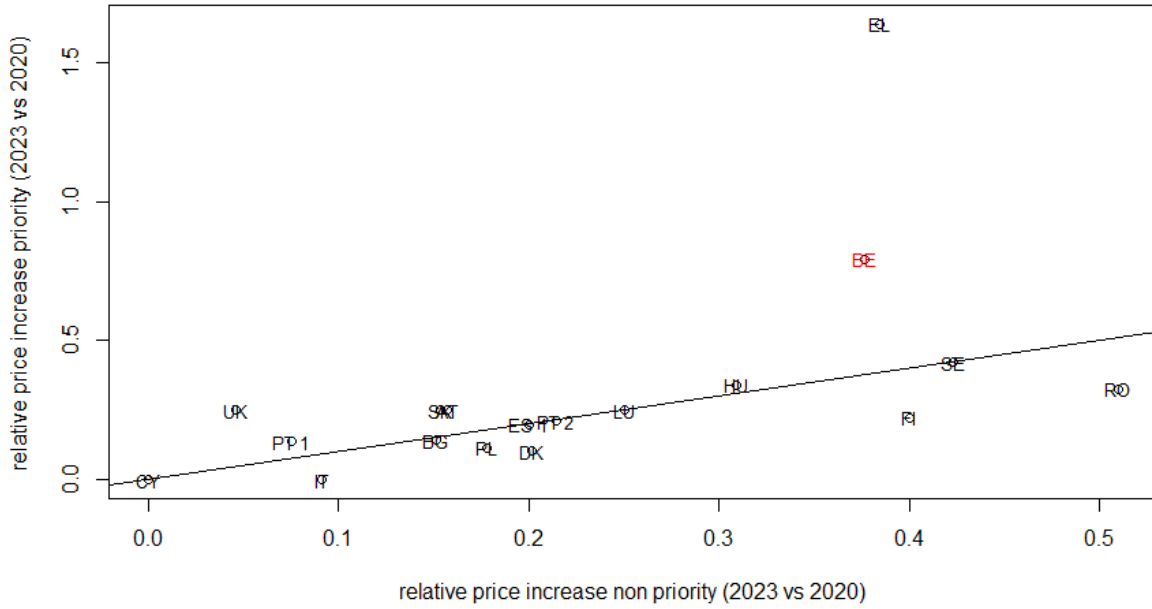
55. It is noteworthy that there is heterogeneity between the countries examined, and that the strong relative increases in the priority rate versus the non-priority rate are rather an exception in the European context. Only Estonia (EE, 130.8%) and Greece (EL, +163.9%) have a higher relative priority price increase than Belgium (79.3%). For Greece this can be seen as a potential catch-up due to initially low rates (rank 21), whereas Belgium already had one of the highest rates in 2020. This should be further clarified by means of a regression analysis to take account of explanatory factors.

Figure 9. Link between the evolution of prices of priority and non-priority stamps in 2020 and 2023 in a European comparative perspective



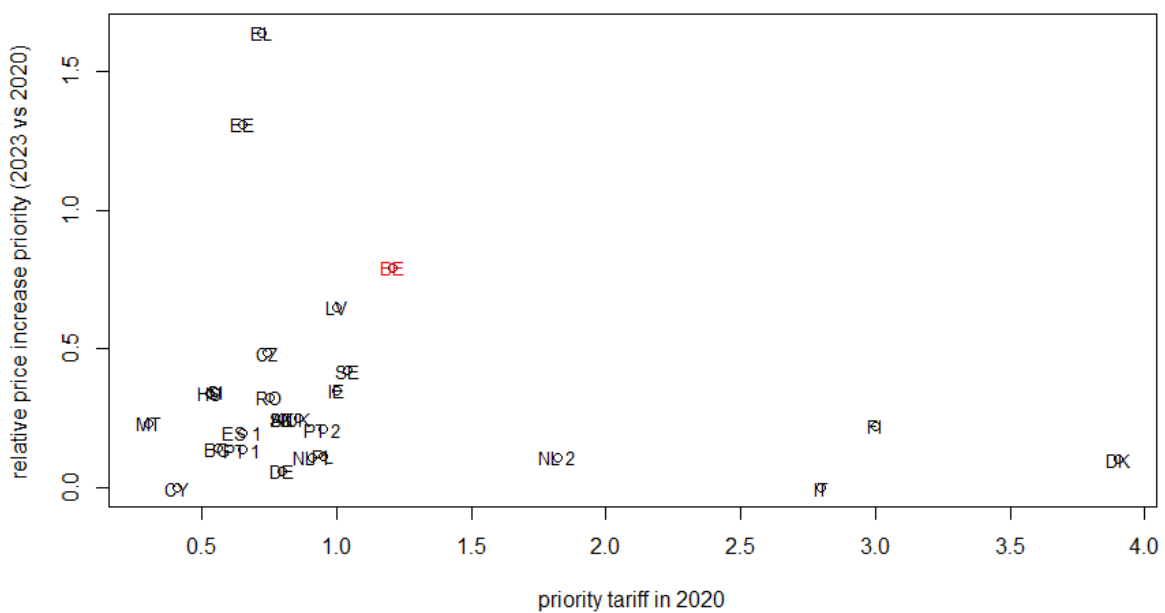
Source: BIPT / Editor: Kris Boudt

Figure 10. Relative price increase for priority and non-priority postage stamps in 2020 and 2023 from a European comparative perspective



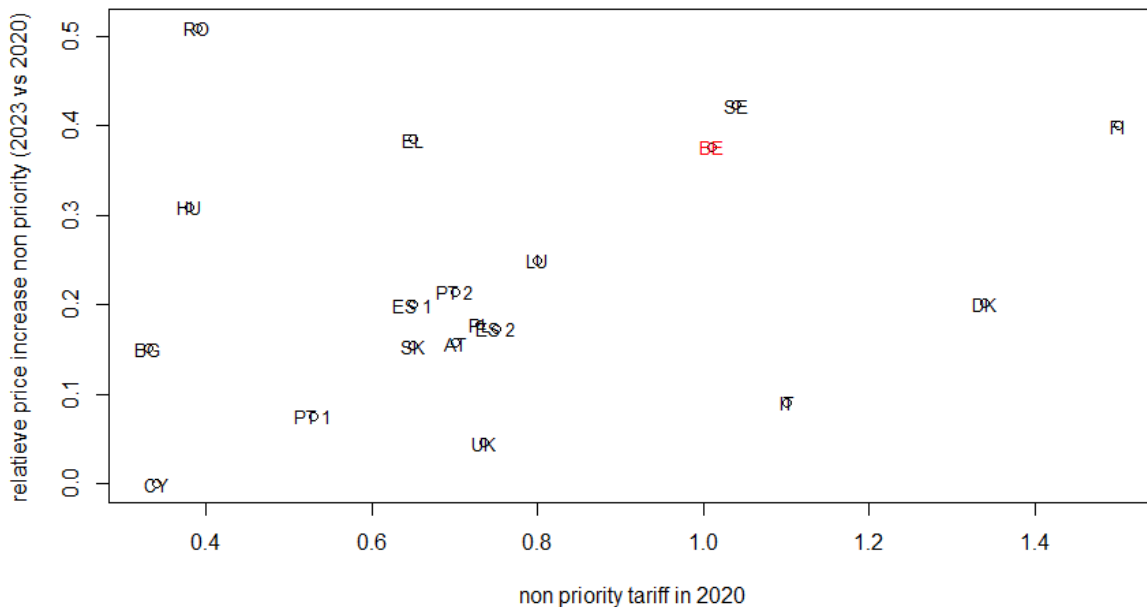
Source: BIPT / Editor: Kris Boudt

Figure 11. Relative price increase of priority postage stamps between 2020 and 2023 versus initial rate from a European comparative perspective



Source: BIPT / Editor: Kris Boudt

Figure 12. Relative price increase of *non-priority* postage stamps between 2020 and 2023 versus initial rate from a European comparative perspective



Source: BIPT / Editor: Kris Boudt

4.3. Possible explanatory variables

56. The exploratory analysis of the tariffs shows that there are differences between countries. This was expected as there are also differences in, inter alia, volumes and labour costs. We will account for these via a multivariate regression model to then check whether nominal rates differ "inexplicably" much from what the model predicts.

57. The price of a postage stamp corresponds to the price of the service requested. This rate is the sum of the cost of the service and the mark-up. For a country i and year t :

$$Tariff_{i,t} = Unit\ Cost_{i,t} + Markup_{i,t}$$

58. In our analysis, we consider the variables, which can explain the unit cost and mark-up, and via regression we look at what rate can be expected based on what the data indicate to be common in the broad sample of countries considered. More specifically, this means estimating the regression coefficients, which provide the best prediction of rates on the basis of a data-driven criterion.

4.3.1. Variables included

59. As discussed in Annex 5.2, we will focus on the following publicly available data for the EU27 countries plus the United Kingdom:

- The volume per capita derived from ERGP core indicators (available for 2020 and 2021, extrapolated for 2022 and 2023);
- The average hourly labour cost per hour from Eurostat (available for 2020 to 2022 included, extrapolated for 2023);
- The maximum weight allowed for the delivery as well as the delivery time;
- The area and population density of the various countries.

60. Inspection of the data shows that Belgium presents a mixed picture in terms of cost for the determining variables. Belgium has the third highest labour cost per hour, which could explain a higher rate. However, it is also the country with the sixth highest volume per capita and third highest in terms of population density, which could justify a lower rate.

Table 3. Value and rank of labour cost, population density and size of the country, EU27 expanded to the UK in 2023

	Labour cost	rank	Vol.per.cap	rank	Pop.Dens	rank	Size.Country	rank
AT	37.0	11	148.0	4	104.6	16	83858	18
BE	41.0	3	137.0	6	372.1	4	30510	30
BG	7.1	34	4.0	32	64.0	28	110912	14
CY	18.0	19	35.0	24	92.4	21	9250	32
CZ	15.0	22	35.0	24	134.1	9	78866	19
DE	37.4	10	163.0	3	231.1	6	357021	7
DK	45.7	2	50.0	19	133.4	10	43094	27
EE	15.0	22	NA	NA	27.7	32	45339	26
EL	14.0	25	18.0	29	82.0	25	131940	13
ES 1	22.9	16	37.0	22	92.2	22	504782	4
ES 2	22.9	16	37.0	22	92.2	22	504782	4
FI	35.1	12	276.0	1	16.3	34	337030	8
FR 1	39.3	5	118.0	9	104.1	17	643548	1
FR 2	39.3	5	118.0	9	104.1	17	643548	1
FR 3	39.3	5	118.0	9	104.1	17	643548	1
HR	11.2	31	56.0	15	73.4	26	56594	24
HU	10.3	32	53.0	16	105.3	15	93030	15
IE	34.7	13	48.0	20	68.1	27	70280	20
IT	28.8	14	39.0	21	201.1	8	301320	10
LT 1	11.6	27	17.0	30	43.7	29	65200	21
LT 2	11.6	27	17.0	30	43.7	29	65200	21
LU	48.4	1	241.0	2	228.4	7	2586	33
LV	11.3	30	24.0	27	30.2	31	64589	23
MT	13.0	26	58.0	14	1456.6	1	316	34
NL 1	38.2	8	118.0	9	411.3	2	41526	28
NL 2	38.2	8	118.0	9	411.3	2	41526	28

PL	11.5	29	29.0	26	121.4	11	312685	9
PT 1	15.4	20	52.0	17	110.9	13	92931	16
PT 2	15.4	20	52.0	17	110.9	13	92931	16
RO	8.5	33	20.0	28	82.4	24	238391	12
SE	40.8	4	144.0	5	22.7	33	450295	6
SI	22.0	18	131.0	8	102.0	20	20253	31
SK	14.5	24	NA	NA	111.3	12	48845	25
UK	26.1	15	135.3	7	281.0	5	243610	11

Source: BIPT / Editor: Kris Boudt

4.3.2. Policy variables

61. Variables such as the size of the country, population density, and the average hourly labour cost in a country are clearly exogenous and are not affected by the postal distribution tariff. The postal distribution volume and tariff are in principle endogenous by the laws of supply and demand, but that effect is diminished as there is higher consumer inelasticity and volume change is more likely to be driven by structural societal trends and technology (e.g. digitization).
62. In terms of policy variables, Belgium belongs to the group of countries in which the State is a shareholder of bpost. Furthermore, Belgium has introduced services of general economic interest (SGEI in short) and there is both a priority and a non-priority postage tariff.

4.4. Model and estimation method

4.4.1. Specification

63. As a dependent variable, we work with prices in EUR, observed for the different countries over the period 2020 to 2023. An alternative is to work with the log-transformed tariff data²⁸, but then we lose the more direct and intuitive interpretation in terms of impact on tariffs in EUR. Another alternative is to work with the change in rates, but then there is no clear link to the research question whether the rate is not different from a comparative perspective.
64. Finally, we could also do the analysis for each year separately and thus carry out a cross-sectional analysis. The disadvantage here is that we then have a limited number of degrees of freedom for the estimation. A detailed analysis of the conditions to arrive at a causal interpretation of the effects of the variables is beyond the scope of this study. The research question of whether or not the rate is divergent, is a predictive question and we will work with estimation criteria that ensure that we make that prediction as well as possible.

²⁸ The log transformation can be useful when the relationship between tariff and the variables is non-linear. For example, if the predicted rate is equal to $\exp(\beta_1 X_{i,t} + \beta_2 X_{i,t})$ or to $X_{i,t}^{\beta_1} X_{i,t}^{\beta_2}$ then a log transformation would lead to $\beta_1 X_{i,t} + \beta_2 X_{i,t}$ and $\beta_1 \log(X_{i,t}) + \beta_2 \log(X_{i,t})$, respectively. It also typically causes the error terms to be more homoscedastic (constant variance) and their distribution to be closer to a normal distribution. The latter two properties are particularly important for the statistical inference based on a regression model. The focus of the analysis in this text is on prediction accuracy however.

65. We make the assumption that the model remains the same throughout the entire period 2020 to 2023. Under this assumption we can use the annual data for the different countries together and thus arrive at a more efficient estimate. However, we should take into account that there are year effects. We do this using a dummy variable²⁹ for 2021, 2022 and 2023. The reference period is 2020. The coefficient for these dummy variables then measures the average total price increase compared to 2020.
66. Because of the high skewness³⁰ in terms of the variables surface area and population density of the various countries, we do apply the log transformation there. Their coefficients can then be interpreted as a semi-elasticity.

The reference model for the priority rate in country i in year t is:

$$\begin{aligned} \text{TariffPriority}_{i,t} = & \beta_0 + \beta_1 Y2021_t + \beta_2 Y2022_t + \beta_3 Y2023_t + \beta_4 \text{max.weightPriority}_{i,t} + \\ & \beta_5 \text{deliverytimePriority}_{i,t} + \beta_6 \text{volumepercapita}_{i,t} + \beta_7 \text{labourcostperhour}_{i,t} + \\ & \beta_8 \log(\text{country size in km}^2)_{i,t} + \beta_9 \log(\text{populationdensity})_{i,t} + \varepsilon_{i,t}. \end{aligned}$$

67. The last term is the error term $\varepsilon_{i,t}$ that corresponds to the deviation between the effective rate and the predicted rate. The model is an approach that serves to be used predictively: what is the expected rate given its characteristics? Although a causal interpretation of the effects of the variables is not recommended, we can nevertheless formulate an intuition about the regression parameters. The intuition regarding the sign (positive or negative) of the regression parameters is as follows:

- $\beta_3 > \beta_2 > \beta_1 > 0$: The average increase in rates in 2023, 2022, 2021 versus 2020. These should be positive and increase over time to capture the impact of inflation, *ceteris paribus*.
- $\beta_4 > 0, \beta_5 < 0$: Rate increases on average if a larger weight is allowed, and decreases when the delivery time is longer, *ceteris paribus*.
- $\beta_6 < 0$: countries with higher per capita volume should on average charge a lower rate, *ceteris paribus*.
- $\beta_7 > 0$: countries with higher hourly labour costs should on average charge in the form of a higher rate, *ceteris paribus*.
- $\beta_8 > 0, \beta_9 < 0$: countries in which longer distances have to be travelled per customer have on average a higher rate, and thus a positive (or negative) impact of scale (resp. population density) on the rate of a postage stamp, *ceteris paribus*.

68. The model and interpretation of the coefficients for non-priority shall be analogous:

$$\begin{aligned} \text{TariffNonPrior}_{i,t} = & \gamma_0 + \gamma_1 Y2021_t + \gamma_2 Y2022_t + \gamma_3 Y2023_t + \\ & \gamma_4 \text{max.weightNonPriority}_{i,t} + \gamma_5 \text{deliverytimeNonPriority}_{i,t} + \gamma_6 \text{volumepercapita}_{i,t} + \\ & \gamma_7 \text{labourcostperhour}_{i,t} + \gamma_8 \log(\text{country size in km}^2)_{i,t} + \gamma_9 \log(\text{populationdensity})_{i,t} + \\ & u_{i,t}. \end{aligned}$$

69. Expected effects:

- $\gamma_3 > \gamma_2 > \gamma_1 > 0$: increase prices due to inflation
- $\gamma_4, \gamma_7, \gamma_8 > 0$: greater permissible weight and higher labour costs and distances result in higher rates, *ceteris paribus*.

²⁹ A dummy variable is an indicative variable that can take a value of 0 or 1. A value of 0 means 'not present' or 'not applicable' and a value of 1 means 'applicable' or 'present'.

³⁰ This is a measure of the asymmetry of a distribution, which indicates whether the values are evenly situated around the average or whether there is more deviation to the left or right.

- $\gamma_5, \gamma_6, \gamma_9 < 0$: longer delivery times allowed, higher volumes and high population density ensure lower prices on average, *ceteris paribus*.

70. We have a different model for priority and non-priority, which corresponds to the reality that postal distribution and cost impact of variables vary. For example, priority deliveries can take place via separate routes, which has an impact on costs.

71. In the regression model above the regression parameters are unknown. By estimation we find the values of the coefficients that are most plausible. This is done in a data-driven manner through the optimization of an estimation criterion. The technical section as Appendix 5.3 discusses this in detail.

4.5. Alternative models to take into account the policy variables

72. For both priority and non-priority, we consider three alternative models each time.

73. For priority, we have:

- Model 1: reference model as defined above
- Model 2: reference model as defined above, but applied only to countries with a universal service provider of which the State is a shareholder
- Model 3: reference model extended with dummy variable SGEI
- Model 4: a model in which the priority rate depends on the non-priority rate. The reason for adding this model 4 is the finding that the largest volume of postal distribution in Belgium consists of non-priority. The model is as follows:

$$\begin{aligned} \text{TariffPriority}_{i,t} = & \beta_0 + \beta_1 \text{TariffNonPrior}_{i,t} + \beta_2 (\text{max.weightPriority}_{i,t} - \\ & (\text{max.weightNonPriority}_{i,t})) + \beta_3 (\text{deliverytimeNonPriority}_{i,t} - \\ & \text{deliverytimePriority}_{i,t}) + \beta_4 Y2021_t + \beta_5 Y2022_t + \beta_6 Y2023_t + a_{i,t}. \end{aligned}$$

74. Expected effects in the models considered:

- $\beta_1 > 1$: The priority rate is on average higher than the non-priority rate, *ceteris paribus*.
- $\beta_2 > 0$: greater permissible weight for priority than non-priority in the same country results on average in a higher rate for priority, *ceteris paribus*.
- $\beta_3 > 0$: the greater the difference in delivery time between non-priority and priority, the higher the cost for priority, on average, *ceteris paribus*.
- $\beta_4, \beta_5, \beta_6$: these coefficients look into the existence of year-on-year effects

75. For the analysis of the non-priority rates, we use the following models:

- Model 1: reference model as defined above
- Model 2: reference model as defined above, but applied only to countries with a universal service provider of which the State is a shareholder
- Model 3: reference model extended with dummy variable SGEI
- Model 4: reference model extended with dummy variable for the presence of a priority tariff in that country.

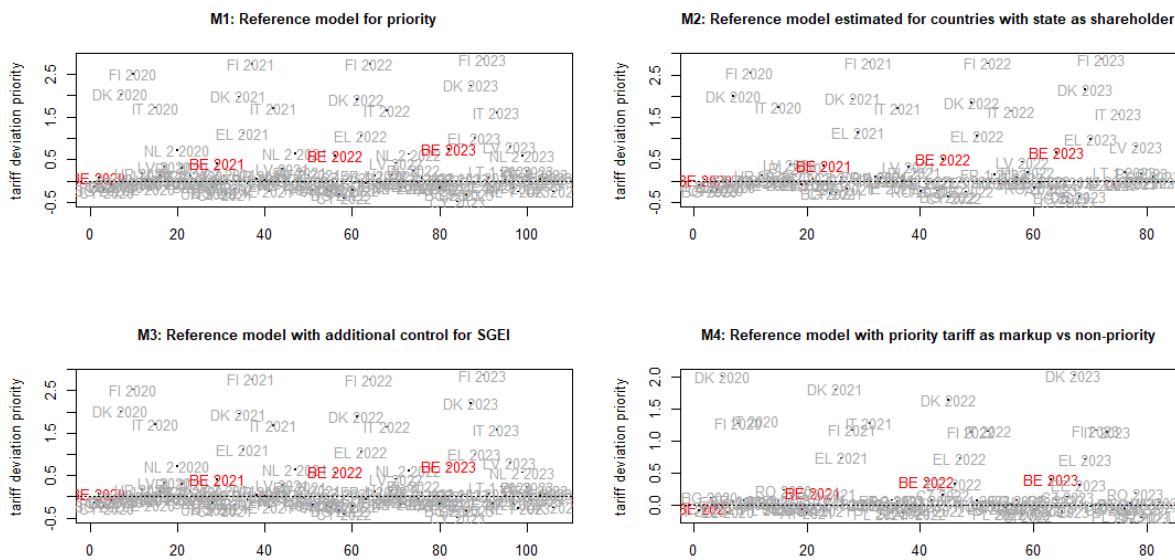
76. The estimated regression models are discussed in detail in the technical section as Annex 5.4.

4.6. Outcomes

4.6.1. Deviations between the nominal rates and values predicted by the model for all countries

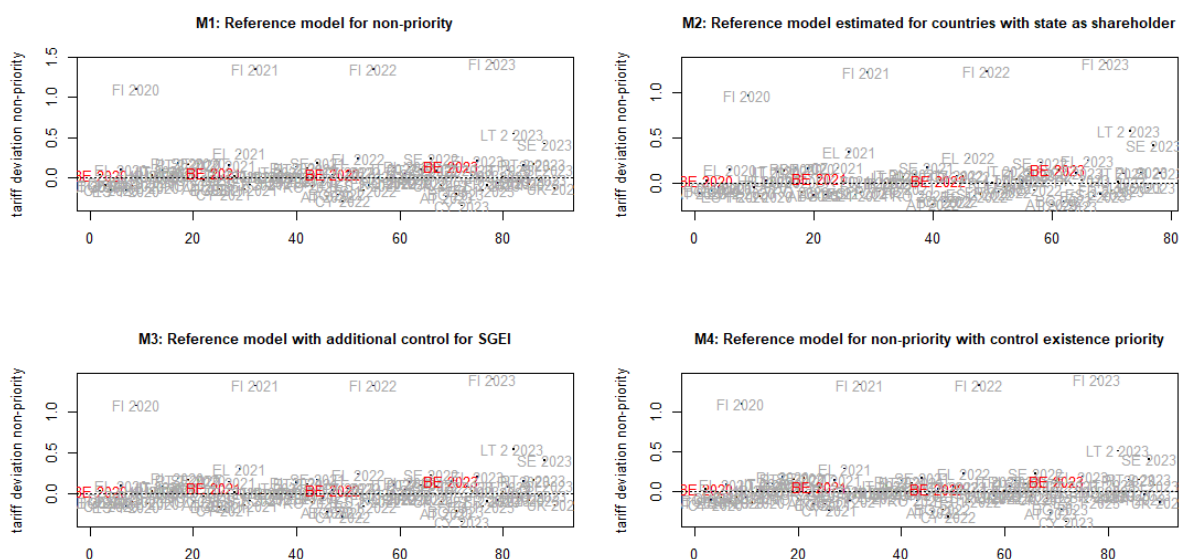
77. The evolution of the deviation of the nominal Belgian rates from the predicted values resulting from the model is shown in the figures below. For both priority and non-priority, the deviation is positive in 2023, indicating that the nominal Belgian rates are higher than the model predicts, given the characteristics of Belgium in the corresponding year. This result applies to each of the four models.

Figure 13. Deviation of the priority rates and model prediction between 2020 and 2023 from a European comparative perspective



Source: BIPT / Editor: Kris Boudt

Figure 14. Deviation of the non-priority rates and model prediction between 2020 and 2023 from a European comparative perspective



Source: BIPT / Editor: Kris Boudt

4.6.2. Focus on Belgium: table with deviation of the rates for Belgium and the model prediction

78. The tables below summarize to what extent the nominal rates for priority and non-priority in Belgium can be explained by the model, estimated on the basis of the European data. For all years, the fixed nominal rate is higher than predicted and the deviation between the predicted and nominal rate shows an increasing trend.
79. For the priority postage stamp, the deviation increases over the years in each of the models and in 2023 it is between 0.4 euro (model 4, which takes into account the presence of a non-priority) and 0.76 euro (model 1). In 2023, the standardized derogation lies³¹ between 2.259 (model 2: reference model applied to countries with a universal service provider of which the State is a shareholder) and 2.929 (model 1: reference model based on EU28 countries), making Belgium a clear outlier in an international context. Annex 5.3.1 clarifies that the probability of finding an even more extreme deviation under a normal distribution is almost nil. The question arises whether this can be explained by elements not included in the model. Model 4 is interesting in that respect. It predicts the price of priority postage based on the price of non-priority postage. The standardized derogation is also significant under this model, namely 2.719 for 2023. Visually, the growing difference between the actual nominal rate used and the predicted rate from the reference model (model 1) is shown in Figure 15.

Table 4. Evolution of priority in Belgium versus the predicted rate according to the different models (all values in EUR)

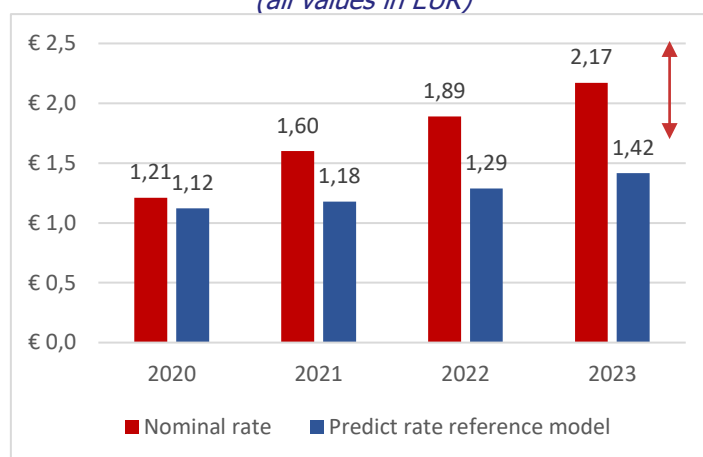
	2020	2021	2022	2023
Nominal priority rate Belgium	1.210	1.600	1.890	2.170
Predicted rate reference model	1.122	1.176	1.289	1.415
Deviation	0.088	0.424	0.601	0.755
Standardized deviation	0.341	1.644	2.334	2.929
Predicted rate model 2	1.170	1.232	1.361	1.496

³¹ Indicates the number of standard deviations, see also Annex 5.3.1.

<i>Deviation</i>	0.040	0.368	0.529	0.674
<i>Standardized deviation</i>	0.133	1.235	1.773	2.259
<i>Predicted rate model 3</i>	1.131	1.187	1.302	1.433
<i>Deviation</i>	0.079	0.413	0.588	0.737
<i>Standardized deviation</i>	0.294	1.536	2.189	2.743
<i>Predicted rate model 4</i>	1.260	1.402	1.518	1.773
<i>Deviation</i>	-0.050	0.198	0.372	0.397
<i>Standardized deviation</i>	-0.341	1.354	2.546	2.719

Source: BIPT / Editor: Kris Boudt

Figure 15. Evolution of priority in Belgium versus the predicted rate according to the reference model (all values in EUR)



Source: BIPT / Editor: Kris Boudt

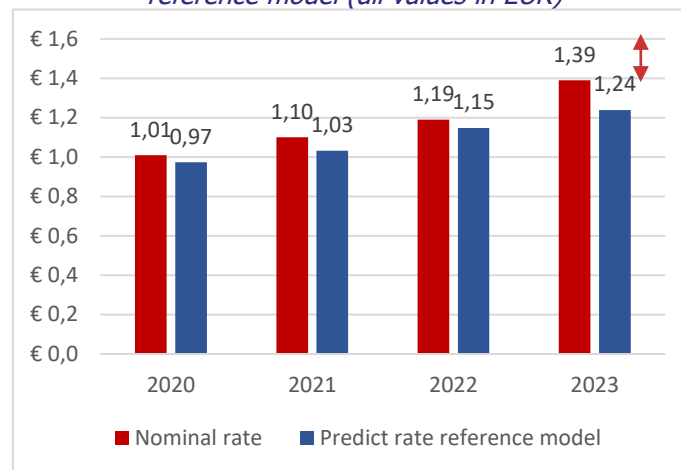
80. For the non-priority stamp, the deviation is always positive but not significant: the actual rates are higher than predicted (see also Figure 16) but due to the variability in the data and consequently uncertainty in the prediction, we cannot conclude that this deviation is significant. It is noticeable, however, that there is an increasing trend for the deviation: from 7.4 cents in 2020 to 18.1 cents in 2023. Although this is not statistically significant, it can be said that these amounts are economically relevant and further analysis seems appropriate.

Table 5. Evolution of non-priority in Belgium versus the predicted rate according to the different models (all values in EUR)

	2020	2021	2022	2023
Nominal non-priority rate Belgium	1.010	1.100	1.190	1.390
<i>Predicted rate reference model</i>	0.973	1.033	1.148	1.239
<i>Deviation</i>	0.037	0.067	0.042	0.151
<i>Standardized deviation</i>	0.323	0.586	0.364	1.310
<i>Predicted rate model 2</i>	0.981	1.041	1.155	1.237
<i>Deviation</i>	0.029	0.059	0.035	0.153
<i>Standardized deviation</i>	0.233	0.463	0.276	1.213
<i>Predicted rate model 3</i>	1.131	1.187	1.302	1.433
<i>Deviation</i>	0.040	0.072	0.047	0.155
<i>Standardized deviation</i>	0.341	0.613	0.403	1.328
<i>Predicted rate model 4</i>	0.973	1.034	1.152	1.250
<i>Deviation</i>	0.037	0.066	0.038	0.140
<i>Standardized deviation</i>	0.320	0.572	0.330	1.217

Source: BIPT / Editor: Kris Boudt

Figure 16. Evolution of the non-priority in Belgium versus the predicted rate according to the reference model (all values in EUR)



Source: BIPT / Editor: Kris Boudt

4.7. Conclusion

81. The postal tariffs are 'united in diversity': the heterogeneity of the countries examined ensures that there is also heterogeneity in the tariffs. A regression model allows for predicting the rates according to the characteristics of a country. The next step is to assess whether the predicted rates deviate significantly from the nominal postage stamp rates actually applied.
82. As far as Belgium is concerned, the BIPT notes that there are differences in the results for priority and non-priority stamps, which means that no uniform conclusions can be drawn for both types.
83. For the priority postage stamp there is a significant deviation from the predicted value that is substantially lower than the nominal rate. In other words, given the Belgian parameters, a much lower priority rate would be expected. Such an observation can be considered as a flashing light, which should be a starting point for further analysis. The significantly higher tariffs should then form the basis for a proactive policy to remedy this situation.
84. As the BIPT has indicated on several occasions in its price decisions - in view of bpost's high margin³² - that proactive policy could be to apply a price cap mechanism whereby the cost orientation of the small users tariffs is effectively monitored in accordance with the tariff requirements of the Postal Directive. Inspiration for this can be found in other European countries. There we find examples of direct comparisons with the underlying costs (Sweden and Italy), applying a brake from a higher margin (the Netherlands) or an ex-post cost orientation verification (as in Germany or Belgium prior to the amendment of the current Postal Act). In the latter case, the legal competence regarding the verification of the principle of cost orientation could be re-examined by the BIPT, as was the case for 2018.³³
85. For the non-priority postage stamp, there has so far been no significant deviation between the predicted and nominal rates, but the deviation did increase sharply (i.e. the nominal rate is increasingly divergent from the predicted value) between 2020 and 2023. If this trend continues, there may be a significant deviation in the future, as is currently the case for the priority postage stamp.

³² [25-35]% in 2022 on the small users' basket.

³³ <https://www.bipt.be/operators/publication/decision-of-21-march-2017-regarding-the-analysis-of-bpost-s-tariff-proposal-for-full-rates-per-piece-for-the-year-2017>

Bernardo Herman
Member of the Council

Peggy Valcke
Member of the Council

Stefaan Vyverman
Member of the Council

Michel Van Bellinghen
Chairman of the Council

5. Annexes

5.1. References

- Claes, Anouk and Wouter Vergote. 2015 Econometric study on parcel list prices. <https://ec.europa.eu/docsroom/documents/14647/attachments/1/translations/en/renditions/native>
- Croux, C., Dhaene, G. and Hoorelbeke, D. (2003) Robust standard errors for robust estimators, Discussion Papers Series 03.16, K.U. Leuven, CES.
- Deutsche Post (2022). Letter prices in Europe. <https://www.dpdhl.com/content/dam/dpdhl/en/media-center/media-relations/documents/2022/letter-prices-in-europe-2022.pdf>
- Deutsche Post (2023). Letter prices in Europe. <https://www.dpdhl.com/content/dam/dpdhl/en/media-center/media-relations/documents/2023/dphl-letter-prices-in-europe-2023.pdf>
- ERGP PL II (22) 12 ERGP report on core indicators 2021 for monitoring the European postal market <https://ec.europa.eu/docsroom/documents/53358/attachments/1/translations/en/renditions/native>
- Martin Maechler, Peter Rousseeuw, Christophe Croux, Valentin Todorov, Andreas Ruckstuhl, Matias Salibian-Barrera, Tobias Verbeke, Manuel Koller, c("Eduardo", "L. T.") Conceicao and Maria Anna di Palma (2021). robustbase: Basic Robust Statistics R package version 0.93-8. URL <http://CRAN.R-project.org/package=robustbase>
- Renaud, O. and Victoria-Feser, M.-P. (2010). A robust coefficient of determination for regression, Journal of Statistical Planning and Inference 140, 1852-1862.
- Yohai, V.J. (1987) High breakdown-point and high efficiency estimates for regression. The Annals of Statistics 15, 642–65.

5.2. Data set comments and adjustments

86. Bpost's response of 28 September 2023 included the following comments in particular.³⁴ Following which we also immediately discuss any subsequent changes to the data set used in the regression models:
87. Bpost advocates limiting the benchmark in the regression analysis to the EU27 plus the United Kingdom. This aims to only include those universal service providers to whom the European Postal Services Directive (97/67/EC) applies or still fairly recently applied (and who still have a national postal legislation based on the latter) in order to maximise comparability.
88. The regression analysis data set (see Section 4) was then limited to these 28 countries.
89. Bpost would like the status of the operator to be taken into account, whether it is a public or private entity or, possibly, even an administration.
90. The share of the government in the universal service provider for each of the 28 countries was then included. This information was largely obtained through Cullen International³⁵ and was then further supplemented by own desk research.
91. In addition, bpost also points to the impact of the degree of use of specific services. For example, most, i.e. 85%, of the postage stamps sold in Belgium are now non-priority postage stamps and the use of the priority postage stamp is of course more limited in Belgium than in

³⁴ After conducting the study, BIPT then consulted bpost on 23 February 2024 regarding the confidentiality of this section. Bpost subsequently indicated on 11 March that nothing in this section should be considered confidential.

³⁵ Current Universal Service Provider sheet - 18 Sep. 2023

countries where, for example, only such a priority postage stamp, without a cheaper non-priority alternative, is offered. Bpost suggests using an average price if necessary.

92. In the regression analysis, 'dummy variables' were³⁶ added which indicate for each year whether there was also a non-priority or a priority postage stamp in the country concerned. An average price was not chosen, not only is the information on the mutual interest of these categories rarely publicly available, but above all, such an average price does not exist. Indeed, no postal products are actually sold at such a hypothetical average price.
93. Bpost also suggests that the number of days of distribution may have an impact, as well as the other activities carried out by the postal operators (for example, the large banking activities of Poste Italiane or the telecom activities of POST Luxembourg).
94. Given that the number of days of distribution is not uniform within a given country, for particular areas in Italy there is a reduced frequency of distribution, a dummy variable was tested based on the possibility of waiving the five days of distribution per week. This information was obtained thanks to the latest Copenhagen Economics Main Developments study³⁷. The analysis did not take into account the other activities of postal operators, since any compensation for letter post within the universal service should not come from other activities but should come from a net cost compensation (or adaptation of the universal service in Belgium).
95. Bpost also highlights that the D+1 priority in France in 2023 is a hybrid delivery.
96. For 2023, the D+1 priority was removed from the data set in France.
97. Bpost also criticized the use of a general population density for a country, which can hide very different distributions. There was also criticism of the use of volume per capita containing all letter post, both more expensive and cheaper products.
98. Alternative ways, such as the degree of urbanization, had already been examined in advance but were found not to provide any added value. Moreover, even if the majority of the population lives centralised, the inhabitants of any remote islands and rural areas should be offered the universal service. This nevertheless renders the concept of a general population density relevant. The per capita volume of letter post is, of course, not publicly available in all countries for specific services (included in the rates quoted here). Nevertheless, the total volume remains relevant because costs, such as those of distribution, can of course be shared across product groups. (see also the reaction above regarding the existence of various products (priority and non-priority) and differences in distribution days)
99. Finally, bpost refers to the use of the average labour cost per country in Eurostat and to what extent this corresponds to the difference in labour costs for the different postal operators.
100. Information regarding labour costs is rarely publicly available. The BIPT did, however, already carry out a validation check regarding the Eurostat labour cost data prior to this study. In order to check whether the general labour data are in line with those for the postal sector, the following verification was carried out. Universal service providers from 9 European countries were³⁸ found to publish their total labour costs as well as the number of full-time equivalents or FTEs (for 2021). By comparing the total labour cost against the number of FTEs, the relative cost per FTE could be obtained, which we can compare with each other. If we consider Belgium (bpost) to be '1', we can compare the other countries (national universal service providers) relatively to Belgium, just as we can do with the average hourly labour costs from Eurostat.

³⁶ A dummy variable is an indicative variable that can take a value of 0 or 1. A value of 0 means 'not present' or 'not applicable' and a value of 1 means 'applicable' or 'present'.
<https://hulpbijonderzoek.nl/online-woordenboek/begrippen/dummy-variabele/>

³⁷ <https://copenhageneconomics.com/publication/main-developments-in-the-postal-sector-2017-2021/>

³⁸ AT, BE, CZ, ES, FI, IE, IT, PL, PT and NL, which are a mix of full state-owned companies, partially privatized and fully privatized operators.

Based on this we found that the proportions compared to Belgium are very similar in both cases. The correlation between the two labour cost indicators is even 0.94. In other words, this is a justification for using the general hourly labour cost in our model as a proxy for the labour costs of the various national universal service providers.

5.3. Estimation

101. We use the convention to present the i -th estimated coefficient as $\hat{\beta}_i$. Due to an estimation error, it differs from the real value β_i . On the basis of the estimated coefficients, a predicted price can be calculated:

$$\widehat{TariffPriority}_{i,t} = \hat{\beta}_0 + \hat{\beta}_1 Y2021_{i,t} + \hat{\beta}_2 Y2022_{i,t} + \hat{\beta}_3 Y2023_{i,t} + \hat{\beta}_4 \text{max.weightPriority}_{i,t} + \hat{\beta}_5 \text{deliverytimePriority}_{i,t} + \hat{\beta}_6 \text{volumepercapita}_{i,t} + \hat{\beta}_7 \text{labourcostperhour}_{i,t} + \hat{\beta}_8 \log(\text{country size in km}^2)_{i,t} + \hat{\beta}_9 \log(\text{populationsdensity})_{i,t}.$$

102. This predicted price has an error due to the error term in the original model (a perfect fit is not possible) and due to an estimation error in the coefficients. We name the estimated prediction error in the text as either the residue or the rate deviation:

$$Residual_{i,t} = TariffPriority_{i,t} - \widehat{TariffPriority}_{i,t}$$

103. A positive (resp. negative) residue corresponds to an understatement (resp. overstatement). We want the 'best' estimate for the chosen criterion. The classic criterion is that of the least squares estimation where we minimize the sum of all squared prediction errors:

$$\hat{\beta}_0, \hat{\beta}_1, \dots, \hat{\beta}_9 \text{ for which } \sum_{i,t} residual_{i,t}^2 \text{ is minimized}$$

104. This method has the disadvantage that it can be strongly distorted by outliers because it tries to get a small deviation for all observations. A robust alternative is to work with a weighted sum of squared prediction errors where outliers get a lower weight (ideally 0):

$$\hat{\beta}_0, \hat{\beta}_1, \dots, \hat{\beta}_9 \text{ for which } \sum_{i,t} w_{i,t} \times residual_{i,t}^2 \text{ is minimized,}$$

with $w_{i,t} \approx 0$ when there is data evidence that $TariffPriority_{i,t}$ is an outlier.

105. In the implementation we use the MM estimator of Yohai (1987) in the default implementation of the `lmrob` function in the R package `robustbase` (Maechler et al., 2021).³⁹ Robust methods are also used for the inference: a robust estimate of the variance of the error terms, a robust estimate of the standard errors (Croux et al., 2003) and as a robust measure of fit the robust R squared measure as described in Renaud and Victoria-Feser (2010). The estimation of the parameters of the non-priority tariff model is analogue.

5.3.1. Interpretation of outliers

106. Robust regression analysis allows to estimate that pattern: useful to see how divergent rates are. Evaluation of the statistical significance of the deviation should be done on the basis of the standardized residues:

$$\frac{TariffPriority_{i,t} - \widehat{TariffPriority}_{i,t}}{\hat{\sigma}}$$

³⁹ See <https://rdrr.io/cran/robustbase/man/lmrob.html>

107. with $\hat{\sigma}$ the robust estimated standard deviation of the error terms. This standardized deviation between observed and predicted rates can then be compared with the classical critical values based on a standard normal distribution. A rule of thumb is that an observation is classified as an outlier when the deviation is greater than 3. This is due to the fact that the probability of finding an even more extreme deviation under a normal distribution is almost nil.

Threshold value k	Chance to find an even more extreme value under a normal distribution: Prob ($ Z > k$) when Z is normally distributed by default
2	$2 * (1 - \text{pnorm}(2)) = 0.04550026$
2.5	$2 * (1 - \text{pnorm}(2.5)) = 0.01241933$
3	$2 * (1 - \text{pnorm}(3)) = 0.002699796$

5.4. Estimated regression model

108. The estimated regression function for rate of priority postage stamps with the statistically significant coefficients (at 5%) indicated in bold is as follows:

Model 1:

$$\widehat{\text{TariffPriority}}_{i,t} = 0.209 + 0.023 * Y_{2021,i,t} + 0.052 * Y_{2022,t} + 0.090 * Y_{2023,t} + \mathbf{0.005} * \text{max.weightPriority}_i - \mathbf{0.129} * \text{deliverytimePriority}_{i,t} - \mathbf{0.002} * \text{volumepercapita}_{i,t} + \mathbf{0.027} * \text{labourcostperhour}_{i,t} + \mathbf{0.042} * \log(\text{country size in km}^2)_{i,t} - 0.059 * \log(\text{populationdensity})_{i,t}.$$

Model 2:

$$\widehat{\text{TariffPriority}}_{i,t} = -0.044 + 0.035 * Y_{2021,i,t} + 0.091 * Y_{2022,t} + 0.151 * Y_{2023,t} + \mathbf{0.007} * \text{max.weightPriority}_i - \mathbf{0.134} * \text{deliverytimePriority}_{i,t} - \mathbf{0.002} * \text{volumepercapita}_{i,t} + \mathbf{0.023} * \text{labourcostperhour}_{i,t} + 0.045 * \log(\text{country size in km}^2)_{i,t} - 0.015 * \log(\text{populationdensity})_{i,t}.$$

Model 3:

$$\widehat{\text{TariffPriority}}_{i,t} = 0.203 + 0.024 * Y_{2021,i,t} + 0.053 * Y_{2022,t} + 0.095 * Y_{2023,t} + \mathbf{0.006} * \text{max.weightPriority}_i - \mathbf{0.132} * \text{deliverytimePriority}_{i,t} - \mathbf{0.003} * \text{volumepercapita}_{i,t} + \mathbf{0.027} * \text{labourcostperhour}_{i,t} + \mathbf{0.042} * \log(\text{country size in km}^2)_{i,t} - 0.057 * \log(\text{populationdensity})_{i,t} + 0.001 * \text{SGEI}_{i,t}.$$

Model 4:

$$\widehat{\text{TariffPriority}}_{i,t} = -0.187 + \mathbf{1.198} * \text{TariffNonPriority}_{i,t} - 0.003 * (\text{max.weightPriority}_{i,t} - \text{max.weightNonPriority}_{i,t}) + \mathbf{0.119} * (\text{deliverytimeNonPriority}_{i,t} - \text{deliverytimePriority}_{i,t}) + 0.035 * Y_{2021,t} + 0.042 * Y_{2022,t} + 0.057 * Y_{2023,t}.$$

We note that in all models the estimated coefficients that are significant have the sign we expected.

For non-priority postage stamps we get:

Model 1:

$$\widehat{\text{TariffNonPriority}}_{i,t} = -0.547 + 0.032 * Y_{2021,i,t} + 0.068 * Y_{2022,i,t} + 0.077 * Y_{2023,i,t} + 0.001 * \text{max.weightNonPriority}_{i,t} + 0.026 * \text{deliverytimeNonPriority}_{i,t} - \mathbf{0.002} * \text{volumepercapita}_{i,t} + \mathbf{0.026} * \text{labourcostperhour}_{i,t} + \mathbf{0.045} * \log(\text{country size in km}^2)_{i,t} + 0.036 * \log(\text{populationdensity})_{i,t}$$

Model 2:

$$\widehat{\text{TariffNonPriority}}_{i,t} = -0.959 + 0.040 * Y_{2021,i,t} + 0.086 * Y_{2022,i,t} + 0.097 * Y_{2023,i,t} + \mathbf{0.002} * \text{max.weightNonPriority}_{i,t} + 0.039 * \text{deliverytimeNonPriority}_{i,t} - \mathbf{0.002} * \text{volumepercapita}_{i,t}$$

$+0.023 * labourcostperhour_{i,t} + 0.067 * \log(country\ size\ in\ km2)_{i,t} + 0.048 * \log(populationdensity)_{i,t}$

Model 3:

$Tariff\widehat{NonPriority}_{i,t} = -0.530 + 0.031 * Y2021_{i,t} + 0.067 * Y2022_{i,t} + 0.077 * Y2023_{i,t} + 0.001 * max.\ weightNonPriority_{i,t} + 0.028 * deliverytimeNonPriority_{i,t} - 0.002 * volumepercapita_{i,t} + 0.026 * labourcostperhour_{i,t} + 0.046 * \log(contry\ size\ in\ km2)_{i,t} + 0.028 * \log(populationdensity)_{i,t} + 0.012 * SGEI_{i,t}$

Model 4:

$Tariff\widehat{NonPriority}_{i,t} = -0.439 + 0.032 * Y2021_{i,t} + 0.069 * Y2022_{i,t} + 0.083 * Y2023_{i,t} + 0.001 * max.\ weightNonPriority_{i,t} + 0.018 * deliverytimeNonPriority_{i,t} - 0.002 * volumepercapita_{i,t} + 0.026 * labourcostperhour_{i,t} + 0.042 * \log(country\ size\ in\ km2)_{i,t} + 0.014 * \log(populationdensity)_{i,t} + 0.046 * ExistencePriority_{i,t}$

We note that in all models the estimated coefficients that are significant have the sign we expected.