

Postal Development Report 2021

Taking stock
of a new reality

October 2021



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About this report

This report examines the state of postal development around the world in 2021, building on the Integrated Index for Postal Development (2IPD) which currently ranks 168 countries across four dimensions: reliability, reach, relevance and resilience. Switzerland, Germany and Austria top the ranking, followed by Japan and France. Belarus, Brazil, Ghana, Singapore and Tunisia have also obtained encouraging results and currently lead their respective regional groups. As shown by greater volatility within the ranking, many postal operators around the world are still adjusting to the new normality brought by the pandemic. The report exploits the information embedded in the 2IPD's reliability pillar, which measures the delivery times of mail items, to quantify the operational disruptions caused by the COVID-19 pandemic. The main finding is that the logistical bottlenecks experienced in 2020 have severely affected the reliability of postal operations, with average domestic delivery times increasing by 13% in 2020 with respect to 2019, before returning to pre-crisis levels in 2021. The results of the report also suggest that, even if disruptions in global supply chains are eventually absorbed, gaps in postal development are likely to remain a considerable challenge for the sector in the coming years.

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Glossary

2IPD	Integrated Index for Postal Development
CIS	Commonwealth of Independent States
DO	Designated operator
EDI	Electronic data interchange
EMSEVT	Express mail service events
EmIS	Emergency Information System
GDP	Gross domestic product
ICs	Industrialized countries
IMF	International Monetary Fund
PREDES	Pre-advice of dispatch
SDR	Special drawing rights
UPU	Universal Postal Union
USD	United States dollar
WDI	World Development Indicators
WHO	World Health Organization
YoY	Year-on-year

Introduction

The battle against the COVID-19 pandemic has redefined the world economy. At the time of writing this report, the overall pandemic situation remains delicate.ⁱ In response to the rapid surge in recorded cases, governments resorted to drastic measures.

In 2020, the pandemic's impact on the world economy, global trade and cross-border supply chains was unprecedented, with a level of contraction not seen since the Second World War.ⁱⁱ In the United Nations system, there has also been a growing concern that the achievement of the Sustainable Development Goals (SDGs) might be compromised.ⁱⁱⁱ

The postal sector was not spared by this major crisis. Since the pandemic was declared, postal operators around the world have had to deal with intermittent air traffic, labour supply shortages and increased operational costs. Unlike many other businesses, they have also had to continue operating during most lockdowns, providing services deemed essential by authorities while at the same time attempting to meet a surging demand for the delivery of online shopping transactions.

However, despite its essential nature, the sector had already been facing tremendous challenges before the pandemic. Postal operators were struggling to make their revenues grow at the same rate as the wider real economy,^{iv} while postal services in many developing countries were increasingly falling behind when compared to the performance in wealthier nations.^v

In this context, measuring postal development remains paramount, and the UPU's Integrated Index for Postal Development (2IPD) constitutes a key tool to help policymakers, regulators and operators steer the course of the sector in an environment of accelerated transformation.

Indeed, by tapping into the wide range of (big) data collected and consolidated by the UPU, the 2IPD provides a composite picture of postal development around the world, with a ranking that reflects the performance of traditional postal operators across four dimensions

(reliability, reach, relevance and resilience).^{vi} Historically, these operators have primarily been considered as vehicles for delivering socio-economic development, representing one of the largest physical networks in the world, with some 630,000 post offices and 5.25 million employees.

In the 2021 edition, the index covers 168 countries, with Switzerland, Germany and Austria at the top, followed by Japan and France. In the various UPU regions, Belarus, Brazil, Ghana, Singapore and Tunisia currently lead the pack.

Notwithstanding the encouraging results of such leading countries, disparities in postal development are intensifying, with the coefficient of variation reaching its maximum value since the first publication of the ranking.

Such disparities are certainly due to differences in economic development, but other factors may also be at play. Indeed, in industrialized countries, postal operators tend to outperform national levels of economic development, whereas in Africa and Latin America the opposite trend is at work.^{vii}

One major symptom of the COVID-19 crisis is perceptible in the area of delivery times, which reflect the reliability of postal services. When the pandemic first struck in 2020, both speed and predictability dropped dramatically, with 13% lengthier delivery times on average and a 9% increase in the coefficient of variation of the same with respect to 2019.

In 2021, delivery times appear to have reverted to pre-crisis levels; but more time will be needed before declaring a "return to normal". Moreover, even if the deterioration of reliability through the crisis is eventually overcome, the issue of gaps in postal development is likely to remain high on the agenda of policymakers, regulators and operators in the years to come.

This report is structured in four sections. Section 1 discusses the methodology behind the 2IPD. Section 2 presents the results of the 2021 edition of the ranking. Section 3 discusses the consequences of the COVID-19 pandemic in terms of postal reliability. Section 4 concludes the report.

1- What is the 2IPD?

Four pillars of postal development

The 2IPD is a comparative indicator of postal development around the world. It is a composite index that summarizes information about the performance of postal operators in 168 countries. As such, the 2IPD is a unique tool for analyzing the state of the postal sector. Thanks to its wide geographic coverage and the depth of its underlying data, this index appeals to a multitude of stakeholders, from policymakers and regulators to postal operators and wider postal sector players.

The 2IPD is built on four pillars (which are in turn sustained by a variety of sub-indicators):

- **Reliability** reflects performance in terms of speed and predictability of delivery, across all the key segments of physical postal services (letter post, parcel post and express).
- **Reach** synthesizes global connectivity by evaluating the breadth and depth of the postal operators' international network. These are measured by the number of partner networks and the volumes of international exchanges, respectively, across all the key segments of physical postal services.
- **Relevance** measures the intensity of demand for the full portfolio of postal services relative to the best performers in each category of postal activity, also taking into account elements such as the number of international transactions and the number of post offices.
- **Resilience** indicates the level of diversification of revenue streams, as well as the capacity to innovate and deliver inclusive postal services.

The purpose of the reliability pillar is to measure the operational efficiency of postal services, showing the degree to which they are performed in a timely and predictable manner.

The reach pillar captures the level of internationalization of these operations, demonstrating whether postal services in the country in question have a high level of cross-border exchanges.

When it comes to relevance, the key goal is to evaluate the competitiveness of postal services

in all key segments, and in particular the potential to generate higher volumes. Countries possessing a relatively denser network and a high level of postal consumption per capita will show good performance in this area.

Regarding the resilience pillar, the intent is to assess the ability of postal services to withstand external shocks through adaptable business models.

Overall, these four pillars are aimed at providing a balanced view of postal development, without solely focusing on operational (e.g. delivery), strategic (e.g. business portfolio management) or societal matters (e.g. financial inclusion). This enables the final score to comprehensively reflect (while succinctly expressing) the situation of postal services in any given geography.

The input is then integrated into an algorithm, which yields a general score between 0 and 100 for each assessed country.

Data supporting the pillars

The 2IPD draws on the following types of UPU data:

- UPU postal big data, namely, tracking data on postal transactions worldwide;
- Official UPU postal statistics and UPU surveys.

The first type is used mainly to compute indicators associated with quality of service, transactions, volumes and connectivity. It feeds the reliability and reach pillars. The second type applies to the measurement of revenue streams, economies of scale, infrastructure and financial inclusion.

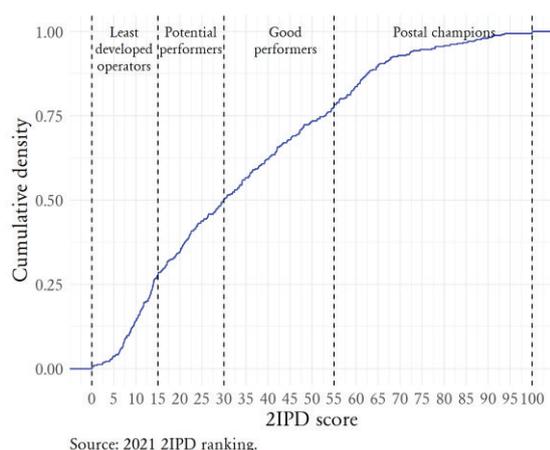
Every year, the best postal development performer obtains a normalized maximum score of 100, while the worst gets the minimum score of 0. Thus, the normalized scores can be read as the performance of any given country compared with the best (score of 100) or worst (score of 0) global performer.

Comparing postal development around the globe

Given the statistical distribution of the 2IPD scores, it is possible to categorize countries in four main categories (see Figure 1):^{viii}

- **Postal champions:** A score above 55 shows that a country's postal development is among the top 20% in the world – a performance which can be considered very good to outstanding. This group of countries can be denoted as having a well-balanced performance across all pillars of postal development.
- **Good performers:** A score between 30 and 55 shows an upper-intermediate level of performance. These countries are consistent performers and belong to the top 50%.
- **Potential performers:** A score between 15 and 30 shows a performance that is lower than the median, with countries usually performing only partially well, albeit with some development potential. Most countries in this group exhibit glaring weaknesses in one or more areas of postal development.
- **Least developed operators:** A score below 15 shows that a country's postal development is very low. These countries are facing major challenges in several of the key pillars of postal development.

Figure 1 Cumulative distribution, 2021 2IPD



Since the 2IPD is a comparative index, the interpretation of the scores has to take into account four important elements:

First, the scores are of a relative nature. Thus, the position of a given country is determined by its performance relative to its peers. If a country

makes absolute progress on a specific dimension of the 2IPD, this will have an impact on the final ranking if and only if its peers have not made even greater gains in performance.

Second, the position of a country in the global ranking should preferably be considered in conjunction with the regional standing and its economic development level. In this sense, it may be unrealistic to expect countries to be postal champions if most of their regional peers are struggling.

Third, performance is more adequately evaluated in clusters, such as within one of the four main categories mentioned above (i.e. postal champions, good performers, potential performers and least developed operators). Movements in the ranking within a category are much more likely than between categories. For instance, turning a least developed operator into a good performer will usually require a substantial transformation, and will most likely take years of conscious and continuous improvement initiatives.

Fourth, beyond the comparison of countries solely within the 2IPD ranking, it may also be useful to benchmark postal development against other macroeconomic dimensions, in particular economic development. This may be a useful exercise because it allows one to more clearly disentangle those issues that are inherent to postal services from wider socio-economic factors faced by a given country. An example of such an analysis is presented in Section 2 of the present report.

Further details on the methodology used to calculate the 2IPD are available in Appendix 4.

2- The 2021 2IPD ranking

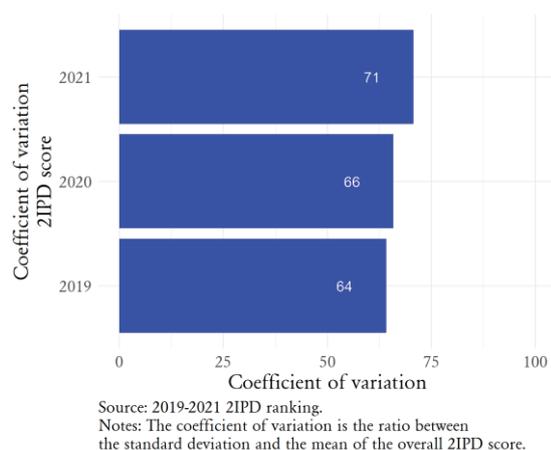
COVID-19 has exacerbated postal development gaps

The 2021 2IPD ranking covers 168 countries (see Table 1), with a global average score of 33, vs 36 in 2020.

Once again, Switzerland secured the top spot, slightly distancing itself from Germany (2nd, 93) and Austria (3rd, 91), with Japan (4th, 90) and France (5th, 88.4) completing the top five. The bar to enter the top 10 is now at 77.1, slightly below the level required in 2020 (77.9).

By contrast, the degree of dispersion of the overall ranking has steadily increased (Figure 2), peaking at 71% in 2021, possibly because of the havoc created by the COVID-19 pandemic. Indeed, the world is witnessing a widening “postal development divide”, with the best 2IPD performers also appearing as the most resilient to the crisis.

Figure 2 Growing dispersion in the 2IPD ranking

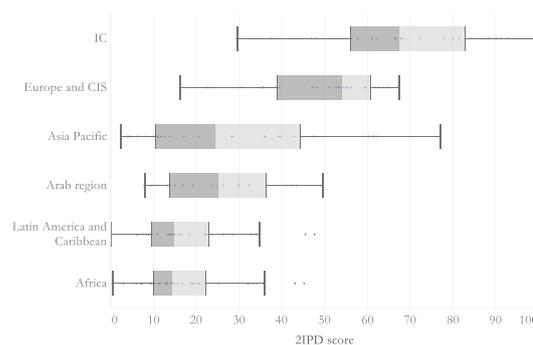


Regional differences

As in all past editions of the ranking, the group of industrialized countries (ICs) has recorded the highest average score at 68.25, followed by Eastern Europe and the CIS (49.82), Asia-Pacific (28.63), the Arab region (25.62), Latin America and the Caribbean (18.74), and Africa (17.85).

Although Asia-Pacific remains the region with the greatest disparity of performance between countries, the coefficient of variation has increased everywhere, suggesting that the

Figure 3 Box plot of 2IPD scores across regions

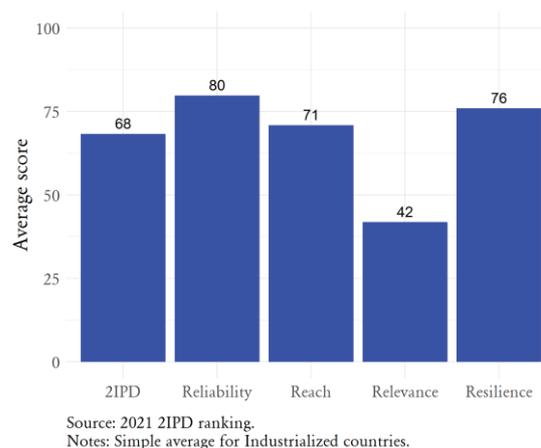


Source: 2021 2IPD ranking.
Notes: Box plots by region, sorted from highest to lowest average value of the 2021 2IPD score. Regional categories defined in Appendix 1.

growing dispersion of scores is indeed a global phenomenon cutting across all historical levels of postal development.

Industrialized countries – consolidation at the top

Figure 4 2IPD performance in ICs



ICs form the most homogeneous regional group and are characterized by high levels of postal development. In the 2021 ranking, with an average of 68.25, the group has the lowest degree of dispersion around the mean, with a coefficient of variation of 27%.

As in all past editions of the ranking, Switzerland retains the top spot thanks to stellar performance across all dimensions of the 2IPD, including additional progress in terms of reach and resilience.

Germany has reached second place, its best performance since the creation of the ranking. This is mainly due to progress made in reach,

combined with continued superior performance in reliability and relevance.

For the second year in a row, Austria is part of the top three. This is mainly due to its ability to retain a balanced showing across all the four pillars of postal development in spite of the many logistical turbulences caused by the COVID-19 pandemic.

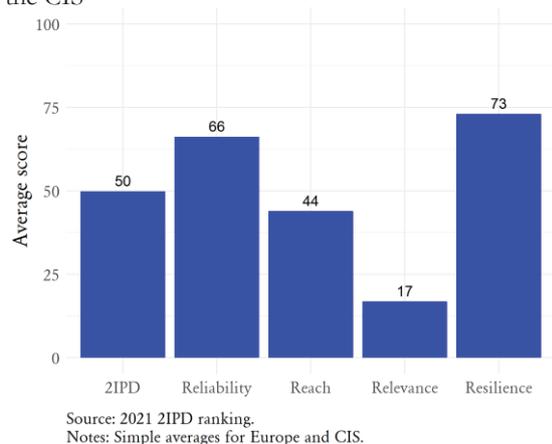
Japan and France complete the top five thanks to very high levels of reliability, and further progress in terms of relevance in the case of France.

Overall, the top 10 remains unchanged compared to 2020, with 9 out of 10 being ICs. In an environment of growing gaps in postal development, this concentration of success would suggest that the most developed countries, even within the ICs, are extending their lead and consolidating their comparative strengths.

Among ICs, Denmark has made the highest relative progress, moving from 53rd to 45th place. Yet, the lowest ranking of this group corresponds to 83rd place, confirming the pattern of intra-regional disparity that has been intensifying across the world, albeit to a lesser extent among ICs.

Eastern Europe and the CIS – good performance in a developing region

Figure 5 2IPD performance in Eastern Europe and the CIS



Following closely behind the group of ICs, countries in Eastern Europe and the CIS also benefit from a high average score (49.8). Moreover, the region is relatively homogeneous,

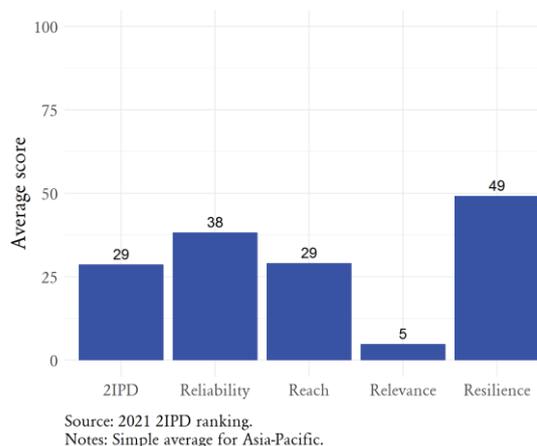
with a coefficient of variation around the mean of 29%, i.e. nearly the same level as in the ICs. Ranks in this region span from 14th to 111th place.

The main novelty of 2021 has been the performance of Belarus, which has for the first time reached the top regional position, progressing in reliability and resilience, while benefitting in the ranking from a slight drop in Poland’s showing.

The best relative progress in the region was made by Latvia, which succeeded in gaining 33 places, jumping from 62nd to 29th rank, owing to tremendous progress in reach and reliability.

Asia-Pacific – the height of heterogeneity

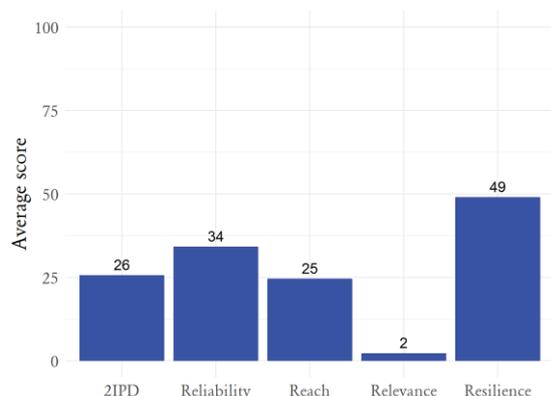
Figure 6 2IPD performance in Asia-Pacific



Asia-Pacific has the third best regional performance, with an average score of 28.6. However, this number masks significant disparities, in what is the most heterogeneous region of all, as witnessed by a coefficient of variation of 76%. With countries ranging from 10th to 166th place, the situation of Asia-Pacific is symptomatic of the extreme gaps in postal development which are affecting the whole world.

Indeed, on the one hand, Singapore outperforms most global and regional peers, with a world-class showing in reliability, reach and resilience. On the other hand, at the bottom of the ranking, the Pacific Islands are struggling to improve their delivery times, reach and relevance.

Figure 7 ZIPD performance in the Arab region



Source: 2021 ZIPD ranking.
Notes: Simple average for the Arab region.

Arab region – moving up

The Arab region is still the fourth best performing region, with an average score of 25.6, i.e. below the global average. Yet, this is one of the regions that have shown the greatest degrees of dynamism in recent years.

Tunisia, ranked 44th globally, still holds the lead; followed by eight countries with scores above the regional average. Iraq, the Comoros and Morocco have experienced the highest relative progression in their ranking, jumping by 26, 13 and 11 places, respectively.

At 51%, the region’s coefficient of variation remains high, but still below that observed in Africa and Latin America.

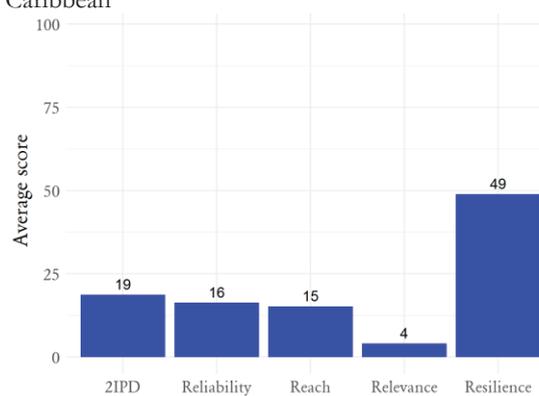
Relevance remains the region’s weakest pillar. In all other dimensions, the average is rather close to the performance of the Asia-Pacific region.

Latin America and the Caribbean – a difficult COVID-19 recovery

The region is facing a very challenging landscape, as many operators have been deeply affected by the COVID-19 pandemic. This is reflected in the average score of 18.7, down from 23.18 in 2020, and the lowest since the creation of the ranking in 2017. Dispersion around the mean is very high at 62%, with ranks ranging from 48th to 160th.

Brazil holds the top regional spot, thanks to continued strong resilience, as well as efforts to maintain reliability and reach in spite of the shock caused by the pandemic. Colombia has

Figure 8 ZIPD performance in Latin America and the Caribbean



Source: 2021 ZIPD ranking.
Notes: Simple average for Latin America and the Caribbean.

the second overall score, while leading the region in terms of delivery times.

As the example of these countries shows, strong performance in the long term requires a balanced showing across all dimensions of the ZIPD; however, it is usually through improvements in reliability and reach that good performers in the second tier of the ranking can progress rapidly, from one year to another.

Africa – persisting challenges

Africa was also significantly affected by the COVID-19 pandemic. The average regional score now stands at 17.9, the lowest since the creation of the ranking. At 63%, dispersion around the mean is the highest of all, with ranks ranging from 53rd to 167th.

Ghana holds the top spot, thanks to very good reliability, improved reach and a level of resilience moving closer to the global average. Zambia, Namibia and Liberia have made the largest relative gains, moving up by 34, 31 and 26 places, respectively.

Figure 9 2IPD performance in Africa

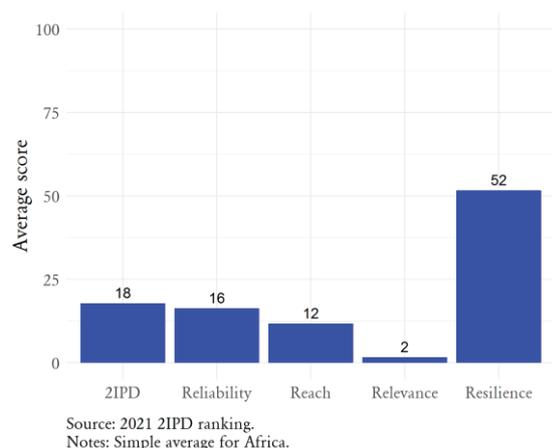
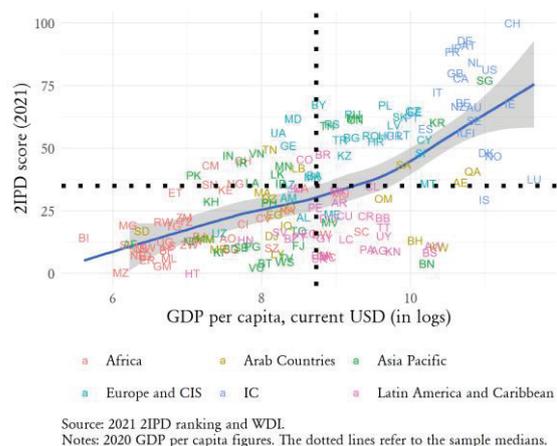


Figure 10 Postal development and economic development



Disparities in economic development remain a key, but definitely not the only, source of postal development gaps

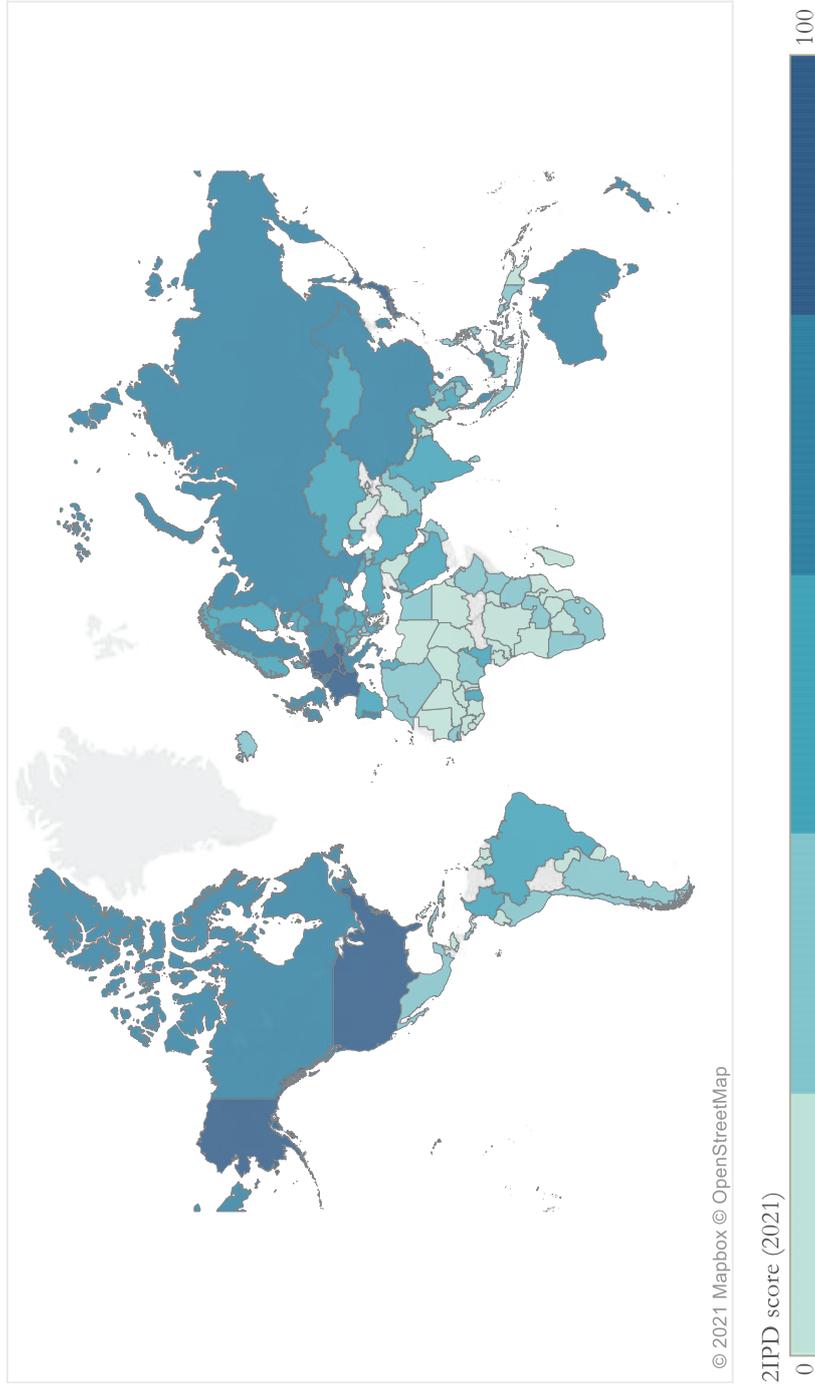
When considering the above-mentioned gaps in postal development between regions, one may wonder whether they stem primarily from sector-specific factors or rather that they are the result of a wider external context.

Historically, the correlation between economic and postal performance has tended to be relatively high. Figure 10 shows that countries with a higher GDP per capita are more likely to achieve higher 2IPD scores. However, the same graph shows that the overall trend is not a hard rule, with numerous countries either outperforming or underperforming their level of economic development.

For instance, a sizeable portion of ICs have postal services that strongly surpass what would be predicted by their level of economic development. Conversely, postal development in Latin America and the Caribbean is lower than what one would expect given the corresponding countries' GDP per capita.

Further analysis of specific cases would provide means for disentangling the various factors behind the individual performance of particular countries. Nonetheless, the comparison between postal and economic development outlined above does suggest that postal operators can improve performance even in a challenging economic environment, and vice versa.

Figure 11 2IPD ranking



Source: 2021 2IPD ranking.

Notes: The five colours represent scores in the intervals 0–20, 20–40, 40–60, 60–80 and 80–100. The boundaries, colours and any other information on this map do not imply, on the part of the UPU, any judgement on the legal status of any territory, or any endorsement or acceptance of such boundaries.

Table 1 2021 ZIPD ranking

Rank	Country	Score	Change	Rank	Country	Score	Change
1	Switzerland	100.0	+0.00	43	Georgia	51.10	-5.00
2	Germany	93.0	-1.24	44	Tunisia	49.51	-2.42
3	Austria	91.0	-4.30	45	Denmark	48.16	+1.67
4	Japan	90.0	-0.44	46	Slovenia	48.12	-8.04
5	France	88.4	+1.87	47	Viet Nam	48.00	-2.47
6	Netherlands	84.3	-8.48	48	Brazil	47.63	-5.54
7	United States of America	81.4	-2.08	49	Kazakhstan	47.20	+0.09
8	United Kingdom	80.0	-1.86	50	India	47.16	-8.98
9	Canada	77.9	-0.63	51	Norway	46.90	-11.38
10	Singapore	77.1	-0.80	52	Colombia	45.56	+1.12
11	Italy	72.4	-2.55	53	Ghana	45.13	+1.05
12	Belgium	68.2	-4.10	54	Iran (Islamic Rep.)	44.32	-6.78
13	Ireland	67.8	-0.57	55	Saudi Arabia	43.39	-3.87
14	Belarus	67.4	+1.86	56	Cameroon	43.15	+4.63
15	Poland	67.2	-3.89	57	Mongolia	42.99	+24.13
16	New Zealand	66.7	-3.69	58	Lebanon	42.11	-3.35
17	Australia	66.5	-1.55	59	Qatar	40.80	+0.87
18	Czech Rep.	65.0	-3.28	60	Sri Lanka	39.71	+5.95
19	Estonia	64.5	+2.49	61	Bosnia and Herzegovina	39.27	-4.09
20	Russian Federation	63.6	-2.62	62	Pakistan	39.21	-0.15
21	Slovakia	62.6	-1.72	63	North Macedonia	38.59	-8.66
22	Portugal	62.2	-1.44	64	Luxembourg	37.65	-0.50
23	Malaysia	62.1	+4.06	65	United Arab Emirates	36.43	-1.81
24	Moldova	61.8	-0.05	66	Lao People's Dem. Rep.	36.23	-5.73
25	China (People's Rep.)	61.5	-5.34	67	Indonesia	35.92	-3.40
26	Sweden	61.0	-1.22	68	Nigeria	35.89	-4.15
27	Korea (Rep.)	60.3	-2.18	69	Malta	35.86	-8.11
28	Serbia	59.6	+0.67	70	Azerbaijan	35.57	-9.09
29	Latvia	59.4	+18.47	71	Senegal	35.56	+1.64
30	Thailand	59.0	-1.89	72	Chile	34.81	-1.81
31	Spain	57.8	-0.23	73	South Africa	34.14	-3.72
32	Israel	56.3	-1.91	74	Jamaica	34.01	-3.97
33	Ukraine	56.2	-2.47	75	Kenya	33.41	-1.61
34	Finland	56.1	-3.52	76	Mexico	32.95	-2.12
35	Lithuania	55.4	-3.16	77	Morocco	32.42	+1.04
36	Romania	55.0	+0.25	78	Ethiopia	32.37	-2.07
37	Hungary	55.0	-3.46	79	Mauritius	31.95	-8.53
38	Greece	55.0	-2.25	80	Armenia	30.24	-6.28
39	Bulgaria (Rep.)	54.3	-1.07	81	Algeria	30.02	-7.95
40	Cyprus	53.5	-2.73	82	Oman	29.91	-5.77
41	Turkey	53.3	+1.83	83	Iceland	29.48	-6.29
42	Croatia	52.7	-5.73	84	Cambodia	28.68	+12.13

Rank	Country	Score	Change	Rank	Country	Score	Change
85	Argentina	28.41	+0.49	127	Bahrain (Kingdom)	13.16	-9.57
86	Philippines	28.24	-7.65	128	Guinea	13.10	-2.21
87	Jordan	26.43	-17.64	129	Nepal	12.80	-0.85
88	Peru	26.32	-10.29	130	Uganda	12.71	-7.14
89	Namibia	25.27	+7.36	131	Afghanistan	11.81	-2.40
90	Montenegro	23.70	-2.78	132	Sierra Leone	11.56	-2.69
91	Egypt	23.65	+0.63	133	Zimbabwe	11.53	-1.50
92	Cuba	23.13	-8.59	134	Lesotho	11.28	-1.72
93	Costa Rica	23.02	-12.31	135	Fiji	11.15	-5.58
94	Albania	22.54	-4.37	136	Aruba	11.01	-2.94
95	Zambia	22.39	+6.85	137	Papua New Guinea	10.78	+5.54
96	Barbados	22.26	-5.23	138	Solomon Islands	10.47	+5.35
97	Cape Verde	22.13	-7.96	139	Malawi	10.46	-2.47
98	Dominican Republic	22.07	-17.60	140	Kuwait	10.42	-11.48
99	Tanzania (United Rep.)	20.77	-6.70	141	Liberia	10.17	+7.26
100	Rwanda	20.61	-1.18	142	Swaziland	10.15	-0.90
101	Maldives	20.46	-7.44	143	Bangladesh	10.02	-5.78
102	Côte d'Ivoire (Rep.)	19.73	-1.02	144	Mauritania	9.74	-4.58
103	Madagascar	19.29	-5.39	145	Panama (Rep.)	9.63	-6.54
104	Iraq	19.19	+3.83	146	Congo (Rep.)	9.59	-0.84
105	Togo	18.95	-0.87	147	Burkina Faso	9.41	-1.87
106	Trinidad and Tobago	18.44	-4.12	148	Antigua and Barbuda	9.27	-0.36
107	Tonga	17.07	-5.63	149	St. Kitts and Nevis	8.89	-1.31
108	Sudan	17.04	-5.73	150	Kiribati	8.52	-2.60
109	Seychelles	16.76	-3.32	151	Bahamas	8.44	-8.57
110	El Salvador	16.58	-9.01	152	State of Libya	7.92	-1.07
111	Uzbekistan	16.21	-3.46	153	Dominica	7.40	+3.50
112	Ecuador	16.01	-2.19	154	Niger	7.37	-0.46
113	Botswana	15.65	-3.36	155	Gabon	7.16	-2.12
114	Djibouti	15.08	-3.70	156	Chad	7.14	+0.65
115	Uruguay	15.01	-1.22	157	St. Vincent and the Gren.	6.47	-0.04
116	Benin	14.83	+0.03	158	Tuvalu	6.21	-3.63
117	Paraguay	14.72	-7.05	159	Mali	6.13	+6.13
118	Burundi	14.34	-4.24	160	Suriname	6.02	-6.36
119	Guyana	14.12	+1.92	161	Eritrea	5.41	-0.31
120	Angola	14.12	-10.87	162	Samoa	4.73	-1.39
121	Belize	14.06	-1.89	163	Bhutan	4.11	-5.23
122	Myanmar	13.94	-4.29	164	Brunei Darussalam	4.00	-2.40
123	Comoros	13.91	-0.08	165	Gambia	3.01	
124	Saint Lucia	13.74	+0.69	166	Vanuatu	2.48	-4.31
125	Honduras	13.38	-17.19	167	Mozambique	0.42	-1.31
126	Dem. Rep. of the Congo	13.27	-4.21	168	Haiti	0.00	-0.34

3- Changes in reliability around the world

Adapting to a new reality

One of the main characteristics of the COVID-19 crisis has been its sudden and lasting impact on logistics and mobility. As the pandemic struck, international travel became, at first, severely restricted, causing major disruptions in international logistics and postal supply chains. The first wave of lockdowns generated a temporary shock that was later followed by permanent changes in the ways of doing business.

In this context, postal operators had to adapt to a “new normal” characterized by increased operational costs and shortages of labour supply. While the effect of these disruptions on postal volumes has already been documented,^{ix} little is known about the changes in operational efficiency.

This section aims to provide answers to two essential questions that may help gauge the effect of the crisis in terms of operational performance. First, did delivery times at the domestic level increase between 2019 and 2020? And second, did delivery times already revert to their pre-crisis levels in 2021 as measures were eased and operators learned from the experience?

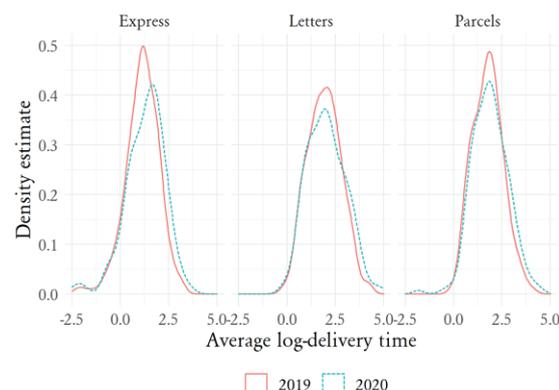
Impact of the COVID-19 pandemic on postal reliability in 2020

The UPU’s Postal Technology Centre (PTC) collects information on tracking events for barcoded mail items. The EMSEVT standard, used by postal operators to exchange information on the location of mail items, allows for the construction of a database of domestic delivery times, which is used for calculating the reliability pillar of the 2IPD.

In order to capture the impact of the COVID-19 pandemic on domestic reliability, a database of tracking events from the EMSEVT standard is used for the years 2019 and 2020, representing a total of 1.26 billion tracking events. For each year and territory, the average, standard deviation, median and coefficient of variation of domestic delivery times are computed for all three major categories of mail, i.e. letters (up to 2 kg), parcels (2–30kg) and express.

Figure 12 shows the two non-parametric densities to fit the data for 2019 and 2020. It appears that the statistical distribution for the three mail classes considered has changed between 2019 and 2020. In particular, there is a marked increase in dispersion as the mode for each distribution in 2020 is lower than its counterpart in 2019.

Figure 12 COVID-19 impact on delivery times



Source: UPU, 2019-2020 EMSEVT tracking messages.
Notes: Non-parametric density estimate based on country-level means.

In order to understand if the graphical observation is corroborated by statistical tests, a series of robustness checks is performed. The empirical exercise tests the assumption that the means in 2019 and 2020 were the same, with the alternative hypothesis being that they were different. The hypothesis of equality is clearly rejected by the data (see Table 2) with 95% confidence. This would imply that, on average, delivery times increased owing to the pandemic in 2020.

Table 2 Statistical difference between 2019 and 2020 delivery times

	H ₀	H _a	p-value	t-stat
Letters	equality	2019<2020	0.03	-1.83
Parcels	equality	2019<2020	0.03	-1.90
Express	equality	2019<2020	0.01	-2.57

Source: Authors’ calculations based on EMSEVT messages.

Notes: One sided t-tests for equality of means.

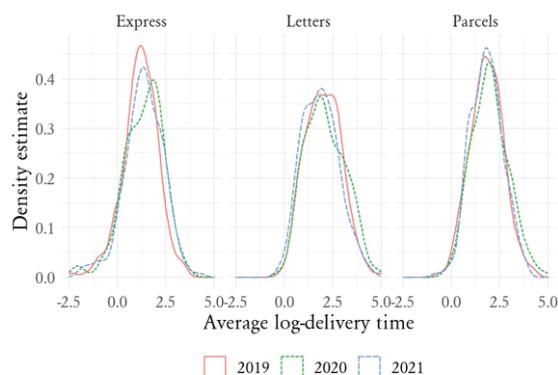
A return to normal in 2021?

The wealth of data collected by the PTC also allows us to test whether a return to pre-crisis levels of operational efficiency is already visible in 2021 based on the latest available data. At the time of writing of this report, 2021 is still ongoing. It is possible, however, to carry out a comparative analysis of tracking events over the first eight

months of each year in 2019, 2020 and 2021 in order to identify patterns.

Figure 13 shows that 2020 has indeed been the year with the most dispersion and that 2021 appears to suggest a return to levels experienced in 2019.

Figure 13 COVID-19 impact and recovery

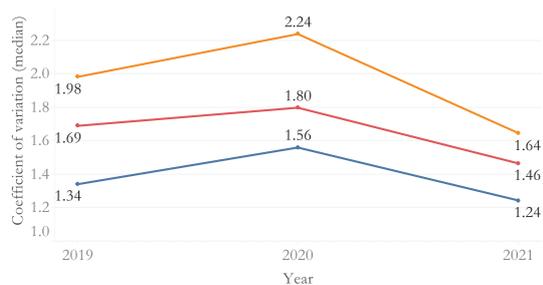


Source: UPU, 2019-2021 EMSEVT tracking messages.
Notes: Non-parametric density estimate based on country-level means. Averages between January 1st and July 31st.

Zooming closer, Figure 14 displays the trajectory of the median coefficient of variation of domestic delivery times. It shows that at least 50% of countries have witnessed an increase in the dispersion of their domestic delivery times around the mean in 2020 and a return to the pre-crisis trend in 2021.

By looking at the within variation in the average

Figure 14 Trajectory of the coefficient of variation



Mail Class
Express Letters Parcels

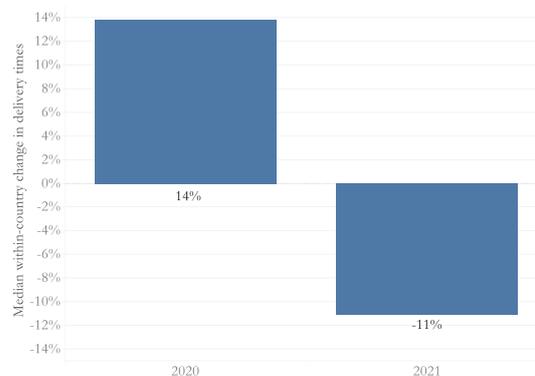
Source: UPU, EMSEVT messages.
Notes: World median of country-level coefficients of variation of delivery times.

delivery time around the world, Figure 15 shows the median year-on-year evolution of average domestic delivery times. The figures support the message that following a clear deterioration in 2020, 2021 has seen substantial improvements in operational efficiency. Moreover, Appendix 2 shows that this has been the case across all regions.

With numerous observations available by date, country, mail class and other dimensions, the

nature of the data allows for a panel data analysis that controls for unobserved country effects.^x The methodology allows us to test the significance of time effects, which in turn provides the degree of the disruption observed between countries.

Figure 15 Median within-country year-on-year change in domestic delivery times



Source: UPU, EMSEVT messages.
Notes: Median of the within-country percentage change in average domestic delivery times.

Taking into consideration unobserved country effects and unobserved mail class effects, the estimates suggest that the **COVID-19 pandemic provoked an increase in the average (+13%) and in the standard deviation (+23%) of delivery times in 2020** with respect to 2019. Conversely, there has not been any observed statistical difference between the average delivery times in 2019 and those in 2021, corroborating once again the idea of a return to pre-crisis levels in this latter year.

Conclusion

As indicated by the UN Secretary General, since the outbreak of the COVID-19 virus, vast gaps have been opening between countries, threatening to “create a sharply diverging post-pandemic world” and potentially resulting in “a lost decade for development”. António Guterres thus advocates investing in sustainable, resilient and equitable recovery, while reforming the institutional and policy architecture, strengthening multilateralism and creating new platforms and networks for global cooperation.^{xi}

Such comments would also be particularly relevant to the postal sector, with the aggravating factor that the latter had already been diverging from the evolution of the wider real economy well before the emergence of COVID-19, in a long-term phenomenon known as “postal decoupling”. Indeed, since 2005, the economic size of the sector – understood as the sum of traditional operators – had already been shrinking in relative terms, in spite of a booming e-commerce trend.

As the pandemic struck, the sector was hit particularly hard, with a 20% volume drop in international exchanges, and worldwide operating revenue losses estimated at between 4.5 and 6.5 billion SDR.^{xii}

Over the same period, postal services were often considered as essential, either by being referred to as such by media outlets and decision makers, or simply by being allowed to continue to operate in the midst of stringent lockdowns.^{xiii}

Yet, in spite of sizeable stimulus packages introduced by governments around the world – close to 9,930 billion USD according to the IMF^{xiv} –, there is still a lack of readily available evidence of a surge in financial support to postal services in recent years. The same remark applies to international bodies that support light-logistics networks.

Ceteris paribus, the gaps in postal development evidenced in this report are thus unlikely to be overcome in the foreseeable future. Most probably, countries with the most developed postal services will continue to race ahead, diversifying their offering and eventually reaping the benefits of strongly interconnected global supply chains, boosted by e-commerce. In such cases, an existing infrastructure with great capillarity would be used

as an asset to distribute a wide range of services beyond letter mail.

In contrast, developing countries with struggling postal operators are likely to face an even more daunting task when attempting to recover from declining letter-mail traffic and successfully diversify into new services. In those cases where the national postal infrastructure is weak, the degree of rethinking of existing policies and the increase in investments will need to be even more substantial.

Although the crisis is still not over, there are also grounds for more positive perspectives. E-commerce continues its ascent, constituting a reservoir of opportunities for all participants in postal markets. Thanks to an existing global network that is well established across 192 nations, traditional postal operators can also attempt to bank on the prospects offered by their international activities, not only as a means of generating revenue, but also as an avenue for sharing experiences and adopting best practices.

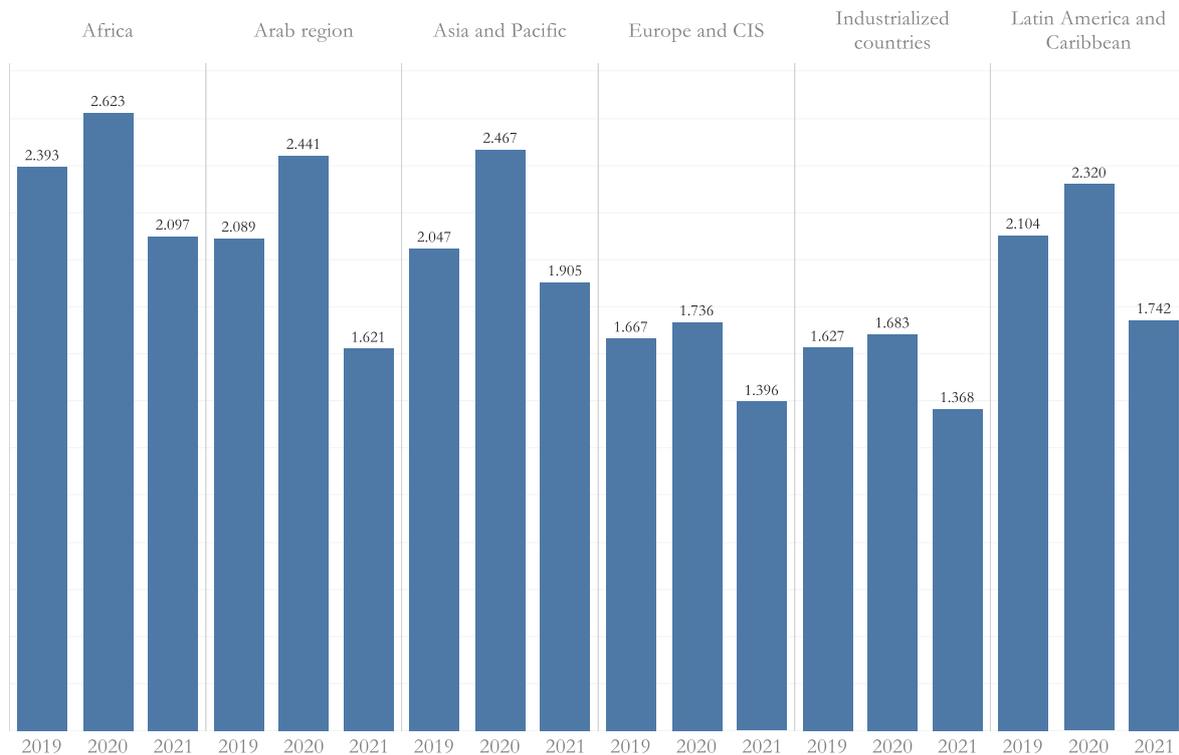
In this endeavour, countries would benefit from making use of the platforms and networks for global cooperation offered by the UPU, supported by tools such as the 2IPD.

Appendix 1: Regional classification and list of countries

ISO 2 UPU Region							
AE	Arab Region	DK	IC	KZ	Europe and CIS	QA	Arab Region
AF	Asia Pacific	DM	Latin America and Caribbean	LA	Asia Pacific	RO	Europe and CIS
AG	Latin America and Caribbean	DO	Latin America and Caribbean	LB	Arab Region	RS	Europe and CIS
AL	Europe and CIS	DZ	Arab Region	LC	Latin America and Caribbean	RU	Europe and CIS
AM	Europe and CIS	EC	Latin America and Caribbean	LK	Asia Pacific	RW	Africa
AO	Africa	EE	Europe and CIS	LR	Africa	SA	Arab Region
AR	Latin America and Caribbean	EG	Arab Region	LS	Africa	SB	Asia Pacific
AT	IC	ER	Africa	LT	Europe and CIS	SC	Africa
AU	IC	ES	IC	LU	IC	SD	Arab Region
AW	Latin America and Caribbean	ET	Africa	LV	Europe and CIS	SE	IC
AZ	Europe and CIS	FI	IC	LY	Arab Region	SG	Asia Pacific
BA	Europe and CIS	FJ	Asia Pacific	MA	Arab Region	SI	Europe and CIS
BB	Latin America and Caribbean	FR	IC	MD	Europe and CIS	SK	Europe and CIS
BD	Asia Pacific	GA	Africa	ME	Europe and CIS	SL	Africa
BE	IC	GB	IC	MG	Africa	SN	Africa
BF	Africa	GE	Europe and CIS	MK	Europe and CIS	SR	Latin America and Caribbean
BG	Europe and CIS	GH	Africa	ML	Africa	SV	Latin America and Caribbean
BH	Arab Region	GN	Africa	MM	Asia Pacific	SY	Arab Region
BI	Africa	GR	IC	MN	Asia Pacific	SZ	Africa
BJ	Africa	GY	Latin America and Caribbean	MR	Arab Region	TD	Africa
BN	Asia Pacific	HN	Latin America and Caribbean	MT	Europe and CIS	TG	Africa
BR	Latin America and Caribbean	HR	Europe and CIS	MU	Africa	TH	Asia Pacific
BS	Latin America and Caribbean	HT	Latin America and Caribbean	MV	Asia Pacific	TN	Arab Region
BT	Asia Pacific	HU	Europe and CIS	MW	Africa	TO	Asia Pacific
BW	Africa	ID	Asia Pacific	MX	Latin America and Caribbean	TR	Europe and CIS
BY	Europe and CIS	IE	IC	MY	Asia Pacific	TT	Latin America and Caribbean
BZ	Latin America and Caribbean	IL	IC	MZ	Africa	TV	Asia Pacific
CA	IC	IN	Asia Pacific	NA	Africa	TZ	Africa
CD	Africa	IQ	Arab Region	NE	Africa	UA	Europe and CIS
CG	Africa	IR	Asia Pacific	NG	Africa	UG	Africa
CH	IC	IS	IC	NL	IC	US	IC
CI	Africa	IT	IC	NO	IC	UY	Latin America and Caribbean
CL	Latin America and Caribbean	JM	Latin America and Caribbean	NP	Asia Pacific	UZ	Europe and CIS
CM	Africa	JO	Arab Region	NZ	IC	VC	Latin America and Caribbean
CN	Asia Pacific	JP	IC	OM	Arab Region	VE	Latin America and Caribbean
CO	Latin America and Caribbean	KE	Africa	PA	Latin America and Caribbean	VN	Asia Pacific
CR	Latin America and Caribbean	KG	Europe and CIS	PE	Latin America and Caribbean	VU	Asia Pacific
CU	Latin America and Caribbean	KH	Asia Pacific	PG	Asia Pacific	WS	Asia Pacific
CV	Africa	KI	Asia Pacific	PH	Asia Pacific	ZA	Africa
CY	Europe and CIS	KM	Arab Region	PK	Asia Pacific	ZM	Africa
CZ	Europe and CIS	KN	Latin America and Caribbean	PL	Europe and CIS	ZW	Africa
DE	IC	KR	Asia Pacific	PT	IC		
DJ	Arab Region	KW	Arab Region	PY	Latin America and Caribbean		

Appendix 2: Regional graphs

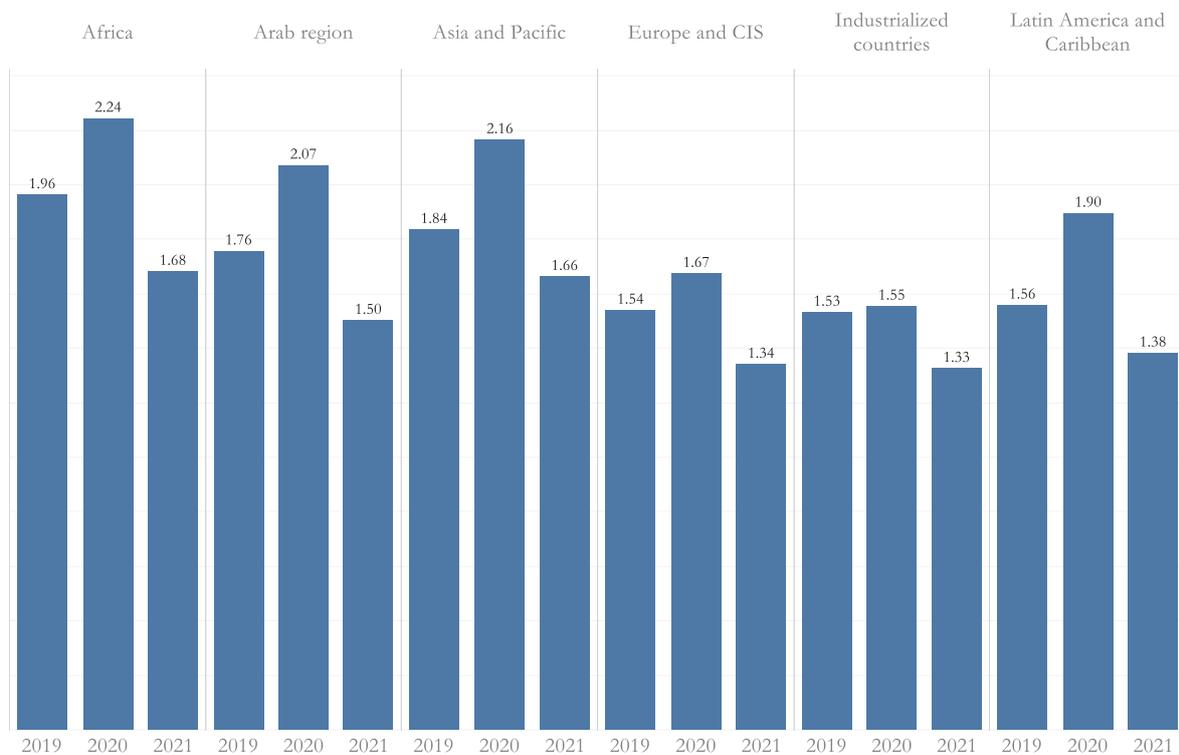
Figure 16 Regional evolution: average coefficient of variation, domestic delivery times



Source: UPU, EMSEVT messages.

Notes: Simple average at the regional level.

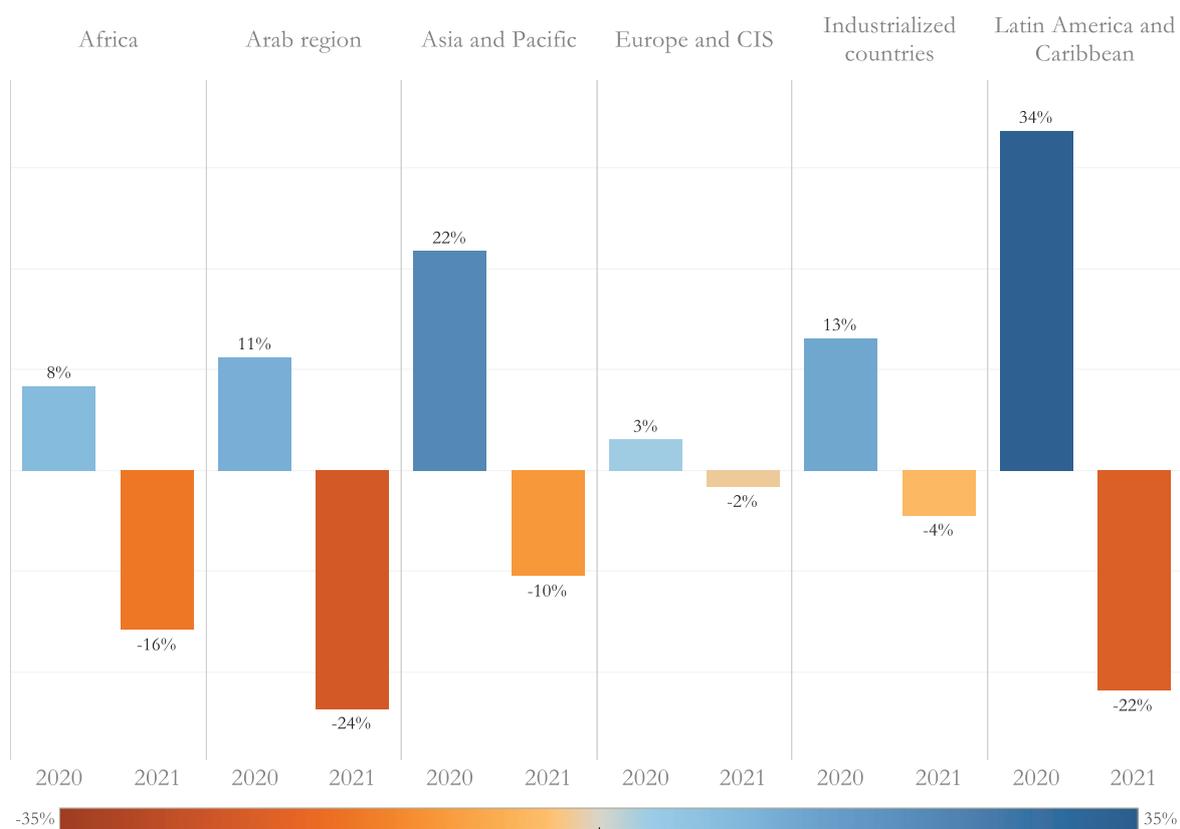
Figure 17 Regional evolution: median coefficient of variation, domestic delivery times



Source: UPU, EMSEVT messages.

Notes: Median at the regional level.

Figure 18 Regional evolution: median year-on-year within-country change in domestic delivery times



Source: UPU, EMSEVT messages.

Notes: Regional median of the within-country variations in average delivery times.

Appendix 3: Estimating the impact of the COVID-19 pandemic on average delivery times

Estimation of the effect of the COVID-19 pandemic relies on a panel data regression of average delivery times around the world. For each country, i , mail segment, m , and year, t , the following model is estimated for log-average delivery time, $\ln \mu$,

$$\begin{aligned} \ln \mu_{imt} &= \alpha_i + \gamma_m + \delta_t + \epsilon_{imt}, \\ \epsilon &\sim \text{IID}(0, \sigma^2), \\ i &= 1, \dots, 196; \\ m &\in \text{Letters, Parcels, Express}, \\ t &= 2019, 2020, 2021. \end{aligned}$$

The coefficients of interest are the dummy variables corresponding to the year 2020 and 2021 which serve as an empirical test on the question of the increase in 2020 or 2021 with respect to 2019.

The regression results for this simple model are shown in Table 3.

Table 3 Estimation results: average delivery times

Coefficient	Dep. variable: $\ln \mu$	Std. error	t-stat
2020	0.1248 ***	0.0307	4.0638
2021	0.0033	0.0308	0.1088

Source: Authors' calculations.

Notes: Mail class and country fixed effects included.

Significance levels: $p < 0.01$ ***, $p < 0.05$ ** , $p < 0.1$ *

Additionally, we test an equivalent model for both the coefficient of variation and the standard deviation of domestic delivery times.

Table 4 Estimation results: coefficient of variation

Coefficient	Dep. variable: log-coefficient of variation	Std. error	t-stat
2020	0.0940 ***	0.0421	4.4124
2021	-0.1800 ***	0.0422	-8.4055

Source: Authors' calculations.

Notes: Mail class and country fixed effects included.

Significance levels: $p < 0.01$ ***, $p < 0.05$ ** , $p < 0.1$ *

Appendix 4: Methodology for calculating the 2IPD

1. General concept and notation

The 2IPD measures the comparative performance of countries in terms of postal development. As a composite index, the individual final scores are based on several components, called sub-variables. These sub-variables are (conceptually) grouped into four pillars: reach, reliability, relevance and resilience. Sub-scores are computed for each of these pillars and then consolidated into the final score, which takes a value between 0 and 100.

The scores are constructed sequentially and hierarchically in the following manner:

- A sub-variable is rescaled between 0 and 100, i.e. the minimum (or the maximum) value;
- The rescaled sub-variables are weighted and added together in a given sequence;
- The above-mentioned sum is rescaled again between 0 and 100.

In the description of the 2IPD methodology presented henceforth, a vector notation will be used, with vectors and matrices expressed in bold print. Let \mathbf{a}_i be the value of a sub-variable a for the country i . In order to denote a collection of values of a for countries $i = 1 \dots k$ the individual values \mathbf{a}_i are grouped into a vector: $\mathbf{a} = (\mathbf{a}_1, \dots, \mathbf{a}_k)^T$.

The rescaling of the vector \mathbf{a} is done by multiplying it by a diagonal matrix \mathbf{S} with typical elements defined as:

$$\begin{aligned} \mathbf{S}[i, i] &= 100 \frac{\min_k \mathbf{a} - \mathbf{a}[i]}{\min_k \mathbf{a} - \max_k \mathbf{a}}, \\ \mathbf{S}[i, j] &= 0 \text{ for } i \neq j \end{aligned} \quad (1.1)$$

Thus, the vector \mathbf{Sa} contains the scores for the sub-variable normalized between 0 and 100.

2. Reach score

2.1 Reach: concept and data sources

The reach score is based on the degree of (international) connectivity of the postal network. The connectivity is measured by the number of outbound partners and the number of outbound items for each mail segment (letters, parcels and express). The higher the number of partners and the volume expressed in items, the higher the reach score.

The data needed to compute the reach scores are contained in the pre-advice of dispatch (PREDES) EDI messages gathered by the UPU.

2.2 Notation

The notation is as follows:

K	is the number of countries for which scores are computed
A	is the set of sending (origin) countries.
B	is the set of destination countries
$A \times B$	is the set of all possible country-to-country flows
$O_i D$	is the multiset of all country-to-country registrations for the origin country i in the PREDES file. Each country-to-country flow in this multiset belongs to $A \times B$ but some flows may appear many times (it may occur that $ O_i D > A \times B $).
n_{ijdc}	is the number of items dispatched from country i to country j on date d for mail class c ($c \in \{\text{"letters"}, \text{"parcels"}, \text{"express"}\}$).

2.3 Sub-variables

Two sub-variables take part in the calculation of the reach score. First, the number of partners is the number of distinct (unique) destination partners for the given origin country i (the cardinal number of the support of the multiset $O_i D$), which is defined as:

$$rpartners_i =: |supp O_i D|, \quad (2.1)$$

Second, the total number of items, in logarithmic scale, dispatched from country i regardless of mail class.

$$rvolume_i =: \ln(\sum_c \sum_d \sum_j n_{ijdc}) \quad (2.2)$$

2.4 Calculation of reach score

The last step consists in applying transformation (1.1) to the two sub-variables and standardizing the average between the two between 0 and 100. In vector notation this leads to:

$$\mathbf{reach} = : S(\mathbf{S rpartner} + \mathbf{S rvolume}) \quad (2.4)$$

The components of the vector **reach** are the individual reach scores corresponding to each country.

3. Reliability score

3.1 Reliability: concept and data sources

The reliability score is based on the performance of a given country in terms of speed and predictability of delivery of incoming items, as measured by the tracking events recorded in EMS item events (EMSEVT) EDI messages, collected by the UPU through the PTC. The underlying assumption for measuring quality of service this way is that performance should not be assessed according to delivery standards, which are more arbitrary and may vary considerably from one country to another. Instead, the assumption is that high performing Posts are those that can deliver mail within an acceptable average time, with a reasonable amount of variability from this average. The total score of the pillar is based on two main sub-variables, speed of delivery and predictability of delivery.

3.2 Notation

The following notation applies:

T_{cij} is the time elapsed between scanning of the event HI and event D, in country i , for item j belonging to the category of mail c ($c \in \{\text{"letters"}, \text{"parcels"}, \text{"express"}\}$)

avT_{ci} is the average time T_{ci} for mail class c and country i . In other terms:

$$avT_{ci} = \frac{1}{N_{ci}} \sum_{j=1}^{N_{ci}} T_{cij}, \quad (3.1)$$

where N_{ci} is the number of valid observations (scanned items) for mail category c in country i

sdT_{ci} is the standard deviation of observations T_{cij} from mean avT_{ci} .

$$sdT_{ci} = \sqrt{\frac{\sum_{j=1}^{N_{ci}} (T_{cij} - avT_{ci})^2}{N_{ci} - 1}}, \quad (3.2)$$

where N_{ci} is the number of valid observations (scanned items) for mail category c in country i .

3.3 Sub-variables

There are two main sub-variables that have to be computed. First, the speed of delivery, defined as:

$$rspeed_i =: \frac{1}{N_i} \sum_{c=1}^{N_i} avT_{ci}, \quad (3.3)$$

The speed of delivery, $rspeed_i$, is the average across mail classes of avT_{ci} for country i . N_i represents the number of different mail classes (letters, parcels, express) in country i .

The second sub-variable is the predictability of delivery, defined as:

$$rpredi_i =: \frac{1}{N_i} \sum_{c=1}^{N_i} sdT_{ci} \quad (3.4)$$

Once again, this is the simple average of sdT_{ci} over valid mail classes for country i . Here too, N_i is the number of valid avT_{ci} times for the country i .

3.3 Calculation of reliability scores

The last step for the reliability pillar consists in applying transformation (1.1) to the two sub-variables and standardizing the average between the two between 0 and 100.

Notice that in the case of both $rspeed_i$ and $rpredi_i$, the lower the value, the better the performance. Therefore the standardization needed, using the vector notation, is:

$$Srspeed = S(-rspeed) \quad (3.5)$$

$$Srpredi = S(-rpredi) \quad (3.6)$$

The final reliability scores are obtained by rescaling the sum between the two:

$$reliability = : S(Srspeed + Srpredi) \quad (3.7)$$

This leads to the final reliability scores.¹

¹ These final scores are compared with reach scores in order to control for countries with very few observations.

4 Relevance score

4.1 Relevance: concept and data sources

The relevance score measures the degree of competitiveness of a given operator in its most important business segment (letters, parcels, financial services) as well as the density of its infrastructure. To this end, the most important business segment is first identified, then compared with the best performing operator for this segment in the world. The (rescaled) distance from the best performing operator becomes the first sub-variable. The second sub-variable is the rescaled number of permanent postal offices per capita. Contrary to what is done for the previous pillars, the sub-scores of relevance do not receive the same weight in the final calculation. The data needed to compute the relevance score is derived from the official UPU Postal Statistics and UN statistics (for population data).

4.2 Notation

The following notation is used:

k	is the number of countries for which scores are computed for the given year
$vpal_i$	is the percentage of revenue generated by the letter post for the given country i . If not available for the given year, the latest value from the last five years is taken.
$vcoll_i$	is the percentage of revenue generated by parcel post and logistics. If not available for the given year, the latest value from the last five years is taken.
$vsfp_i$	is the percentage of revenue generated by the financial postal services. If not available for the given year, the latest value from the last five years is taken.
$palint_i$	is the number of domestic letter-post items in country i .
$palexpi$	is the number of international exported letter-post items in country i .

$popul_i$ is the population of country i .
 $bseden_i$ is the value of permanent post offices (including outsourced ones) in country i

4.3 Sub-variables

Before identifying the most important transaction segment it is necessary to define a certain number of variables.

$tpal_i$ is the number of letter post transactions per capita in country i

$$tpal_i =: \frac{palint_i + palexp_i}{popul_i}, \quad (4.1)$$

$tcoll_i$ is the number of postal transactions attributed to parcel post, but expressed in “letter post units”

$$tcoll_i =: \begin{cases} \frac{vcol_i}{vpal_i} tpal_i, & vpal_i \neq 0 \text{ and available} \\ 0, & \text{otherwise} \end{cases} \quad (4.2)$$

$tsfp_i$ is the number of postal transactions attributed to postal financial services, expressed in “letter post units”.

$$tsfp_i =: \begin{cases} \frac{vsfp_i}{vpal_i} tpal_i, & vpal_i \neq 0 \\ 0 & \text{otherwise} \end{cases} \quad (4.3)$$

$infra_i$ is the number of permanent post offices per capita in country i .

$$infra_i =: \frac{bseden_i}{popul_i}, \quad (4.4)$$

4.4 Identification of top-performing segments

The observations $tpal_i, tcoll_i, tsfp_i, infra_i$ are stacked up for all countries into vectors $tpal, tcoll, tsfp, infra$, which in turn are rescaled according to (1.1). This yields four vectors: $Stpal, Stcoll, Stsfp, Sinfra$. At this point it is necessary to identify, for each country, its most important segment, $Strans_i$, which is defined as:

$$Strans_i =: \max\{Stpal_i, Stcoll_i, Stsfp_i\} \quad (4.5)$$

4.5 Calculation of relevance scores

The relevance scores are the following linear combination of $Strans$ and $Sinfra$:

$$relevance =: S(0.75 * Strans + 0.25 * Sinfra). \quad (4.6)$$

5 Resilience scores

5.1 General concept and data source

The resilience score relies on a number of factors, which determine a postal operator's adaptability to economic, social, technological and environmental shocks.

Firstly, a combination of factors such as the mail volumes decline rate, the level of economies of scale achieved by the postal mail delivery network or the degree of diversification in terms of postal revenues measures the level of economic strength of a given postal business model in response to both macroeconomic and technological shocks.

Secondly, the potential for delivering financial inclusion through the postal network constitutes a measure of the level of social resilience provided by postal operators in order to mitigate economic and social inequalities within any given country.

The data needed to compute the resilience score is sourced from the official UPU Postal Statistics, as well as the UPU's Global Panorama on Financial Inclusion.

In most cases, the key variables are transformed into scores which are functions of critical value thresholds.

5.2 Notation

Let us denote by:

k	is the number of countries for which scores are computed for the given year.
$vpal_i$	is the proportion of revenue generated by letter post for the given country i .
$vcol_i$	is the proportion of revenue generated by parcel post and logistics.
$vsfp_i$	is the percentage of revenue generated by financial postal services.
$vaut_i$	is the percentage of revenue generated by other services.
$palint_i$	is the number of domestic letter-post items in country i for the given year
$palexp_i$	is the number of international exported letter-post items in country i for the given year
$palint_prev_i$	is the number of domestic letter-post items in country i three years ago

$palexp_prev_i$ is the number of international exported letter-post items in country i three years ago

$popul_i$ is the population of country i for the given year

5.3 Computation of sub-variables

$vdec_i$ is the ratio of decline of letter-post volumes

$$vdec_i = \frac{palint_i + palexp_i}{palint_prev_i + palexp_prev_i} \quad (5.1)$$

$veco_i$ is the number of letter-post items per capita

$$veco_i = \frac{palint_i + palexp_i}{popul_i} \quad (5.2)$$

$sdec_i$ is the indicator of letter post decline in country i

$$sdec_i = \frac{1}{1 + e^{-10(vdec_i - 0.9)}}, \quad (5.3)$$

This function takes values between 0 and 1. If the ratio of decline of letter post is below the threshold of 0.9 the function rapidly tends to zero.

Conversely, above the threshold it rapidly tends to 1.

$seco_i$ is the indicator of economies of scale for country i (threshold = 15).

$$seco_i = \frac{1}{1 + e^{-(veco_i - 15)}}, \quad (5.4)$$

$seor_i$ is the indicator of concentration on other services than postal business

$$seor_i = \frac{1}{1 + e^{(vaut_i - 33.3)}} \quad (5.5)$$

Above the threshold of 33.3% the function tends rapidly to 0, below the threshold to 1.

$scon_i$ is the indicator of diversification of services in country i

$$scon_i = \sqrt{(1 - vpal_i)(1 - vcol_i)(1 - vsfp_i)}, \quad (5.6)$$

The variables $vpal_i$, $vcol_i$, $vsfp_i$ are the relevant proportions of revenue generated by the given service, and here they are represented by values between 0 and 1 and not, as in postal statistics, in percentages. The higher the diversification, the greater the function value. If the arguments are

missing the function will get the value of 0.

$fincl_i$ is the individual score of country i in Postal Financial Potential Success Index as found in the UPU's Global Panorama for Financial Inclusion.

5.4 Calculation of resilience scores

First, we compute the variable of economic resilience. To this end, for each country i we sum together the four variables computed according to (5.3), (5.4), (5.5), (5.6):

$$ecores_i = sdec_i + seco_i + scon_i + seor_i, (5.7)$$

Then, the variables $ecores_i$ and $fincl_i$ are assembled into vectors ***ecores***, ***fincl***, which in turn are rescaled according to (1.1). This yields two vectors, ***Secores***, ***Sfincl***.

The final resilience scores are computed according to the usual formula:

$$resilience = :S(Secores + Sfincl). (5.8)$$

6. The 2IPD scores

Once all the scores for the four pillars have been computed, the final 2IPD scores can be obtained. For each country, the sum of the four scores is taken and then rescaled according to (1.1).

$$2IPD = :S(reach + reliability + relevance + resilience). (6.1)$$

Endnotes

ⁱ The WHO publishes weekly situation reports on the COVID-19 pandemic. Detailed information is available at the link: www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports.

ⁱⁱ World Bank (2021). Global Economic Prospects, June 2021.

ⁱⁱⁱ United Nations (2021). Liquidity and debt solutions to invest in the SDGs : the time to act is now, March 2021.

^{iv} UPU (2019). Postal Economic Outlook, page 10.

^v UPU (2019). Postal Development Report.

^{vi} By traditional postal operators, the report refers to the postal operators designated by member countries in order to fulfil the obligations with the UPU; they are also commonly known as designated operators or DOs.

^{vii} The regional categories used in this report are available in Appendix 1.

^{viii} The discussion revolves around the quantiles of the 2IPD statistical distribution.

^{ix} UPU (2020). Postal Economic Outlook.

^x The methodology is depicted in Annex 3.

^{xi} United Nations, Inter-agency Task Force on Financing for Development, Financing for Sustainable Development Report 2021. (New York: United Nations, 2021), available from:

<https://developmentfinance.un.org/>

^{xii} UPU (2020). Postal Economic Outlook.

^{xiii} UPU (2020). The COVID-19 crisis and the postal sector.

^{xiv} IMF (2021). Database of Fiscal Policy Responses to COVID-19, figures up to March 2021.

www.imf.org/en/Topics/imf-and-covid19/Fiscal-Policies-Database-in-Response-to-COVID-19

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