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# Mobile Usage baskets to measure ICT Sector Performance

Stephen Esselaar and Christoph Stork

## Abstract

This paper aims to address two questions. Firstly, whether the OECD mobile usage baskets from December 2017 are suitable tools to measure ICT sector performance in developing countries and, secondly, to identify issues that require a regulatory or policy response. This paper uses prices collected in January 2018 from 100 countries, 547 mobile operators and 2560 prepaid products from the Global South to assess the suitability of the OECD basket methodology for ICT policy making and regulation. We propose a simple index that can be compiled using ITU data to measure the drivers of the separation of mobile access and service platforms.

## Introduction

The Organisation for Economic Co-operation and Development (OECD) published its new mobile telephony basket definitions in December 2017. Benchmarking prices using user baskets is a well established method to understand price trends and the basket methodology is most recognized as an inflation measure, among other things (Esselaar et al, 2017b). In the fractured telecom sector, where new products and prices are introduced weekly or even daily, price baskets allow comparisons between operators and between countries. Price baskets can identify trends, new business strategies and the need for a regulator to intervene. Price baskets can show what strategies new entrants are adopting in order to compete against incumbent operators and identify predatory pricing. The basket methodology make it possible to compare products, that otherwise would be different in too many of the product attributes.

Price matches demand and supply and is therefore the entry point to understand the competitiveness of a country's ICT sector. High prices, especially when benchmarked against similar countries, are an indicator that there is ineffective competition. The causes of the lack of effective competition need to be investigated and prices play a role in monitoring the effectiveness of regulatory intervention. Continued high prices would indicate that policy and regulatory interventions have failed. Prices trending towards benchmarked averages indicate that policy and regulatory interventions are succeeding. Prices below cost may indicate predatory prices.

The OECD December 2017 update of mobile usage baskets was long overdue since the previous basket only included voice and SMS for mobile baskets. Data is driving revenue growth, while voice and SMS revenues have been declining in some instances. In some countries, data revenues are higher than voice and SMS and are still growing rapidly. The new price baskets capture the trend towards data and allow comparisons between different data products, between operators and countries.

This paper uses a database of prices collected in January 2018 from 100 countries, 547 mobile operators and 2560 prepaid products from the global south. Pricing trends in Asia are used to assess the suitability of the OECD basket methodology for ICT policy making and regulation. Asia is currently the most innovative region in terms of new products and pricing regimes. Innovative pricing systems and new products that are introduced in Asia and these migrate to Africa and South America. Asia is also the region where access and service platforms are increasingly separated due to OTT usage and flat rate access pricing. Operators in Asia

are aggressively driving data usage and looking at new business models to encourage higher data usage by subscribers.

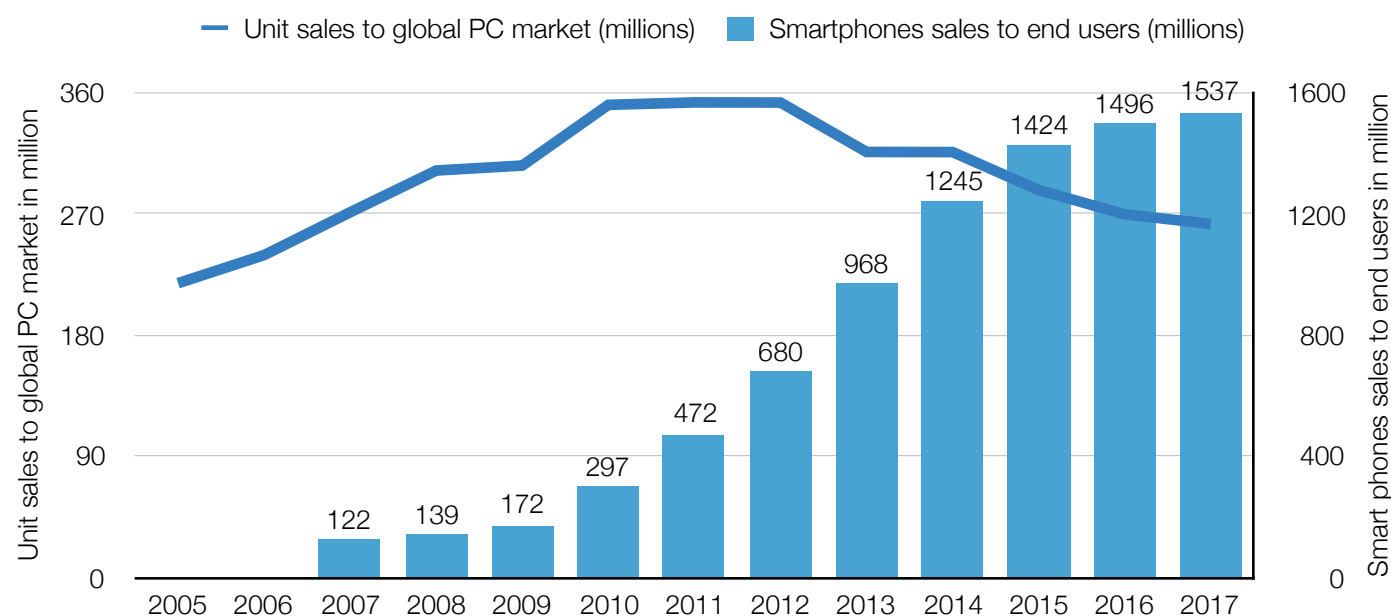
The aim of this report is to assess whether the 2017 OECD basket definitions are suitable tools to monitor these developments and to aid regulators and policymakers in understanding the market.

## Global telecommunication trends

Two trends have had an impact on the ICT sector: the shift from personal computers (PCs) to smartphones for internet access and the separation of access and service platforms for mobile telephony. Both are being driven by social media such as Facebook and other Over The Top (OTT) applications.

### Smartphones have replaced PCs

PC sales peaked in 2012 and the arrival of mobile broadband coincided with the PCs long term decline. For developing countries, prepaid mobile broadband via a mobile phone or tablet is much easier, cheaper and more accessible compared to PC based internet access (Stork et al 2013). Smartphones are cheaper, do not rely on a permanent electricity connection, billing is pro poor and the skills barrier to internet use is far lower on a smart phone compared to a PC (Stork et al 2014).



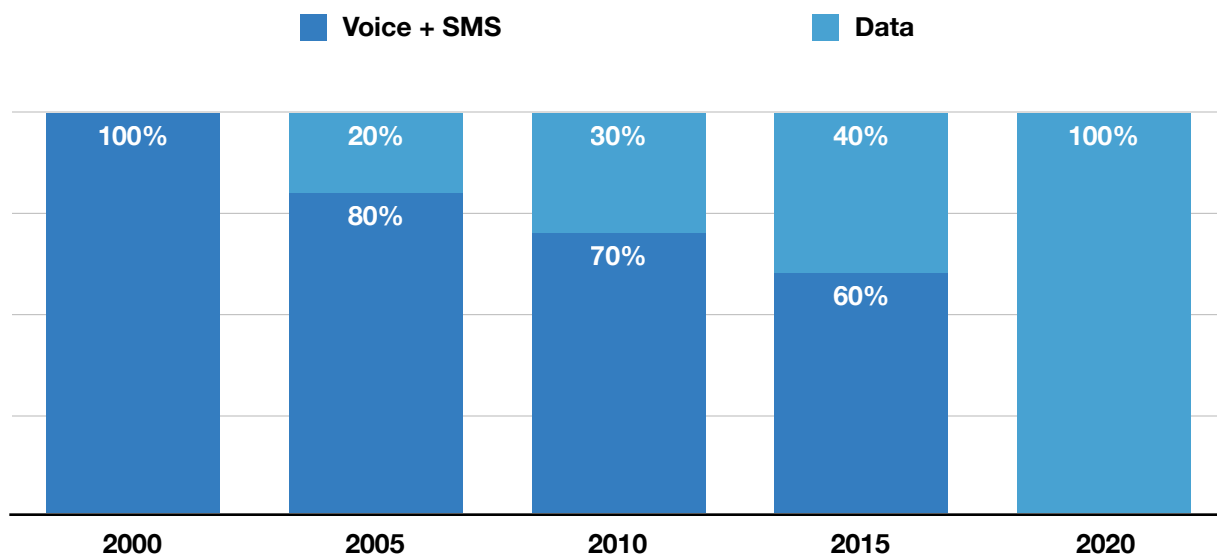
**Figure 1: PCs vs tablets (Source: Gartner & Statista)<sup>1</sup>**

The growth in smartphones has also coincided with the decline of voice and SMS. OTTs such as Skype, WhatsApp and FaceTime have, for many people, replaced voice and SMS services. But the real impact of smartphones is the platform they provide for mobile applications. Mobile applications represent the most affordable way for millions of people to access information, markets, finance, and governance systems previously unavailable to them (Qiang et al, 2011). The 2017 OECD definitions address this trend by defining a wide range of mobile broadband baskets.

<sup>1</sup> [https://en.wikipedia.org/wiki/Market\\_share\\_of\\_personal\\_computer\\_vendors](https://en.wikipedia.org/wiki/Market_share_of_personal_computer_vendors) and Statista, <https://www.statista.com/statistics/263437/global-smartphone-sales-to-end-users-since-2007/>

## Separation of mobile access and service platforms

OTTs, specifically social media, led to the explosion of mobile broadband adoption and usage and consequently to a massive upgrade in mobile network infrastructure across Africa since 2011 (Stork et al, 2013) and the rest of the world. Esselaar et al (2017a) predict that OTTs will replace regular voice and messaging services in the near future altogether. Figure 2 depicts the transition from traditional voice and SMS to data-access-only services, which rely on OTTs for communication. The x-axis is an average period of time, because some countries may reach a phase sooner than others, and some countries will lag behind these trends for a longer period of time, depending on the level of competition within the ICT sector of each country.



**Figure 2: Trends towards “Access” only business models (source: authors’ own graphic)**

The general trend is a shift away from voice and SMS revenues towards data revenues, driven by OTT applications, such as social media and other IP-based applications, which will be increasingly used for voice and message communication.

Mobile operators will eventually become “access” providers, distinguishing their products by speed and quality of service, and competing with other forms of access, such as Public WiFi and connectivity in places of work, study and home. Apart from competitive pressure, the trend described in Figure 2 depends on smartphone penetration and 3G+ network coverage. The migration to a data-only business model will take longer for countries that have little 3G and 4G coverage and low smartphone penetration.

The consequence of a data-only business model for mobile operators is that traditional services such as calling and sending SMS will be provided by a service platform on top of the network, that is, a separation of access and service platforms.

The voice and SMS component of the OECD price baskets will become less useful indicators of the health of the mobile sector and data will become the key measure. The OECD basket would ideally also be able to monitor the transition from integrated to separated platforms.

## OECD basket definitions Dec 2017

The new OECD basket definitions from December 2017 include 12 mobile phone baskets that can be split into three groups (OECD, 2017): no data use (2 baskets), low data and message use (5 baskets) and high data and message use (5 baskets).

Call durations are split across on-net, off-net and fixed line calls. Time distribution is split by day (corresponding to peak rates), evening (corresponding to off-peak rates) and nights (corresponding to off-off peak rates). SMS is similarly split between destination and time of day.

There are also seven new mobile data baskets, ranging in volume from 0.5 GB to 50 GB. The default validity is 30 days, but shorter validities can be included by multiplying the price per period with the number of periods in a 30 day month (OECD, 2017). The mobile data baskets are the main difference between the 2017 price baskets and previous baskets.

## RIS Price Database

This paper uses a unique price database maintained by Research ICT Solutions (RIS) covering 100 countries from the global South. The database tracks prepaid mobile prices for all national mobile operators in a country. It combines the best prepaid product for voice and SMS prices with top-ups, bundles and promotions to estimate the actual cost of usage baskets. It is different from data collected by the ITU, which typically only collects prices from dominant operators, does not include promotions and bundles and does not combine products. The RIS Prepaid database currently covers Africa, Latin America and South- and South-East Asia, as well as select northern hemisphere countries, for a total of 101 countries.

Table 1: RIS price database	Countries	Operators	Total products	Active products
Africa	53	265	2472	1482
Southern Asia	9	65	389	297
South-Eastern Asia	11	90	504	379
Southern America	12	77	245	140
Central America	8	27	328	216
Additional	8	23	172	172
Total	101	547	4110	2686

The data is compiled by RIS using several assumptions.

- Data collection is limited to prepaid. Postpaid in the developing world can be less than 1% of the market in some countries and is generally of low policy relevance.
- The RIS data collection aims to reflect actual user behaviour, which entails mixing products. Typically a prepaid user has a SIM card without bundled minutes, SMS and data, but uses mostly bundled voice, SMS and data purchased through a top up. While a prepaid user may occasionally use regular minutes and SMS and pay out of bundle (OoB) rates, data is mostly used through top ups because of the high out-of-bundle MB prices compared to top ups. The RIS database thus prices all top-ups for the OECD baskets and combines each one with the lowest out of bundle SMS and minute prices.
- In an OTT environment on-net, off-net, fixed-line and international calling has no meaning. Users call each other via an IP connection independent of operator and country. The RIS database takes the average of peak, off-peak and off-off-peak and on-net, off-net and fixed line calling prices. The same process is used

for SMS, the captured SMS rate is the average out of on-net and off-net SMS. The OECD basket assumes a traffic pattern which would be unrealistic across differently sized operators. A smaller operator would have more off-net calls and a larger operator would have more on-net calls. By taking average rates across all locations and destinations, these sorts of assumptions are removed.

The next sections will use the RIS database to assess the suitability of the 2017 OECD definitions for policy and regulatory purposes for the global south using the example of South- and South-East Asia.

## Application of the OECD 2017 definitions to South and South East Asia

Table 2 displays the application of the basket to South- and South-East Asia for 10 of the OECD baskets, excluding the unlimited baskets. The two cheapest countries are highlighted in green and the two most expensive countries in red.

Table 2: South and South_East Asia OECD baskets (2017 def) in USD Q1 2018										
Minutes	50	50	50	188	188	188	577	577	1795	1795
SMS	10	20	10	20	40	20	80	40	160	80
Data GB		0.1	0.5		0.5	2	1	5	2	10
Iran	0.15	0.15	0.15	0.15	0.15	6.25	13.03	15.01	33.94	42.70
Indonesia	0.33	1.99	1.88	1.05	2.82	2.60	4.97	4.78	6.11	5.22
Bangladesh	0.40	1.48	1.87	1.21	3.02	4.52	4.97	9.49	14.33	24.37
Sri Lanka	0.63	1.26	1.26	1.85	2.50	4.00	6.87	12.10	24.09	27.80
Nepal	0.64	1.19	1.11	1.78	2.37	2.23	9.47	9.18	30.83	30.77
India	0.68	1.32	1.40	2.30	2.85	3.30	3.30	3.30	3.30	3.30
Myanmar	0.87	1.40	1.47	2.96	3.88	5.48	10.95	15.37	31.26	40.54
Pakistan	1.10	1.70	2.62	2.70	4.50	4.50	11.31	11.02	32.17	39.19
Malaysia	1.37	7.51	7.32	4.77	11.71	10.69	18.33	16.81	21.39	22.13
Bhutan	1.45	3.19	3.15	5.34	7.58	10.01	19.62	24.06	55.50	61.26
Afghanistan	1.49	2.87	2.66	5.08	7.08	11.21	17.55	26.57	66.82	70.27
Thailand	1.51	3.01	2.33	4.25	6.70	10.82	19.88	21.95	47.70	45.32
Vietnam	1.65	4.22	5.15	5.99	11.46	12.13	28.44	33.71	82.05	112.43
Kazakhstan	1.99	4.44	4.16	6.98	10.27	9.72	26.51	25.40	70.34	69.54
Maldives	2.49	11.39	11.25	8.53	23.07	22.72	41.76	51.36	99.49	149.61
Cambodia	2.80	4.05	3.75	10.00	11.55	13.00	32.20	34.34	97.55	120.48
Singapore	4.42	8.59	12.00	14.40	14.40	22.74	20.63	69.39	87.01	
Laos	4.98	6.36	8.58	11.88	11.88	22.01	43.27	59.71	161.28	178.90
Brunei Darussalam	5.43	13.39	13.01	15.15	22.73	22.73	22.73	68.19	22.73	68.19
Timor-Leste	7.03	11.85	11.15	15.00	30.27	34.59	86.76	102.11	242.58	266.98
Philippines	7.16	11.73	11.54	26.58	31.35	32.40	87.77	89.42	258.36	

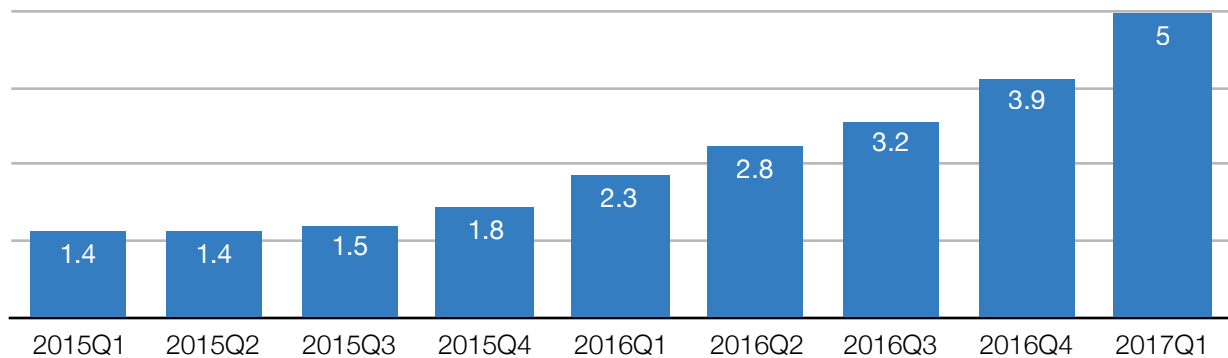
Generally the OECD basket definitions from 2017 cover a broad range of user profiles, from lower voice and SMS use to extensive communication baskets. However, when analysing actual price data for these baskets a couple of factors become apparent.

Firstly, the ranking mostly changes with the cost of data for countries. It would thus be possible to reduce the number of baskets significantly without losing the explanatory power of the data.

Secondly, the highest usage baskets for data also contain large allocations of voice minutes. It would be unlikely that someone would use 10GB of data on a mobile phone and at the same time use 1795 voice minutes. Such a high data user would be more likely to have shifted to OTT communications. Deloitte (2016) predicted that a quarter of smartphone users in developed markets would not make any traditional voice calls in a given week in 2016. In 2018 it is safe to assume that this is applicable around the globe for higher-end smartphone users.

## Trends in mobile broadband pricing and bundling

Because voice and SMS revenues are declining, operators are looking at mechanisms to drive data usage. In Q3 2015, Digi Malaysia introduced free basic internet. All subscribers get 500MB of data for free throttled at 64kbps. Data usage has grown by 257% between 2015 and 2017.



**Figure 3: Data usage in GB (Source: Digi Malaysia, annual reports)**

Free basic internet is one of the techniques that operators are using to generate data growth. Other techniques include bundled data for different types of content, purposes or access formats. Examples include:

- Social media data such as Facebook, WhatsApp and social media applications
- Video streaming such as YouTube,
- Late night access
- Wifi access to hotspots,
- Purpose linked data for specific applications, often operator developed OTTs

Operators that offered uncapped slow internet include:

- India - Jio: 64Kbps
- Thailand- dtac (Telenor): Free at 64Kbps for life
- Brunei - Progresif: 256Kbps
- Peru - Bitel (Viettel): 256Kbps
- Nepal - Ncell (Axiata): 256Kbps
- Egypt - Vodafone: 256Kbps
- Benin - Moov: 256Kbps

- Dominican Republic: Claro: 256Kbps
- Dominican Republic: Altice: 256Kbps
- Angola: Unitel: 256Kbps
- Thailand - TOT: 384Kbps
- Thailand: my (CAT Telecom): 384Kbps
- Mauritius - Chilli: 512Kbps
- Cambodia -SEATEL (Southeast Asia Telecom): : 640Kbps
- Haiti - Natcom (Viettel): un specified speed

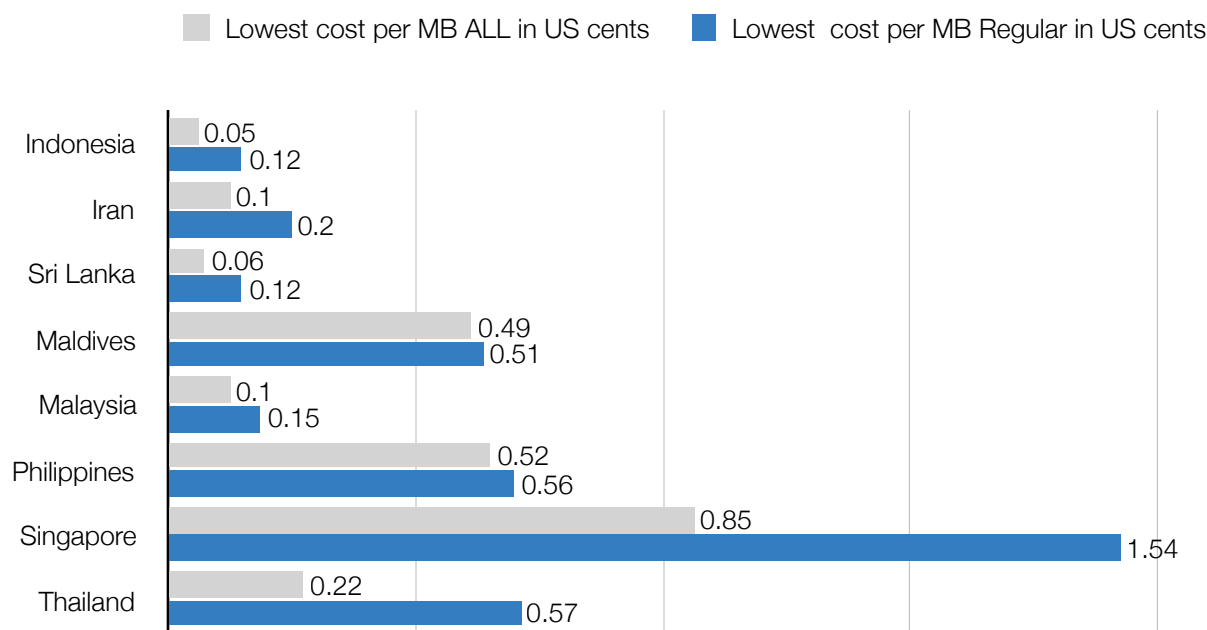
These techniques encourage subscribers to use data at a very low cost. Subscribers can experiment with different types of applications. The assumption, borne out by the increasing revenues of operators such as Digi, is that subscribers will pay for faster access once they are used to accessing data applications at any time.

Currently OECD baskets do not capture how people actually use the internet and the incentives they are being given to increase their data usage. The baskets would ideally be modified to take into account the different types of data available. The current approach of ignoring free slow data allocations and discounted purpose linked data, results in higher cost of data being captured than is actually the case.

<b>Table 3: Asia Mobile prepaid data costs for monthly use in USD Q1 2018</b>	<b>100MB</b>	<b>500MB</b>	<b>1GB</b>	<b>2GB</b>	<b>5GB</b>	<b>10GB</b>	<b>20GB</b>
Myanmar	<b>0.39</b>	<b>0.60</b>	1.18	2.37	6.24	12.49	31.61
Indonesia	<b>0.44</b>	<b>0.44</b>	<b>0.44</b>	<b>0.44</b>	2.21	2.21	2.21
India	0.47	0.82	<b>0.82</b>	1.62	2.48	2.48	2.48
Bangladesh	0.56	1.43	1.45	3.05	5.09	10.91	15.27
Pakistan	0.60	1.44	1.44	1.44	4.50	6.17	
Afghanistan	0.72	0.72	1.42	4.31	6.90	10.35	14.37
Thailand	0.81	0.81	4.75	5.64	9.46	9.46	9.46
Sri Lanka	0.82	0.82	1.15	1.64	6.45	10.92	16.09
Cambodia	1.00	1.00	1.00	2.00	4.00	4.00	4.00
Nepal	1.04	1.04	1.04	<b>1.04</b>	<b>1.04</b>	<b>1.04</b>	<b>1.04</b>
Vietnam	1.09	1.09	1.09	1.09	<b>1.09</b>	<b>1.09</b>	<b>1.09</b>
Laos	1.20	3.60	3.60	3.60	3.60	5.14	18.00
Bhutan	1.55	1.55	3.11	4.67	7.80	10.92	15.61
Kazakhstan	1.82	1.82	1.82	1.82	4.30	6.15	9.24
Yemen	2.79	5.98	<b>9.97</b>	<b>15.96</b>	<b>35.90</b>		
Singapore	3.79	7.58	7.58	10.61	21.22		
Malaysia	4.05	4.05	4.05	6.75	6.75	8.10	8.10
Timor-Leste	4.29	4.29	7.50	7.50	25.00	<b>40.00</b>	<b>100.00</b>
Philippines	4.37	4.37	5.81	5.81	8.25		
Maldives	<b>6.80</b>	<b>6.80</b>	<b>10.23</b>	13.67	23.97	<b>61.75</b>	<b>68.62</b>
Brunei Darussalam	<b>7.58</b>	<b>7.58</b>	7.58	<b>15.15</b>	<b>26.52</b>	37.88	49.25



Table 3 highlights another shortcoming of the OECD baskets. Many operators offer products that match the OECD basket such as the 500MB and 1GB baskets. However, it might be cheaper to purchase multiples of smaller packages to make up a larger data package. In Pakistan and Sri Lanka, purchasing three 2GB packages (for a total of 6GB) is cheaper than purchasing a 5GB package. The OECD price baskets need to be clear that it is the cheapest product that should be tracked especially if multiples of that product can be cheaper than purchasing a higher data package at a higher price.



**Figure 4: Asian countries with differing average MB price for regular data and purposed linked data**

Stork et al (2017) proposed a value for money index that translates various bundled data categories into monetary values. While far from perfect, it would be one way to compare countries to each other in terms of the different types of bundled data.

## Measuring separation of access and service platforms

We developed a methodology to measure how far a country has progressed towards the separation of mobile access and service platforms based on the prices for voice, SMS and data. If one MB of data is vastly cheaper than one voice minute or one SMS, then OTT use is encouraged, which in turn shifts revenues from voice and SMS to data and towards a data-only access model.

We called this indicator the SASP Index which stands for (s)eparation of (a)ccess and (s)ervice (p)latforms. The index is calculated on country level, based on the cheapest rate in the country. It is possible that a subscriber could use a SIM card from one operator and data from another. However, this assumption means that the data can be easily compiled based on existing ITU data and it is an effective way to measure separation of access and service platforms.

Table 4: South and South East Asia - cheapest rates available in a country for Q1 2018						
	US cents			Number of MBs per 1 SMS	Number of MBs per 1 minute	SASP (Price for 1 SMS + Price 1 minute) / Price 1 MB
	1 SMS	1 Minute	1 MB			
Afghanistan	2.16	2.40	0.41	5.3	5.9	11.1
Bangladesh	0.42	0.60	0.19	7.5	3.2	5.4
Bhutan	0.47	2.78	0.12	3.9	23.2	27.1
Brunei	3.79	10.10	0.49	7.7	20.6	28.3
Cambodia	3.00	5.00	0.14	21.4	35.7	57.1
India	1.55	0.54	0.12	12.9	4.5	17.4
Indonesia	1.10	0.44	0.13	8.5	3.4	11.8
Iran	0.30	1.70	0.24	1.3	7.1	8.3
Laos	1.80	9.60	0.43	4.2	22.3	26.5
Malaysia	1.40	2.29	0.24	5.8	9.5	15.4
Maldives	1.30	4.36	0.51	2.5	8.5	11.1
Myanmar	0.75	1.46	0.12	6.3	12.2	18.4
Nepal	0.73	0.84	0.39	1.9	2.2	4.0
Pakistan	0.45	1.49	0.23	2.0	6.5	8.4
Philippines	1.94	13.93	0.56	3.5	24.9	28.3
Singapore	3.79	8.08	1.54	2.5	5.2	7.7
Sri Lanka	0.13	0.97	0.12	1.1	8.1	9.2
Thailand	3.17	1.58	0.45	7.0	3.5	10.6
Timor-Leste	5.25	12.33	1.20	4.4	10.3	14.7
Vietnam	0.98	3.05	0.25	3.9	12.2	16.1

Cambodia provides the strongest incentive for OTT use and Nepal the weakest based on price differences between data and SMS and voice minutes.

## Conclusion

The 2017 OECD baskets are a welcome modification. The new baskets acknowledge the importance of data in driving mobile usage and the importance of data prices in assessing the health of the mobile sector in developing countries. However, the current structure of the OECD baskets misses out on a vital trend within data packages: the inclusion of heavily discounted or even free data that is tied to a specific use or application. In India, the operator Jio has transformed the mobile sector by offering free basic internet throttled at 64kbps and subscribers have flocked to the new entrant. Other use-specific or application-specific data includes free video streaming or late night data. Ignoring these additions means that OECD data baskets look more expensive than they actually are.

The OECD baskets continue to give priority to voice and SMS baskets, even though voice and SMS is becoming a niche market, serving customers where quality of service is important. When affordability is the prime motivation, OTTs are dominant and therefore data baskets are the key metric.

We propose a simple index, called the SASP, that can be compiled using ITU data, to measure the drivers of the separation of mobile access and service platforms.

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