CHAPTER 13

Towards improved economic measurement

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Credible measurement of economic activity is critically important to inform decision making. For example, reliable quantification of a country's output is needed to assess its living standards, to identify the growth challenges it faces and to fine-tune its macroeconomic management. Similarly, credible employment numbers are required to judge whether economic growth is creating jobs at a sufficiently rapid pace, to understand where job creation and destruction are taking place and to assess whether the created jobs match people's aspirations.

More generally, good economic decisions and policies are only possible with good statistics (Bernanke, 2012). Reassuringly, much progress has been made over time in refining concepts and improving statistical tools, making economic data more meaningful and precise. This is true both for data on economic activity and for employment data.

Gross domestic product (GDP)—defined as the value of all final goods and services produced within the country during a given period, net of the value of inputs—is the most standard measure of economic activity. The origins of GDP measurement can be traced back to the aftermath of the Great Depression, when it became clear that economic management had to be improved. One of its pioneers was Simon Kuznets, who in 1971 was awarded the Nobel Prize in Economics for his contributions to national accounts. Over the years, the criteria and data sources used to measure GDP have improved steadily. New survey instruments, increased reli-

ance on administrative data and enhanced computing capacity have greatly contributed to the improvement.

The employment rate—defined as the share of working age people who are actually working—is another important indicator. In advanced economies, the focus is often on the unemployment rate, the share of people who want to work and do not have a job. Employment and unemployment rates, together with the GDP growth rate and the inflation rate, are among the main indicators of the health of an economy. For decades, statisticians have forged consensus on the merits of different reference periods to assess what a person's employment status is, or on how employment and unemployment should be defined (World Bank, 2012). High-frequency labour force surveys have become the norm in many countries.

Needless to say, measurement is always bound to be approximate. It is certainly weaker in developing countries, where government capacity is low and a large fraction of economic activity is informal, thus escaping scrutiny by the authorities.

In most of the developing world, GDP data tends to be produced on an annual basis at best and its disaggregation by province or state—not to mention district—is uncommon. Unemployment rates may not be very meaningful when people are often too poor to remain idle, and employment rates are difficult to measure when nine-to-five jobs with a paycheck at the end of the month are the exception more than the norm. In some cases, weak governance also makes official statistics vulnerable to politically motivated interference. All of this is especially unfortunate, as developing countries are arguably the ones in most need of sound economic policies that are solidly anchored in reliable empirical evidence.

South Asian countries are not an exception in this respect. Despite considerable variation in statistical capacity across countries, the reliability of GDP figures often comes into question, whereas the extent of job creation tends to be anyone's guess. This is despite the fact that economists and statisticians from the region had been pioneers in the measurement of wellbeing.

However, more rigorous analyses of existing data, together with new sources of data made available by technological innovations, offer much room for statistical improvement. This chapter illustrates the possibilities through the discussion of two examples related to the measurement of GDP and employment rates in select South Asian countries. In doing so, it makes the case that strengthening economic measurement—more broadly, statistical systems—is one of the most important priorities developing countries face.

Once at the forefront

Little known to many today, South Asians were true pioneers in economic measurement. From the 1960s to the 1980s, distinguished economists and statisticians from the region were at the forefront of statistical development and the adoption of new metrics. Instruments and indicators widely used today are connected to South Asia to a much greater extent than is generally recognized. Indeed, the priority given these days to the fight against poverty and, more broadly, the improvement of living standards could be easily taken for granted. But it was not always this way. A few South Asians were instrumental in articulating this agenda and developing the measurement tools needed to make it operational. Two names stand out in this respect.

Mahbub ul Haq (1934–1988) was a Pakistani economist. He studied at Cambridge University—where he developed a lifelong friendship with Indian economist Amartya Sen, a Nobel Prize winner—and subsequently at Yale and Harvard Universities. In the 1960s, while still in his 20s, he was appointed the Chief Economist of Pakistan. He had a keen interest in the distribution of income and wealth, conducting research on how two dozen family groups had come to dominate Pakistan's economy.

In the 1970s, ul Haq was the Chief Economic Adviser to Robert McNamara, the President of the World Bank at the time. There he influenced the World Bank's development philosophy for several decades to come. Ul Haq helped convince McNamara

that development should focus on raising living standards and that poverty alleviation could be a cause, rather than a consequence, of economic development. This view was embraced by McNamara in 1973 in his watershed "Nairobi address."

In 1988, after having served as Finance Minister of Pakistan, ul Haq worked with the United Nations Development Programme, where he led the establishment of the Human Development Report. In the process, he articulated the now-popular Human Development Index (HDI), a measure of economic and social development that combines monetary and non-monetary dimensions of wellbeing. The HDI is arguably the precursor of modern Multidimensional Poverty Indices.

Prasandra Chandra Mahalanobis (1893–1972) was an Indian scientist and statistician. Born in what is now Bangladesh, he pursued his undergraduate courses in Calcutta and went to study further at the University of London. In 1932, together with two other university professors, he founded the Indian Statistical Institute (ISI), registered as a non-profit learned society. Following India's independence, ISI was declared as an institute of national importance, with the rank of a university. At ISI, Mahalanobis conducted pioneering studies in anthropometry, examining the role of caste in stunting. In the process, he developed a new multidimensional distance metric, commonly known as the Mahalanobis Distance.

His best-known contribution was the development of the modern household survey approach. Mahalanobis was keen to produce a credible snapshot of living standards at the district level at a time when many Indian districts did not even have a road connecting them. In the words of Angus Deaton, another Nobel Prize-winner, India became "the motherland of household surveys." The approach developed by Mahalanobis was subsequently scaled up by the World Bank, under the Living Standards Measurement Project. It did not take long to realize that surveys of this sort could provide the basis for reliable poverty measurement.

These distinguished South Asians shaped the notion that living standards could be credibly measured even in poor countries with very large informal sectors. Their approaches influenced

statistical development for several decades. It can only be hoped that a new generation of South Asian economists and statisticians will play a similar role now, when new technologies and the availability of big data have paved the way to revamping economic measurement.

Better measurement of GDP

Properly measuring GDP is particularly challenging in developing countries. With pervasive informality, many final goods and services, as well as many inputs, are beyond the oversight of statistical agencies. Even in the formal sector, businesses and individuals understate their earnings to avoid taxation and regulation. Since not all economic activity can be precisely captured, GDP data is necessarily based on estimations and extrapolations. National accounts revisions, aimed at strengthening GDP estimates, can change GDP growth stories dramatically. It is the data gaps, inconsistencies and revisions that nurture skepticism about official GDP growth figures.

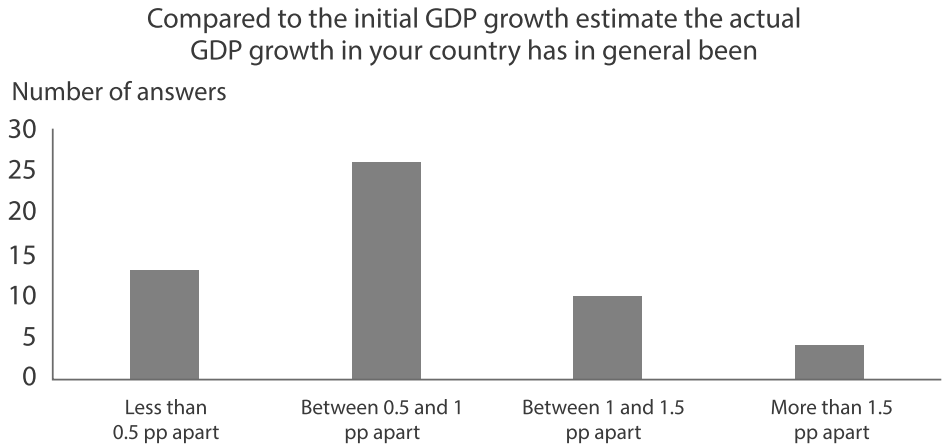
Temporal or spatial disaggregation of GDP is infrequent and, when available, it is rarely timely. Only two countries in South Asia—namely India and Sri Lanka—produce quarterly GDP estimates, making it difficult to identify trend breaks. Subnational estimates, when they exist, are made available after substantial delays. In some countries, these subnational estimates do not add up to national figures.

South Asian researchers and practitioners are aware of these measurement challenges. Respondents to a survey conducted in 2017 saw a sizeable gap between GDP estimates and reality. Half of them declared that they expected actual GDP growth to be between half a percentage point and one percentage point different from first estimates. And, one third believed that the gap was even larger than that (Figure 13.1).

Regardless of what the real growth rate is, final figures are often quite different from preliminary estimates. India has a better statistical infrastructure than many other countries in the region,

Figure 13.1

Researchers and practitioners see a gap between estimated and actual growth



Source: World Bank (2017).
Note: pp—percentage points.

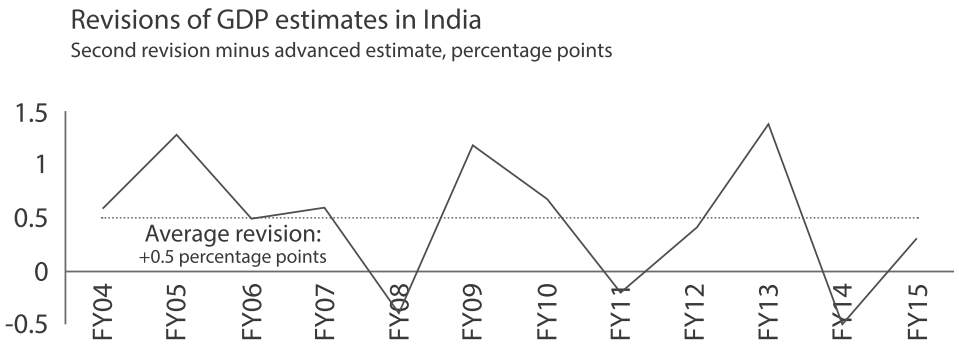
but even there, the first GDP growth estimate has on average been revised upward by 0.5 percentage points. The average absolute correction (positive or negative) since FY2004 has been 0.7 percentage points (Figure 13.2).

New technologies offer an opportunity to improve on this state of affairs. Luminosity observed from outer space can be expected to be correlated with the intensity of economic activity on the earth. Measures of economic activity based on night-time light (or nightlight for short) have important advantages over surveys and censuses. These measures capture economic activity regardless of whether it is formal or informal. They do so with a very high level of spatial granularity and they are available nearly in real time. Importantly, nightlight data is cheap to acquire and is not subject to political interference.

Nightlight data at the global level is a by-product of the Defense Meteorological Satellite Programme (DMSP), a meteorological initiative of the US Department of Defence. Data collected by six DMSP satellites for years 1992 to 2013 has been made publicly

Figure 13.2

Preliminary GDP growth rates can be revised substantially



Source: Sapre and Sengupta (2017).

available on an annual basis. The design of the Operational Linescan System (OLS) sensor onboard DMSP has not changed significantly since 1979. Given sensor aging, new satellite deployments also aim at ensuring data collection continuity.

The release of DMSP-OLS nightlight data was discontinued in 2013. A new data product, the Visible Infrared Imaging Radiometer Suite (VIIRS), became available then. The new data has a monthly frequency. It also has features that were not available in DMSP-OLS, especially in relation to the over-saturation of nightlight data at bright core centers. The data available publicly is still raw. Some temporary lights and background noise remain. Therefore, some preliminary work to "clean" the VIIRS data is needed before it can be used (World Bank, 2017).

The intensity of nightlight has been shown to be as good a proxy, at the global level, for economic activity as officially measured GDP (Henderson et al., 2012). The relationship between the two is similar for South Asian countries (Table 13.1). The correlation between nightlight intensity and official GDP is especially strong in manufacturing and services sectors. But it is insignificant in the case of agriculture (World Bank, 2017).

The relationship between nightlight intensity and GDP has been shown to hold even at the subnational level (Bhandari and Roychowdhury, 2011). This insight has been exploited to generate a range of subnational economic indicators, which are not readily available otherwise (Ebener et al., 2005; Ghosh et al., 2010b; Sutton et al., 2007). The relationship also holds in South Asia, allowing monthly measures of economic activity to be generated at the district level (World Bank, 2017).

Changes in economic activity derived from changes in nightlight intensity provide valuable insights into recent economic episodes whose assessment has so far been blurred by a lack of data.

An example is the GDP impact of the two major shocks experienced by Nepal in 2015, namely the major earthquakes of April

Table 13.1

The relationship between GDP and nightlight is similar in South Asia and elsewhere

	World	World without South Asia	South Asian countries
	ln(GDP)	ln(GDP)	ln(GDP)
	(1)	(2)	(3)
ln(lights/area)	0.267***	0.266***	0.248***
	(0.0303)	(0.0314)	(0.0491)
Observations	3,966	3809	157
Number of countries	187	179	8
(within country) R^2	0.788	0.782	0.971

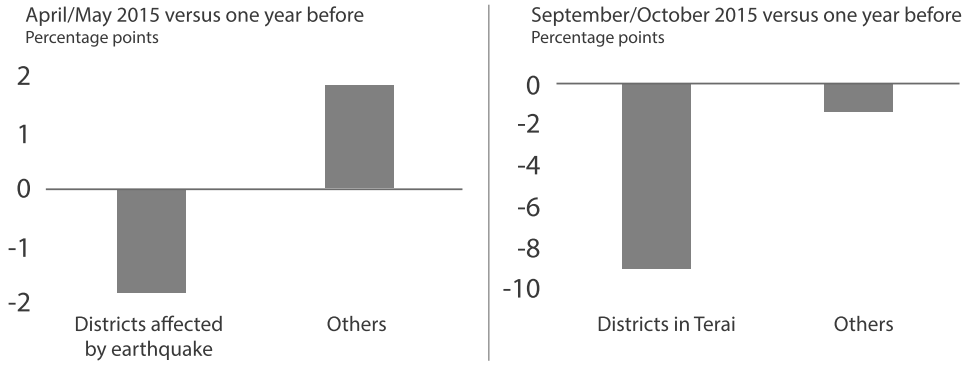
Source: World Bank (2017).

Note: The following regression is estimated: $\ln(GDP_{i,t}) = a+b_i+c_t+\delta \ln(light_{i,t})+\varepsilon_{i,t}$, where $\ln(GDP_{i,t})$ is the natural logarithm of GDP of country i in year t measured in constant local currency, $\ln(light_{i,t})$ is the natural logarithm of lights per km^2, b_i is a country fixed effect and c_t is a year fixed effect. Robust standard errors, clustered by country, are in parentheses.

**** p<0.01 .*

Figure 13.3

Nepal's 2015 earthquakes and trade disruption had large impacts on local GDP



Source: World Bank (2017).
Note: Monthly predicted GDP is distributed across districts according to the special approach outlined in World Bank (2018). The rates reported are the median growth rates among districts.

and May, and the trade disruption with India between August and November. Data on nightlight intensity reveals that the impact of the earthquakes was substantial at the local level, mainly affecting poor districts, but not significant at the aggregate level. On the other hand, the trade disruption with India had a large impact at the aggregate level, hitting the affected districts in the Tarai the most, even though the effects were short-lived (Figure 13.3). These findings cast doubts on the very large decline in GDP growth rates reported by official statistics (World Bank, 2017).

Another episode that has attracted much commentary in recent times is demonetization—a policy intervention that withdrew large amounts of currency from circulation in India—in November 2016. The demonetization experiment has been blamed for the growth deceleration India experienced in 2017, but data on nightlight intensity suggests that its impact was more muted than is generally believed. At the aggregate level, its effect on GDP was modest and vanished after a couple of months. On the other hand,

nightlight-based measures of economic activity at the local level provide evidence that districts with fewer formal wage earners, lower banking access and that were more rural performed much worse after demonetization (Figure 13.4).

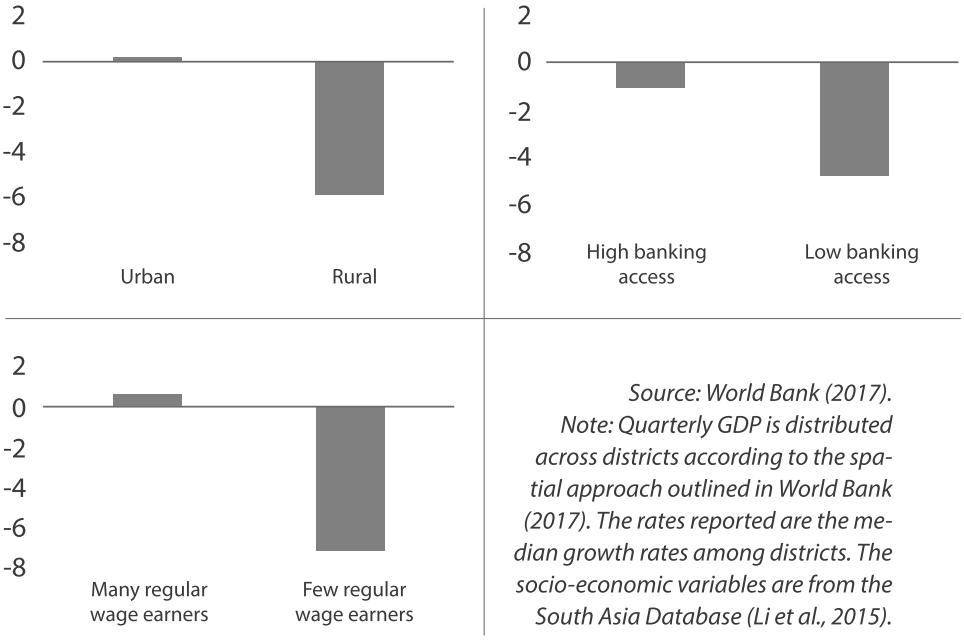
Nightlight data has been employed to address other development issues, including in South Asia. For example, Ghosh et al. (2010a) focus on the size of the informal economy. By comparing economic activity as captured by nightlight data with official GDP estimates, they conclude that India's informal economy and remittances are much larger than is generally acknowledged.

Nightlight intensity has also been used to study long-term growth. In India, nightlight data from 2000 to 2010 provides evi-

Figure 13.4

Districts with more informality were affected more by demonetization in India

Changes in GDP growth in 2016/2017 Q3 vs 2015/2016 Q3
Percentage points



Source: World Bank (2017).
Note: Quarterly GDP is distributed across districts according to the spatial approach outlined in World Bank (2017). The rates reported are the median growth rates among districts. The socio-economic variables are from the South Asia Database (Li et al., 2015).

dence of both absolute and conditional convergence among rural areas (Chanda and Kabiraj, 2016). Nightlight data also suggests that there is convergence at the district and state level (Tewari and Godfrey, 2016). This is in contrast with findings based on GDP data, according to which there is divergence or, at best, neither convergence nor divergence.

Using nightlight data, it also appears that the growth of secondary cities has been more conducive to poverty reduction than that of large metropolitan areas (Gibson et al., 2017). And, in Pakistan, there are signs of convergence, albeit slow, between the richest and poorest provinces of the country (Mahmood et al., 2017).

Nightlight intensity is strongly correlated not only with GDP, but also with several other socio-economic indicators. Proville et al. (2017), for example, uncover a clear relationship with electricity consumption and with carbon dioxide emissions, followed by a somewhat weaker relationship with population, methane emissions, and poverty. Nightlight intensity has consequently been used to estimate electrification rates at local levels (Min, 2011). Based on this approach, it has been suggested that close to half of the rural population of South Asia lacks access to electricity (Doll and Pachauri, 2010). Intermittent nightlight of a specific location has provided a proxy for unreliable access to electricity, thus allowing the estimation of how the quality of power supply affects living standards (Min et al., 2017).

Around the world, the use of nightlight data is common in studies dealing with urbanization dynamics. In India, significant changes in urban population have been observed in Tamil Nadu, Kerala and Punjab (Pandey et al., 2013). While the loss of agricultural land to urban expansion has been slow, it appears that it has steadily accelerated over time (Pandey and Seto, 2015). There is also evidence of increasing nightlight intensity along the peripheries of major Indian cities (Chand et al., 2009). The growing importance of the urban fringe may explain why measures of urbanization based on nightlight intensity are quite different from those relying on administrative definitions or on land classification by type of use (Ellis and Roberts, 2015; Galdo et al., 2017).

Improving the measurement of employment

Job creation is one of the main concerns of politicians and policymakers around the world. If anything, the concern is more pronounced in South Asia, where very large numbers of young people are reaching working age every year. However, discussions on the relationship between economic growth and job creation in South Asia are muddled by data gaps and inconsistencies. Employment figures are seldom available with high frequency. Labour indicators differ in subtle but important ways across statistical instruments. Population censuses, economic censuses, household surveys and labour force surveys often define employment in different ways.

The implications of the gaps between definitions are amplified in economies where self-employment and casual work are the norm. A nine-to-five job, with a written contract and benefits attached to it, is easy to recognize. But relatively few jobs match this description in South Asia. In many cases, it is thus difficult to tell whether people are working, are unemployed, or are out of the labor force and the answers vary depending on the statistical instrument considered. The difficulty in measuring employment is exacerbated for women, as they tend to engage even more than men in activities falling in the gray area between work, unemployment and inactivity.

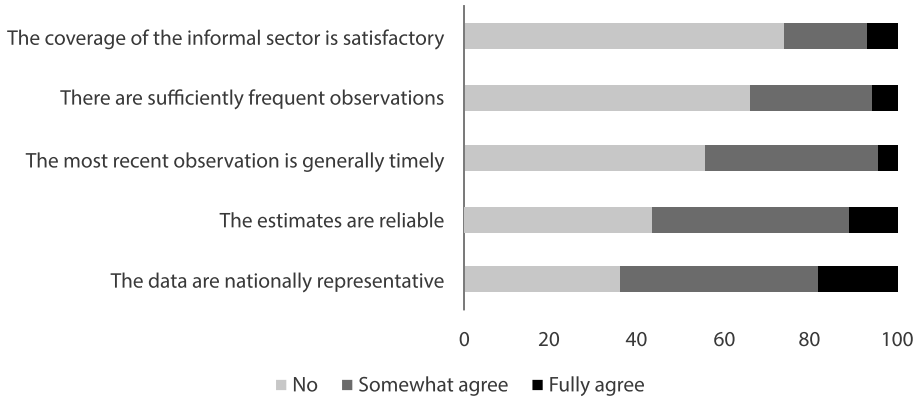
Economists in South Asia agree that the quality of the available employment data makes it difficult to credibly assess the labour market situation in their countries. In a recent survey, unsatisfactory coverage of the informal sector and infrequent observations are named as the most important limitations of available data. More than half of the respondents were also concerned about the timeliness of data, and 40 percent about the reliability of estimates (Figure 13.5).

Comparable employment figures across countries, and over time, are needed to benchmark employment rates and assess their trends, or to evaluate whether the relationship between economic growth and job creation is the same. Comparable employment figures can be constructed out of primary data from exist-

Figure 13.5

Economists are aware of the challenges posed by the available employment data

Do you agree with the following statements regarding the quality of labour market information in your country? Distribution of responses



Source: World Bank (2018).

ing population censuses, economic censuses, household surveys and labour force surveys (World Bank, 2018). Indeed, since 2001, close to 100 such censuses and surveys have been conducted in the region.

Sri Lanka and Pakistan have the most frequent and easily accessible household and labour force surveys. Sri Lanka runs the Household Income and Expenditure Survey every three years. It has an annual Labour Force Survey which provides national and quarterly data. Similarly, Pakistan has been carrying out the Pakistan Social and Living Standards Measurement (PSLM) survey and the Household Integrated Economic Survey on alternate years since 2004-05.

In India, labour market information is collected every five years by the National Sample Survey (NSS) using a separate employment-unemployment module. In the intervening years, basic employment information is gathered together with the household consumer expenditure module. The quinquennial surveys

have large samples and are referred to as the "thick rounds." The intervening surveys are known as the "thin rounds" because of their relatively smaller sample size. Overall, data is less frequent in India. The most recent data point is the "thick round" that NSS conducted in 2011-12. The annual Periodic Labor Force Survey, which was started in 2017, aims to fill this gap by providing frequent and timely labor market data that is nationally and regionally representative.

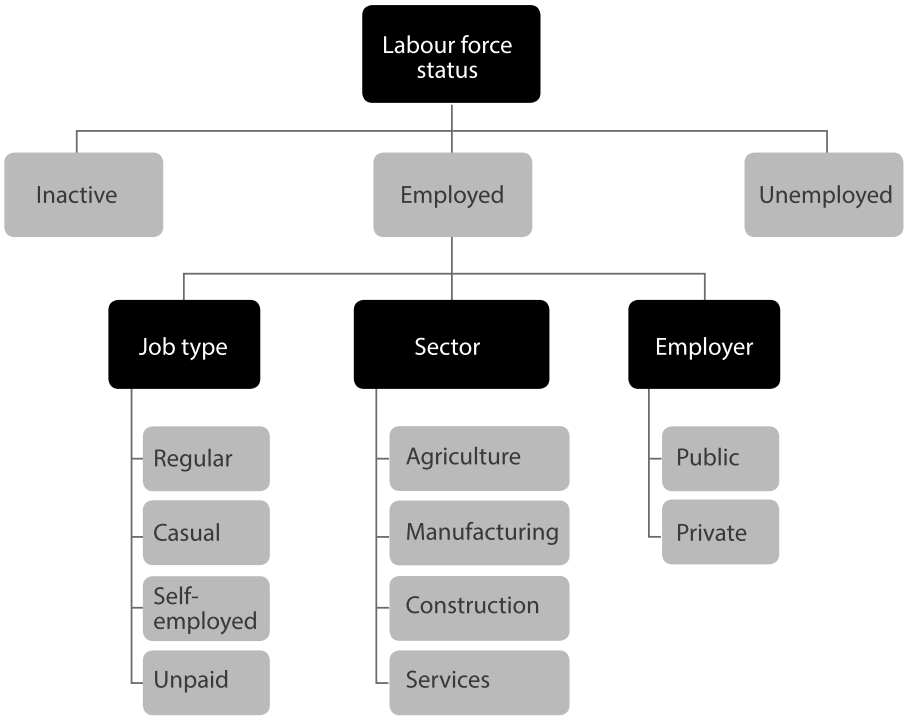
World Bank (2018) assembled a new dataset, built out of primary data from all these sources, classifying each respondent as employed, unemployed or inactive, relying on internationally agreed definitions, matched as closely as possible to the questionnaire of each census or survey. Employed individuals were further classified based on the nature of their activity. Three breakdowns were considered: by type of job (regular, casual, self-employed and unpaid), by sector of activity (agriculture, manufacturing, construction and services) and by institutional sector (private or public). The procedure used for the construction of this employment database allowed the generation of information at a relatively high frequency (Figure 13.6).

In many of the surveys used in this exercise, it was possible to attribute individual observations to specific quarters. This is because the month when a respondent was interviewed is recorded in most of the household and labour force surveys. Individual observations can thus be mapped to quarters, allowing for the generation of quarterly employment data, in addition to annual estimates. However, this approach is only sensible if interviews are spread across space and over time in a relatively even way.

Needless to say, quarterly employment rates constructed in this way are "noisy", or with potentially large measurement error. The same is true for Bangladesh and Pakistan's quarterly GDP series, obtained by interpolating annual GDP data based on quarterly industrial production. Despite the noise, a positive short-term correlation between the growth of employment rates and GDP growth emerges across much of the region. In size, the correlation is comparable to estimates in advanced economies (World Bank, 2018).

Figure 13.6

Comparable employment information extracted from over 60 surveys



Source: World Bank (2018).

In the longer term, job creation can be summarized under the form of an "elasticity", or percentage change in employment per percentage point of GDP growth. Depending on whether the mean or the median of the distribution of estimates is considered, the elasticity of employment to GDP varies between 0.2 and 0.3 (Table 13.2). This shows that economic growth is not jobless in South Asia, contrary to the widely shared opinion.

The "standardized" employment data also allows analysis of how economic growth has modified the types of jobs available in South Asia. From a sectoral point of view, it appears that structural transformation has been slow in many countries. Perhaps more disturbingly, the growth in regular wage employment has been

extremely modest across the region (Figure 13.7). Regular wage jobs are generally seen as better jobs, compared to farming, self-employment or casual work.

Towards stronger statistical systems

The analyses above show that refining basic economic indicators can be done at a relatively low cost. Nightlight data captures informal economic activity; it is available at high levels of spatial disaggregation; it can be obtained in almost real time; it is relatively cheap to acquire; and it is not subject to politically motivated interference. The same can be said of other forms of big data—from land classification to cell-phone traffic. New technologies also provide an opportunity to strengthen the measurement of other economic indicators. For example, insightful price indices have been developed by "scraping" the internet. These indices cover a very large number of products and points of sale; they can be updated daily and they are cheap to maintain.

Table 13.2

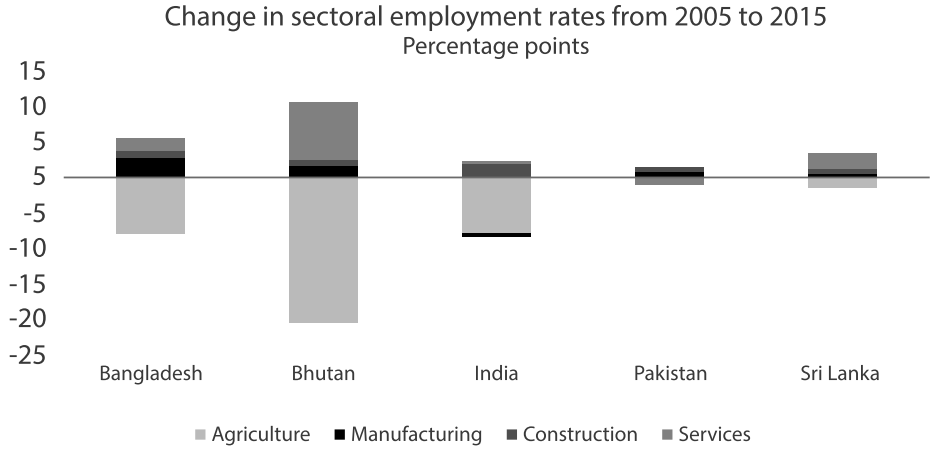
South Asian countries have created a large number of jobs

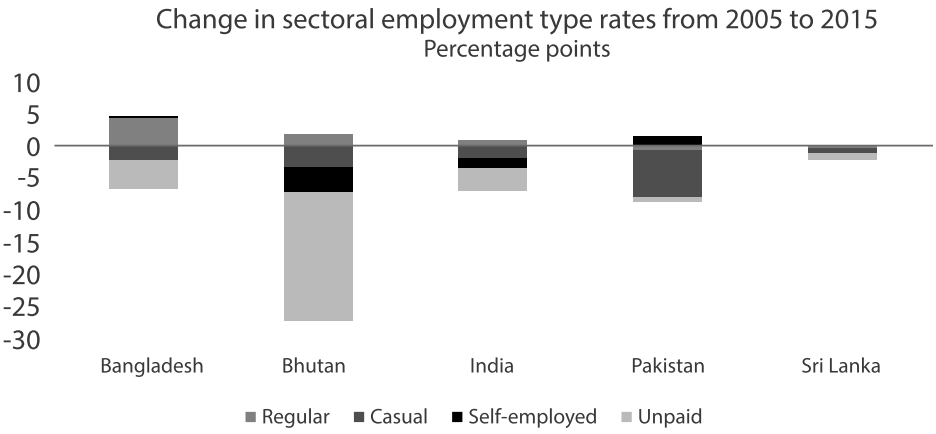
	South Asia	Bangladesh	India	Pakistan	Sri Lanka
	Elasticity	Jobs created by one percentage point of growth (in thousands)			
25th percentile	0.10	90	400	310	5
Median	0.20	100	540	360	8
75th percentile	0.60	120	730	410	16
Mean	0.34	130	540	360	11
Long run	0.19	110	750	200	9

Source: World Bank (2018).

Figure 13.7

Structural transformation is slow and regular employment increases only modestly





Source: World Bank (2018).

However, the "data revolution" under way requires more than just a good grasp of technology: it is, above all, an institutional reform agenda. Despite substantial efforts to ensure comparability across countries, employment data in South Asia remains "noisy" and is not frequent enough. Unfortunately, big data may not be of much help in this respect. Employment definitions and classifications that are better aligned with the international practice would

be a more important priority. And, except for Pakistan and Sri Lanka, employment information should be generated more frequently. India's recent initiative in this respect is highly welcome. It can only be hoped that the frequency of data points will increase in other South Asian countries as well.

Statistical agencies are a much more central part of the service delivery machinery than is generally acknowledged. The availability of high-quality data, which can be easily accessed without impinging on privacy or breaching confidentiality, is an extremely valuable public good. Tech-savvy private sector players are also an important part of the data architecture of a country. They help push the frontier with their innovations and develop new products for subsets of customers who can afford them. However, for reliable high-quality data, as a public good, it is likely that statistical agencies will still be the source for the foreseeable future. In other words, the "data revolution" requires their institutional and technological upgrading, so that they can play this role effectively.

There is a long tradition of economic measurement based on censuses and surveys and South Asian economists and statisticians were at the forefront of this approach. Of late, efforts to modernize statistical systems have mostly emphasized a deepening of this model: more frequent surveys, standardized definition of variables, piloting of new questionnaires, capturing of responses through electronic tablets rather than paper questionnaires. The example provided above, regarding the difficulty of obtaining good employment data in South Asia, confirms that these efforts are indeed important.

However, there has generally been less emphasis on other potential upgrades, including the systematic geo-referencing of data, or the linking of government databases. It is as if new rooms are being piled up on top of an old building to accommodate new functions, rather than a new modern building being designed with updated functions as the organizing principle.

In developing countries, the upgrade of statistical agencies has often been approached in an "extractive mode", rather than with a reform mindset. Quite often, a donor or an international organiza-

tion is interested in a specific metric. A trust fund is mobilized to cover the cost. And, a new survey is conducted. The Sustainable Development Goals, with their long list of policy-relevant indicators, represent an important step forward as they implicitly benchmark the statistical systems in terms of what they are expected to deliver. In other development areas, the international community has been more ambitious. Entire programmes have been designed to help developing countries liberalize international trade, unbundle infrastructure sectors, or revamp their social security systems. These programmes combine policy dialogue, technical assistance and sizeable financial resources under the form of a long-term engagement. But such programs have been the exception more than the rule, especially when it comes to statistical upgrading.

Building trust in citizens towards reliable and precise official statistics is an integral part of the development agenda. This requires a clear strategy. The first step is upstream—enshrining the technical independence of statistical agencies and clarifying their reporting lines to the rest of the government. Also upstream is where the adoption of rules striking the right balance between access to information and the protection of privacy takes place. Then comes the statistical development strategy of the country, a compact that needs to be brokered at a high level—as an integral part of the country's overall growth strategy. The next step concerns business process engineering, designing an institutional form that brings together the multiple sources of data available, including big data, in a way that ensures their alignment with the strategy. Technology is the final step in this chain; a very important step, but not the driver of the process. Strengthening statistical systems should be a priority for South Asia.

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