1.6 THE LABOUR SUPPLY CHAIN AND POTENTIAL GDP GROWTH

The concept of potential GDP growth, when first developed by Okun for USA (in his classic paper, *Potential GNP: Its Measurement and Significance*, 1962) was rooted in labour supply variables. To understand this crucial concept, it is helpful to first outline the connections between different labour supply variables with a numerical example. The constructed Table 1.E given below lays out what can be called the complete 'labour supply chain,' starting with population growth, via productivity and hours of work, to arrive at aggregate labour supply output growth.

Based on Table 1.E, we can derive various growth accounting equations. The exact definitions of labour market variables are not needed to understand the table below. However, most of them should be intuitively clear. The important point to note is that the labour force (L) is made up of those in the working age group who are either employed (E) or unemployed (U). The unemployed are those *without a job and looking for one.* If they are not looking for a job, they are classified as not in the labour force (N). The table shows how with steady growth in population and related variables, the URATE and other ratios stay the same.[26]

Table 1.E Hypothetical Values of Labour and Output Variables

Variable	Symbol	Formula	Period t	Period t +1	Growth
Full Population	FP		1500	1560	4%
Dependents (non-working age population < 15 and > 65)	D		300	312	4%
(Working Age) Population	P		1200	1248	4%
Dependency Ratio	d.r	= D/P	25%	25%	NIL
Not in labour force	N		200	208	4%
Labour Force	L	= E + U	1000	1040	4%
Labour Force Participation Rate	l.f.p.r	= L/P	83.3%	83.3%	NIL
Employed	E		950	988	4%
Unemployed	U		50	52	4%
Unemployment Rate	URATE	= U/L = U/(E+U)	5%	5%	NIL
Average Hours per worker	AH	= TH/E	40	40	NIL
Total Hours	TH		38000	39520	4%
Labour Productivity Tonnes/hr	LP	= y/TH	50	51	2%
Output (in hundred tonnes)	y	= TH×LP	19000	20155.2	6%

[26] The unemployment rate is actually a ratio. The term rate, strictly speaking, refers to a measure over a period of time, i.e., a flow.

In Table 1.E above, the 6% GDP growth is the approximate rate, slightly lower than the actual one. For numerical convenience, we will use the growth approximation.[27] (Elsewhere in this text, a 6% unemployment rate has usually been chosen for numerical examples, but 5% is chosen for this table to get round numbers.)

We start with the basic identity,

Total Output = Labour Input (Total Hours) × Output per Hour (Labour Productivity)

The term Productivity, by default and general usage, also followed here, refers to Labour Productivity, unless one is specifically referring to some other measure, such as TFP, as in the Solow model.

Thus, ***g*(Output) = *g*(Total Hours) + *g*(Labour Productivity)**

The above is the first fundamental equation for output growth.

Note that Total Hours = Average Hours (per worker) × # Employed[28]

Assuming Average Hours is fixed, then

g(Total Hours) = g(Employed). So we can replace g(TH) with g(E).

Hence, g(Output) = g(Employed) + g(Labour Productivity)

Further, assuming a constant unemployment rate, we can replace g(Employed) with g(Labour Force).

Hence, ***g*(Output) = *g*(Labour Force) + *g*(Labour Productivity)**

Finally, assuming a constant labour force participation rate, we can replace g(Labour Force) with g(Working Age Population), i.e., those of working age. Further, assuming a constant dependency ratio, we can replace g(Working Age Population) with g(Full Population).

Thus, g(Output) = g(Population) + g(Labour Productivity)

This equation above is the second fundamental equation for output growth, which in turn implies that

g(Output per Capita) = g(Labour Productivity)

Ultimately, increase in standard of living (output per capita) depends upon real wages, which in turn depend upon increases in productivity growth.

In our example, with population growing by 4% and productivity by 2%, the output grows by 6%. This above equation, by itself, provides a projection of long-run (potential) GDP growth. Most economic analysis of growth for emerging economies *ignores* the changes that occur, in values of those labour supply variables that affect Total Hours and thereby determine g_{y*}. However, if all these relevant labour supply variables are unchanged, then the *growth in labour hours will equal population growth*.

[27] The approximate rate of growth is the sum of 4% + 2%. If $A = B \times C$, then the precise growth rate will be $g(A) = g(B) + g(C) + g(B \times C)$. The precise growth rate is 6.08% due to the cross product term (0.04 × 0.02, i.e., 0.08%), small enough to be ignored.

[28] Average hours is normally measured and reported weekly as for USA. For this equation, however, average hours have to be adjusted to the same frequency as GDP in the above equation.

Thus, a higher population growth leads to a higher GDP growth. Compared to developed countries, emerging economies have a higher population growth. This is a major reason why they tend to have a higher GDP growth.[29]

Leaving aside the impact of EDB on productivity and growth, and focusing on the labour variables, the last formula above, although it incorporates the impact of labour supply variables, is still mechanistic. It ignores *variations* in a whole range of labour market variables. For emerging economies, as their agricultural sector and activities get monetised, their *labour force participation rates* go up. Even without much change in average hours, or growth in productivity, total hours, and so GDP growth, goes up, as the subsistence economy becomes a market economy, and free time or unpaid work gets converted into paid work. Note that rising labour force participation of women played a big role in the East Asian miracle, discussed earlier. Their rapid growth may not be easily replicable in other emerging economies, including much of India and in Islamic countries, where cultural norms restrict high female labour force participation.

Of late, for emerging economies, there has been much discussion about the 'demographic dividend.' The phenomenon implies a low dependency ratio, i.e., a high ratio of working age to the total population. For a given population, this leads to a higher growth in hours and, thus, in GDP growth.[30]

The Goldman Sachs BRICS report—and other such reports—has made projections of high potential GDP growth for India on the basis of its demographic dividend (Chapter 6). The IMF also projected in 2011 that the demographic dividend could raise India's GDP growth rate, in over the next two decades, by 2% per year. However, such calculations tend to be mechanical. Much of India's low dependency ratio reflects a high birth rate in those backward states where labour force participation, in general, and for women in particular, is low.[31]

To summarise the main conclusion of this Section, in assessing potential GDP growth, for emerging economies, the focus should be on labour supply growth. While this is a good starting point, a more detailed examination of labour market characteristics is called for.

1.7 CHOOSING THE RIGHT OUTPUT MEASURE FOR MACROECONOMIC ANALYSIS

In order to choose the correct output variable, we need to discuss the suitability of different output measures. Most of the underlying concepts and economic decisions and choices (e.g., amount to spend, how much to produce, hours of work, etc., that are studied in microeconomics) pertain to *levels*. For example, as an individual you decide to spend

[29] As pointed out in Section 1.2, rich countries with immigration (USA, Canada) have higher growth rates than those without (Japan and Germany).

[30] The latest census data for 2011, reported that India's working age population (15–64 years) is now 63% of the total, and that the dependency ratio has shrunk further.

[31] These are called the BIMARU states (Bihar, Madhya Pradesh, Rajasthan and Uttar Pradesh).