

Expansion Technical Notes

The objective of these technical notes is to provide an overview of the analytical approach we took when expanding our findings from our case studies to the global economy. We have not attempted to be exhaustive; we aim instead to highlight the principal inputs and assumptions on which our methodology is built. For more general guidance on the methodology behind the case studies, readers should refer to the "Technical Notes" section of this document, as this chapter is concerned solely with the extra methodological principles that underpinned the expansion exercise. The chapter is in five sections:

- **Expansion objectives** outline the goals of the expansion exercise, which in turn govern the methodological approach taken by the team.
- **Global employment definition and overview** defines the types of employment that are under analysis.
- **Global employment assessment** discusses the methodology used to determine global nonagricultural employment in 2003 and 2008, as well as global services employment in the same period.
- **Theoretical maximum** describes the way in which the theoretical maxima determined in the cases were applied to the global economy.
- **Degree of adoption of global resourcing** discusses the methodology used to estimate the level of global resourcing in 2003 and 2008 at a global level, as well as the techniques that were used to distribute the demand for globally-resourced employment among occupations.

EXPANSION OBJECTIVES

This chapter outlines the methodology used to extrapolate sector results to a worldwide view. The objectives of the expansion exercise are (a) to arrive at a global view of theoretical maximum globally-resourced employment demand and degree of adoption and (b) to break out these top-level figures into occupations in order to facilitate any eventual matching with supply of globally-resourced labor.

GLOBAL EMPLOYMENT DEFINITION AND OVERVIEW

The expansion focuses on nonagricultural labor. It therefore comprises in the first instance all services employment and industry employment (i.e., employment in mining and manufacturing). It is nevertheless important to note the following nuance to the analysis: our evaluation of theoretical demand for globally-resourced labor is restricted to employment in services and in the services element (e.g., payroll) of industry. Our definition of "services employment" is thus broader than what is typically meant by the term in widely available labor data sources, such as those supplied by the International Labor Organization (ILO). Thus, when theoretical demand is expressed as a percentage of services employment, it is expressed according to our definition. For clarity, this broad definition of services employment is henceforth referred to as services(t) employment, where the (t) stands for "total."

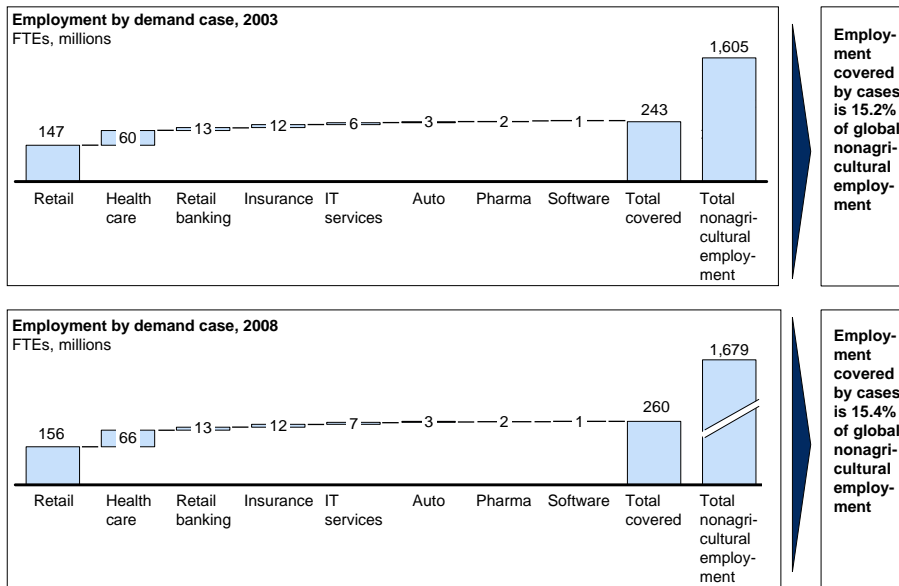
To put our results in perspective, we thus compare our numbers with two main labor pools: global nonagricultural labor and global services(t) labor. A common query sparked by this methodology is why it is necessary to collect data on nonagricultural employment as well as on services(t) employment. A collection of both is necessary because of the way in which manufacturing industry sectors (such as auto and pharma) were handled, which in turn is driven by methodological consistency with other sectors. To construct representative industry groups (see below), we needed to include all employment, which is why total nonagricultural employment was a key starting point for our analysis. Furthermore, as we look at the impact on the economy as a whole, understanding the percentage of all nonagricultural employees potentially impacted by this new phenomenon of global resourcing of services is an interesting measure. However, when total theoretical maximum globally-

resourceable jobs are discussed as a fraction of the economy, it also makes sense to use services(t) employment as the denominator. This allows us to understand within the specific sector we are examining—services(t) employment—what percentage must be performed onshore and what percentage can be globally resourced.

A second query that is sparked by the expansion approach is what fraction of global employment is covered by our sector studies. We have covered 15 percent of global nonagricultural labor (Exhibit 1), a significant and robust fraction. Furthermore, we explain below how the sectors we selected were representative of the global economy and thus can be used for projection.

Exhibit 1

TOTAL COVERAGE OF CASES IS OVER 15% OF EMPLOYMENT*



* Nonagricultural employment
Source: McKinsey Global Institute analysis

GLOBAL EMPLOYMENT ASSESSMENT

Global employment breakdown

Unlike individual sector cases, the expansion does not attempt to generate a split of employment by function, as it is not possible to split global employment into a meaningful set of nonoverlapping functions. This section thus focuses on employment share by occupation. The steps taken to arrive at a global occupational breakdown—crucial for matching to supply data—were as follows:

- *Split economy into Industry Groups (IGs).* US Bureau of Labor Statistics (BLS) data were used to develop the IG concept. IGs are groups of sectors that are characterized by similar activities, such as a large back office or a large number of customer-facing employees. The development of IGs occurred at the start of the project, and influenced the set of sectors that were chosen for more detailed analysis. Indeed, the sectors were chosen in order to guarantee good coverage across IGs. The split of employment into IGs comprised three steps: (1) we identified 32 industries, using three-digit NAICS¹ codes for industry and two-digit codes for services and other industries; (2) we used BLS employment by occupation data to characterize each industry's occupational distribution; and (3) we grouped together industries with similar occupational distributions.
- *Collect country data on employment in IGs.* For each of our focus countries, we obtained data on the division of economy-wide employment among IGs. The collection of data from each of the focus countries enabled the team to check for consistency across countries and also generate a worldwide average for the fraction of global employment in each IG.
- *Match or calculate occupational split of employment within IGs.* For most IGs, we were able to find a representative sector case (which had been the intention when the sectors were selected). Some of these were direct representatives, such as the auto case, which is part of IG B (production-intensive high-tech). Other IGs were indirectly represented, in cases where the employment split of a sector case could reasonably be judged to apply to an IG that does not encompass the sector case to begin with. For example, our retail case, which is part of IG E (customer-facing services,

¹ North American Industry Classification System, which is also used by Mexico and Canada, replaced the Standard Industry Classification (SIC) system in the United States in 1997.

small back office) also provides the employment split for IG D (customer-facing services, large back office, small business and finance). This indirect representation applied to two IGs (the other IG was IG G, construction, which was also represented by retail) and affected 13 percent of employment. Where no link, direct or indirect, could be established, BLS occupational data (Exhibit 2) from representative industries was used to determine how, in each case, employment was divided into our 19 occupational groups.

Exhibit 2

FOR INDUSTRY GROUPS NOT COVERED IN STUDY, EMPLOYMENT SPLITS CAN BE OBTAINED FROM CASES OR FROM BLS DATA

	Examples	Employment split source
(A) Production-intensive low-tech	<ul style="list-style-type: none"> • Wood • Paper 	<ul style="list-style-type: none"> • BLS data for pulp and paper
(B) Production-intensive high-tech	<ul style="list-style-type: none"> • Petroleum and coal • Electrical machinery 	<ul style="list-style-type: none"> • Auto • Pharma
(C) Customer-facing services, large back office, large business and finance	<ul style="list-style-type: none"> • Finance • Insurance 	<ul style="list-style-type: none"> • Retail banking • Insurance
(D) Customer-facing services, large back office, small business and finance	<ul style="list-style-type: none"> • Real estate • Other business services 	<ul style="list-style-type: none"> • Retail
(E) Customer-facing services, small back office	<ul style="list-style-type: none"> • Retail 	<ul style="list-style-type: none"> • Retail
(F) High-tech, large back office	<ul style="list-style-type: none"> • Professional, technical, and scientific services • Other information services 	<ul style="list-style-type: none"> • IT services • Software
(G) Construction	<ul style="list-style-type: none"> • Construction 	<ul style="list-style-type: none"> • Retail
(H) Education and health care	<ul style="list-style-type: none"> • Health care 	<ul style="list-style-type: none"> • Health care
(I) Telecom and utilities	<ul style="list-style-type: none"> • Telecom 	<ul style="list-style-type: none"> • BLS data for telecoms
(J) Wholesale and transportation	<ul style="list-style-type: none"> • Transportation 	<ul style="list-style-type: none"> • BLS data for transportation
(K) Government*	<ul style="list-style-type: none"> • Government 	<ul style="list-style-type: none"> • BLS data for government

* Uses BLS data
Source: McKinsey Global Institute analysis

Global employment projections, 2004-2008

Two types of employment were forecast: nonagricultural employment and services(t) employment.

- **Nonagricultural employment.** The forecasting steps were as follows:
 - *Use most recent data available for all focus countries.* This also applied to our assessment of the "rest of EU-15" group and the "rest of the world" group. Global Insight data for 2003, triangulated with in-country sources and the Groningen European Union labor supply database, were used.

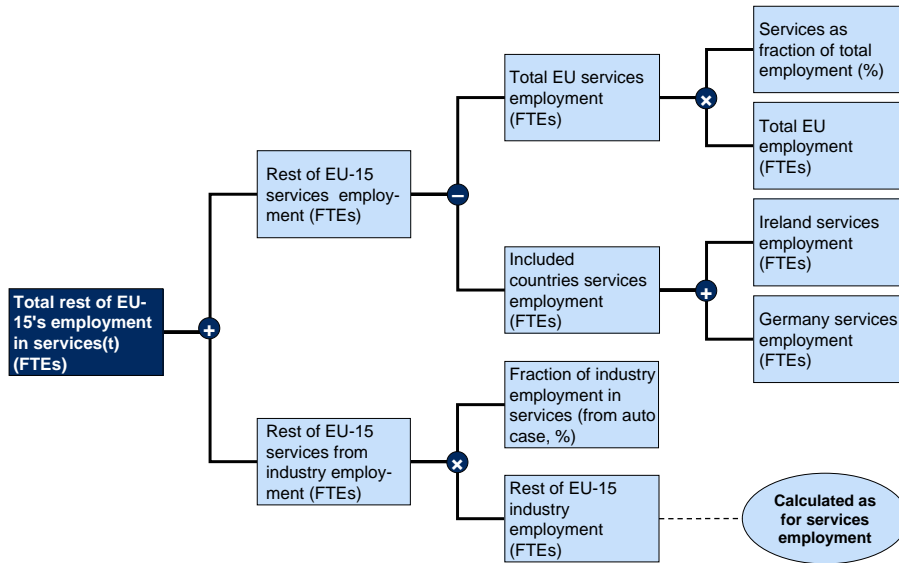
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- *Determine growth rate of each country.* To determine the growth rate to 2008, we used ILO nonagricultural labor forecasts for the United States, China, India, Germany, Japan, Czech Republic, Brazil, and Russia for 2000 and 2010, then calculated the growth rate for each country.
 - *Calculate growth rate for missing countries and country groups.* For Canada, for which no ILO data was available in our data set, we assumed the US growth rate for the 2000-2010 period. We assumed the "rest of EU-15" has a growth rate of the average of Germany, Ireland, and Czech Republic. For the "rest of the world" we assumed a growth rate equal to the average of China, India, Russia, and Brazil.
 - *Apply growth rates to base data.* The last step was to apply the annual growth rates from the ILO to the base data we had from Global Insight.
 - **Services(t) employment.** The forecasting steps taken were as follows:
 - *Collect historical ILO data (split into services, manufacturing, and mining) for each focus country.* The base data is available on the ILO Web site and was simply aggregated onto similar templates on a country-by-country basis. The formula for services(t) employment is $(\text{services employment}^2) + 34\% * (\text{industry employment}^3)$. Thirty-four percent is the typical fraction of industry employment that is in services, and is based on data from our cases.
 - *Use historical growth rates to extrapolate future growth.* Historical data for focus countries from 1998 onward was used in every case.
 - *Generate employment forecasts for rest of EU-15 and rest of world.* Both of these forecasting groups were calculated using data from subsets of focus countries. For the rest of EU-15, data from Germany, Ireland, and Czech Republic were used; for the rest of world, China, Brazil, and Russia were used (Exhibits 3 and 4).

² As defined by the ILO.

³ "Industry" employment is all employment in mining and manufacturing.

Exhibit 3

REST OF EU-15 SERVICES(T)* EMPLOYMENT ANALYSIS TREE

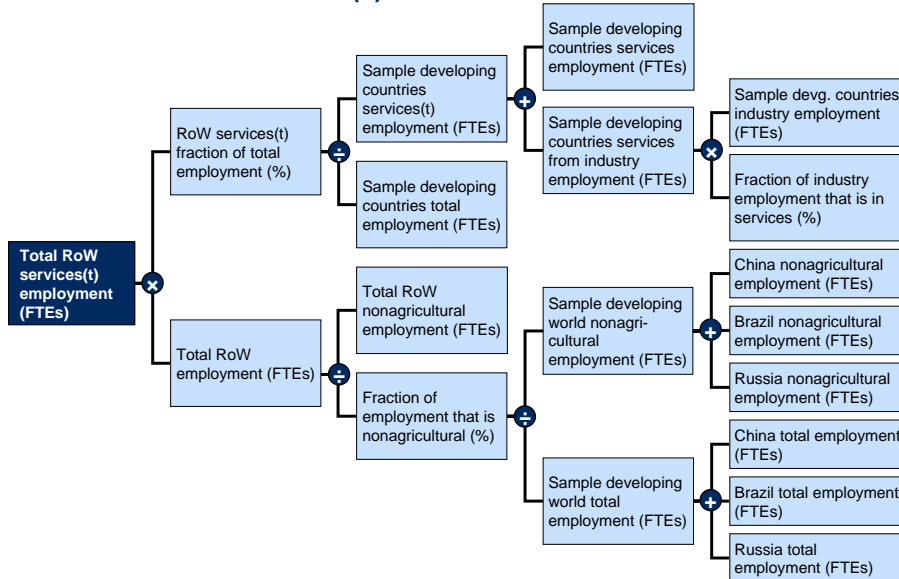


* Services(t) stands for services employment plus services employment in industry sectors (as defined by ILO; industry sectors include manufacturing and mining)

Source: McKinsey Global Institute analysis

Exhibit 4

REST OF WORLD SERVICES(T)* EMPLOYMENT ANALYSIS TREE

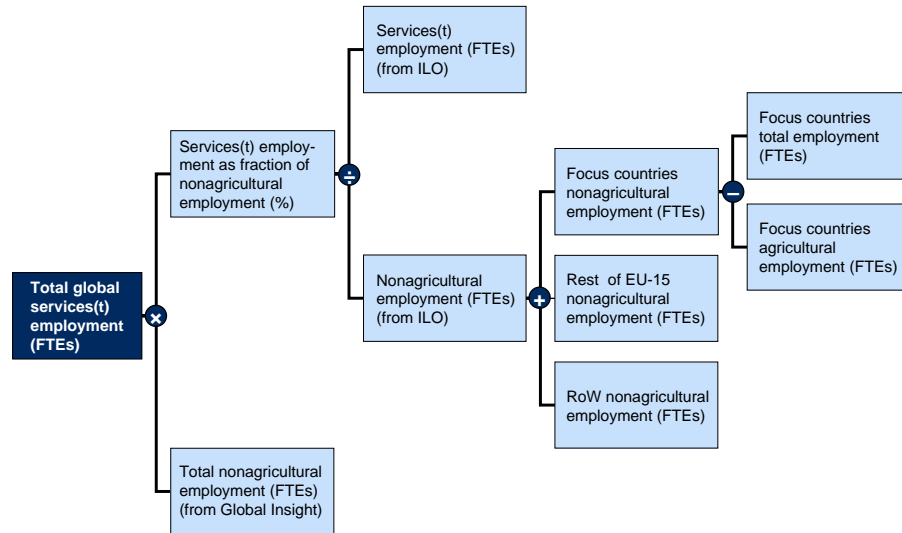


* Services(t) stands for services employment plus services employment in industry sectors (as defined by ILO; industry sectors include manufacturing and mining)

Source: McKinsey Global Institute analysis

Exhibit 5

SERVICES(T)* EMPLOYMENT APPLIES ILO DATA RATIOS TO GLOBAL INSIGHT DATA



* Services(t) stands for services employment plus services employment in industry sectors (as defined by ILO; industry sectors include manufacturing and mining)
Source: McKinsey Global Institute analysis

- Calculate ratio of (services(t) employment)/(nonagricultural employment).⁴
This step was taken in order to generate a ratio (86 percent, growing to 87 percent by 2008) that could then be applied to the Global Insight data used for the country-by-country calculation of nonagricultural employment, in order to generate a figure in full-time equivalents (FTEs) of global services(t) employment.
- Apply ratio to existing Global Insight nonagricultural data. The ratio technique (Exhibit 5) allowed the team to use the consistency of the ILO data and the more accurate base figures for 2003 from Global Insight.

Changes in assumptions that could alter projected employment

The main area that was checked was the growth rate of nonagricultural labor. A significant increase in the rate at which Chinese and Indian farm workers leave the land could drive up growth in nonagricultural labor through 2008. Currently,

⁴ As shown by the ILO.

⁵ See, for example, Harney, Alexandra, "China's economic growth shrinks labour supply," Financial Times, 16th August 2004.

50 percent of the Chinese labor force works in agriculture, and the migration of farmers to cities is closely managed by the state. A change in policy or a deregulation of this process could herald steep growth over the next five to ten years in nonagricultural employment. Currently, no such change is anticipated, and recent reports even show that rural migration to cities in China is slowing due to improving conditions in rural areas⁵ (especially among farmers who grow fruits and vegetables that are sold in urban areas).

The ILO has forecast the growth rate at 1.9 percent, and for the purposes of this exercise we assumed the stock of nonagricultural employment remained at 40 percent to 2008 (Exhibit 6). If migration were to increase such that the nonagricultural fraction of total employment rose by 0.5 percent a year (i.e., 42.5 percent, as opposed to 40 percent in 2008), the annual growth rate of nonagricultural labor would be 3.2 percent. At a 1 percent per year stock increase (i.e., 45 percent, as opposed to 40 percent) to 2008, the corresponding annual growth rate of nonagricultural labor would be 4.4 percent. Even under this (implausibly) aggressive scenario, the total stock of nonagricultural labor is 12 percent higher in India, but only 0.01 percent higher at a global level. For the sensitivity analysis of Indian employment, the starting data were the 2003-2008 nonagricultural employment forecasts (described above) and the Global Insight estimate of the fraction of total employment that is outside agriculture. Dividing the first by the second yields total employment for each year to 2008, to which various fractions of nonagricultural employment were applied (e.g., 40 percent in 2003, 39.5 percent in 2004, 39 percent in 2005, and so on).

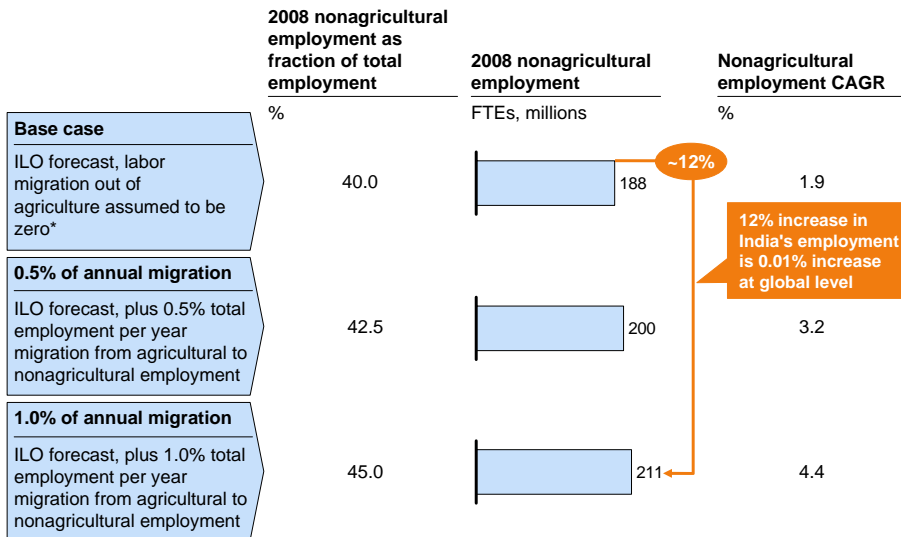
THEORETICAL MAXIMUM

The main technique employed is that of matching IGs with cases where possible, which is similar to the technique used in splitting employment among occupations in IGs (outlined earlier). The following steps were taken (Exhibit 7):

Exhibit 6

MIGRATION OUT OF AGRICULTURE CAN AFFECT NONAGRICULTURAL EMPLOYMENT GROWTH RATES

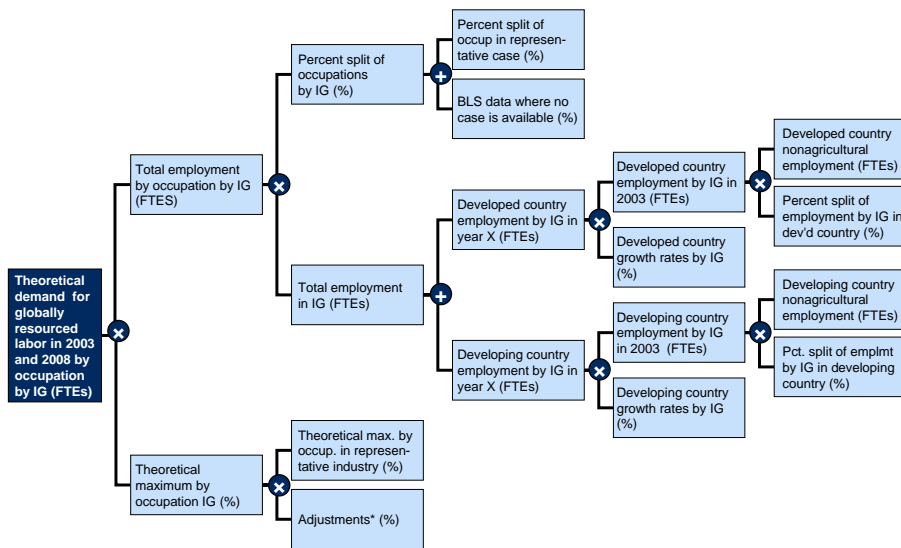
INDIA EXAMPLE



* Some migration is included in the ILO forecast, but by assuming it is zero for this sensitivity analysis, the methodology is simplified
Source: McKinsey Global Institute analysis

Exhibit 7

COMBINATION OF INFORMATION ALLOWS THE EXTRAPOLATION OF THEORETICAL MAXIMUM



* Two IGs (telecom and utilities, and government) were not matched to representative cases, so the average of the theoretical maxima in other IGs was used
Source: McKinsey Global Institute analysis

-
- *Compare cases and check for outliers.* The initial filter for inconsistencies in the data was a comparison among values for theoretical maximum for each occupation in different cases.
 - *Assign cases to IGs where possible.* Through discussions with practice experts and demand case authors, it was possible to match the theoretical maximum values of cases with all IGs except for two: telecom and utilities, and government.
 - *Calculate average occupational theoretical maximum and assign to unmatched IGs.* In the two IGs that were not matched to a demand case, the average was applied.⁶
 - *Multiply theoretical maximum by FTEs in all occupational groups in all IGs.* To generate an FTE figure for theoretical maximum for each IG and each occupational group, the percentage theoretical maximum is multiplied by the corresponding total number of FTEs in each of those occupational groups in each IG.

DEGREE OF ADOPTION OF GLOBAL RESOURCING

As degree of adoption cannot be assessed on an occupational level, we took a different approach in this part of the expansion. The two main steps were a calculation of global degree of adoption, followed by a distribution of this global figure among occupations.

Calculation of global degree of adoption

The basic approach was to calculate degree of adoption (DA) as a fraction of theoretical maximum (TM) for all of the detailed demand cases, and then apply that fraction to the global theoretical maximum detailed previously. It is worth noting that a representative sample of the demand cases was calculated, as it would be unrealistic to allow high level of adoption in IT services and packaged

⁶ In the case of telecom and utilities, the value of one occupational group (support staff) was changed from the average to that found in retail. The change was made based on the team's judgment that support staff in telecom and utilities (likely to be maintenance workers) will have a theoretical maximum similar to that found in retail support staff, because of the need for physical presence in maintenance work.

software to influence significantly the average level of adoption applied to all industries (Exhibit 8). The equation central to this part of the expansion is:

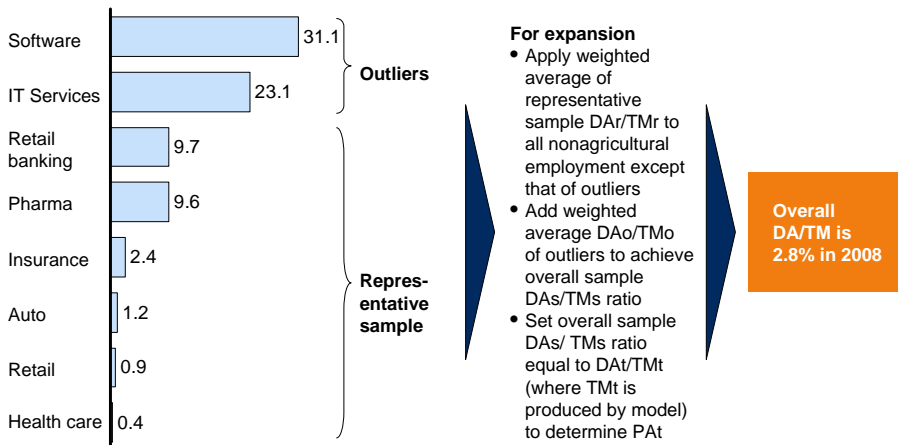
$$DA_t/TM_t = ((DA_r/TM_r)*x) + ((DA_o/TM_o)*y)$$

where DA_r/TM_r is DA/TM for the representative sample; DA_o/TM_o is the equivalent expression for the outlier cases; $x + y$ equals 100 percent, and y is the employment in the two outlier cases; DA_t is the unknown and TM_t is the total theoretical maximum calculated earlier in the expansion exercise. The five main groups of steps were (1) determine outliers, (2) calculate and weight DA/TM for the representative sample, (3) calculate and weight DA/TM for the outliers, (4) determine DA_t from the equation, and (5) make IG-specific changes to the total number of globally-resourced FTEs (Exhibit 9).

Exhibit 8

IN DEGREE OF ADOPTION, IT SERVICES AND SOFTWARE ARE OUTLIERS AND ARE NOT INCLUDED IN REPRESENTATIVE SAMPLE

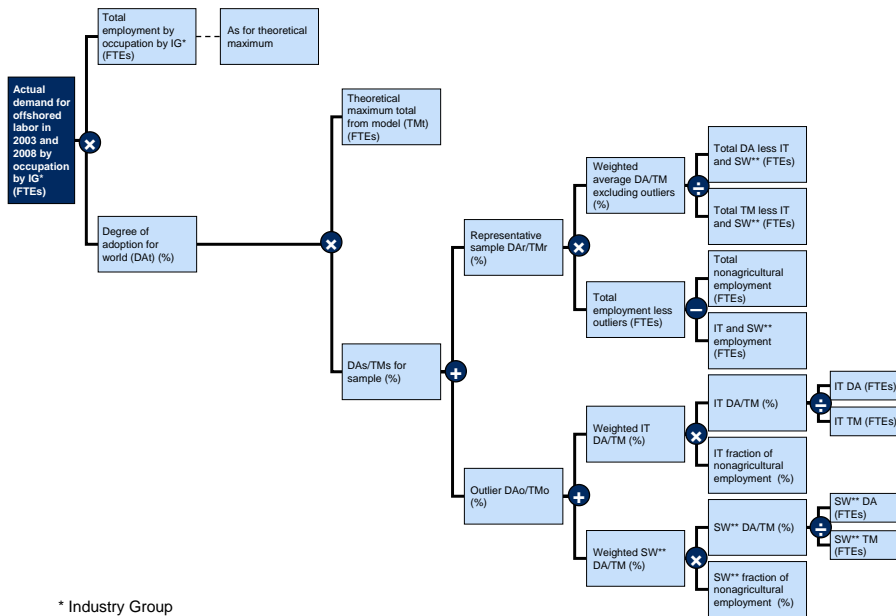
Ratio of degree of adoption to theoretical maximum in demand cases, 2008
%



* The subscripts r, o, s, and t denote different elements of the computation. DA_r is the degree of adoption of the representative sample, DA_o is that of the outliers, DA_s is that of the overall sample and DA_t is that of the total global economy. TM is theoretical maximum, to which the same subscript letters apply
Source: McKinsey Global Institute analysis

Exhibit 9

DEGREE OF ADOPTION DRIVER TREE USES REPRESENTATIVE SAMPLE



- **Determine outliers:**

- Calculate DA/TM for all demand cases in 2008.⁷ Projections for actually globally resourced labor in 2008 were divided by the theoretical maximum number of globally-resourceable FTEs in the same sector in the same year.
- Select representative sample. Outliers—or any industries with much higher or lower degrees of adoption (DA) than the rest of the cases—were identified. IT services and packaged software had DA/TM ratios that were much higher than the other cases and were therefore excluded from the representative sample.

- **Calculate and weight the representative sample:**

- Calculate weighted average DA/TMr. All globally-resourced labor in the auto, pharma, retail banking, health care, insurance, and retail cases was divided by the sum of theoretical maximum employment in the same cases.

⁷ A similar approach was taken for the 2003 expansion.

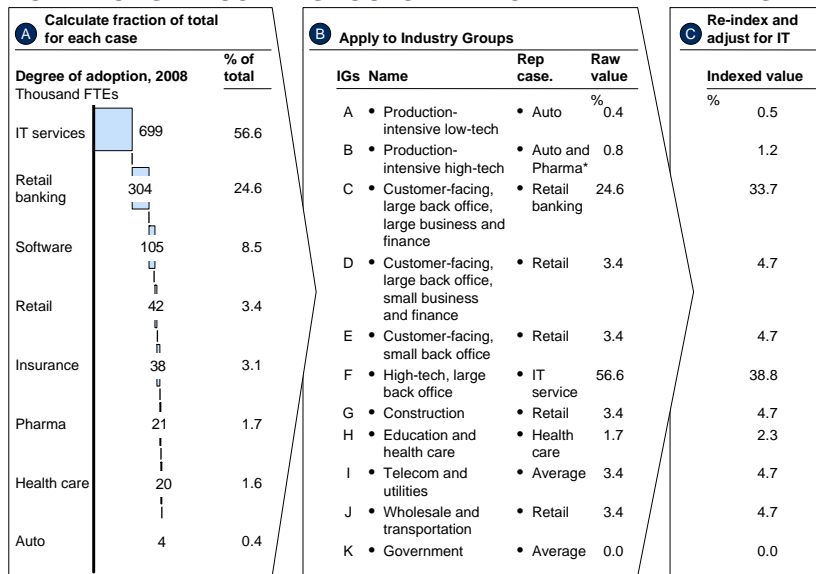
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- Calculate x (fraction of total nonagricultural employment to which representative sample applies). The sum of employment in IT services and software was divided by total nonagricultural employment (<1 percent), and then subtracted from 100 percent.
 - Multiply representative sample DA_r/TM_r by x .
 - **Calculate and weight outliers.** The same approach as for the representative sample was taken, and x was substituted for y .
 - **Determine DA_t .** Once DA_t/TM_t was determined (found simply by adding the weighted expressions for the representative sample and the outliers), we multiplied DA_t/TM_t by TM_t . TM_t is the total number of FTEs that can theoretically be globally resourced in 2008 and is calculated separately in the model.
 - **Make IG-specific changes.** This was only relevant to the IG that related to government employment, where we judged that degree of adoption could be assumed to be zero. To make the change, we reduced the DA figure by the fraction of employment in the government IG.

Distribute total globally-resourced FTEs among occupations

As the representative sample technique only produced a global degree of adoption figure, it was necessary to develop an occupation-level perspective. Our approach was in three steps: (1) calculate weightings to distribute FTEs among IGs (Exhibit 10), (2) calculate weightings to split globally-resourced employment among occupations within IGs (Exhibit 11), and (3) multiply splits together (Exhibit 12).

Exhibit 10

WEIGHTINGS THAT DISTRIBUTE GLOBALLY RESOURCED LABOR AMONG INDUSTRY GROUPS WERE CREATED IN THREE STEPS

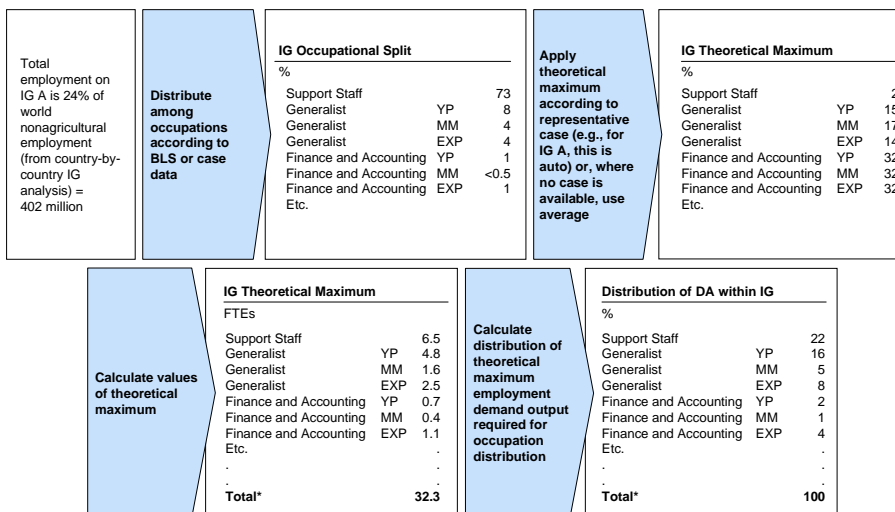


* Weighted average of auto and pharma degree of adoption
Source: McKinsey Global Institute analysis

Exhibit 11

GLOBALLY RESOURCED LABOR WITHIN INDUSTRY GROUPS IS SPLIT USING THEORETICAL MAXIMUM OF OCCUPATIONS

IG A EXAMPLE



* Column does not add up because not all 19 occupations are shown
Source: McKinsey Global Institute analysis

Exhibit 12

TOTAL GLOBALLY RESOURCED LABOR IS DISTRIBUTED AMONG INDUSTRY GROUPS AND OCCUPATIONS

3,839,093 FTEs

FTEs to be distributed among IGs and occupations (preadjusted for zero degree of adoption in government)

Weighting within IGs	Weighting among IGs				Output			
	%				FTEs			
	0.5 A	1.2 B	33.7 C	4.7 D	A	B	C	D
Support Staff	22	12	20	13	4,093	5,202	257,260	22,976
Generalist YP	16	16	31.7	32	3,006	7,180	409,941	57,569
Generalist MM	5	4	9	3	1,000	1,653	118,165	6,110
Generalist EXP	8	12	10	12	1,576	5,303	126,120	22,455
Finance and Accounting YP	2	1	6	<0.5	432	389	72,734	719
Finance and Accounting MM	1	1	3	<0.5	234	230	32,448	668
Finance and Accounting EXP	4	2	6	1	712	761	82,668	2,227

4,101,672 FTEs x 31.7% x 33.7%

Source: McKinsey Global Institute analysis

- **Calculate weightings to distribute FTEs among IGs:**

- Sum globally-resourced employment projections in demand cases.
- Calculate percentage value of total for each case. This step resulted in a percentage value (e.g., IT services 56.6 percent , retail 3.4 percent) of total employment projected in detail that was in each of the demand cases.
- Apply representative cases to IGs. The same representative cases as in theoretical maximum were used (e.g., the auto case's values are applied to IGs A and B, and retail banking's values are applied to IG C). IG I (telecoms and utilities), which had an average value applied in the theoretical maximum analysis, was linked to the retail case.
- Re-index weighting values and adjust for IT services. The linking system does not guarantee that all values will add to 100 percent, so a re-indexing was conducted to ensure that the distribution among IGs added to 100 percent. The high degree of adoption of the IT services case was judged to overstate the degree of adoption that could be assumed for the whole of

the high-tech, large back office IG (IG F). This was compensated for by setting the degree of adoption of the IT services case to half its projected 2008 value for the purposes of the weighting exercise, which gave somewhat more weight to all the other IGs.

- **Calculate weightings to split globally-resourced employment among occupations within IGs.** The theoretical maximum values for each occupation in each IG were used as a guide for the distribution among occupations:
 - *Use occupational splits from previous work on employment.* Combining the total employment in each IG with the occupational splits from cases or the BLS yields an FTE value for employment in IG and in each occupation.
 - *Multiply employment by theoretical maximum.* Different occupations in different IGs have different theoretical maxima, according to the case to which the IG is linked.
 - *Calculate percentage of total theoretical maximum employment is in each occupation.* This step generates the weighting factor among occupations within each IG, such that the weightings all add to 100 percent.
- **Multiply both weightings by the total stock of globally-resourced FTEs.** This last step distributes the overall stock of globally-resourced FTEs among all occupations and IGs, and allows matching with supply to occur.

