WORLD BANK GROUP
Jobs

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Purpose

The tool decomposes per capita output growth into four components - contributions of productivity growth, employment growth, labor force growth, and change in working age population - using the Shapley decomposition method. The aim of the analysis is to understand the roles of productivity and employment growth in driving a country's overall growth.

To understand a country's job structure, the tool calculates different sectors' contributions to aggregate productivity and employment growth. The tool helps the user make growth projections and analyze the consistency of such projections in terms of historical data as well as UN population projections. By using the Country Comparison feature, the user can select five countries and compare results.

Data

The tool uses sectoral value added, population and employment data from the WDI database.
The user can also manually enter his or her own data.

World DataBank: http://databank.worldbank.org/data/home.aspx   WDI Data Accessed 03 Oct 2019

In the Projection-feature, the user can also select to use population projection data from the UN:

UN Projected Data: http://esa.un.org/unpd/wpp/DVD/   File version: PPOP/DB/WPP/Rev.2019/POP/F07-1 (Aug 2019)

Step-by-Step

Follow the Step-by-Step instructions from sheet to sheet:

Step 1	Select Country
Step 2	Select Data
Step 3	Select Period
Step 4	Select Other Assumptions
Step 5	Review Results
Step 6	Country Comparison
Export	Export Results

Color coding

123-ABC Cells filled by the tool and can be modified by the user

All other cells filled by the tool and CANNOT be modified by the user

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Password Protection

To prevent the user from inadvertently overwriting formulas, a password is used protect all sheets.
If it becomes necessary to revise the structure of the file, use these buttons:
NB! The password is 'GROWTH' and must not be changed as it is included in macros.

All sheets: Unprotect
All sheets: Protect

Contact Details

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Documentation
No errors reported in structural check

The tool decomposes per capita output growth into four components - contributions of productivity growth, employment growth, labor force growth, and change in working age population - using the Shapley decomposition method. The aim of the analysis is to understand the roles of productivity and employment growth in driving a country's overall growth. To understand a country's job structure, the tool calculates different sectors' contributions to aggregate productivity and employment growth. The tool helps the user make growth projections and analyze the consistency of such projections in terms of historical data as well as UN population projections. By using the Country Comparison feature, the user can select five countries and compare results.

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      Data Requirements
      References
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      Checks and Balances
      How To Add More Existing Data

Definitions & Concepts

Sectors of Economic Activity

The tool can be used to describe how each of the following sectors of economic activity contributes to the total observed growth in value added and employment rate. The following sectors are considered:

Major	Sector (Manual Data)	Sector (WDI)
Agriculture	Agriculture	Agriculture
Industry	Mining & Utilities	Industry
Industry	Manufacturing	
Industry	Construction	
Services	Wholesale & Retail	Services
Services	Transport & Communications	
Services	Other Activities etc.	
	Total Value Added	Total Value Added

Statistical Discrepancy

Due to statistical discrepancies, the sum of Value Added from each sector sometimes does not add up to the total Value Added. Similarly, the sum of employment from each sector sometimes does not add up to the total employment. In line with the approach in the WDI database, this discrepancy is included in the Services sector, which is why the data series is named "Services".
See: https://data.worldbank.org/indicator/NV.SRV.TOTL.KD

Compound Annual Growth Rate (CAGR)

Growth rate is calculated as a geometric average growth rate between the beginning and end year (t, t+T) using the compound average growth rate (CAGR) formula. For example, for value added growth (Y):

$$g_{t,t+T} = (Y_{t+T}/Y_t)^{\frac{1}{T}} - 1$$

(Eq. 1)

where

    $g_{t,t+T}$ = Period average growth rate of value added between year t and t+T

    Y_t = Value added in year t

    Y_{t+T} = Value added in year t+T

Decomposition of of Aggregate Growth—Shapley Decomposition Method

Growth in aggregate per capita value added can be described by growth in its components using the following identity:

$$\frac{Y}{N} = \frac{Y}{E} * \frac{E}{L} * \frac{L}{A} * \frac{A}{N} \qquad \text{or} \qquad y = w * e * p * a$$

(Eq. 2)

where

    Y = Total value added

    N = Population

    E = Employment

    L = Labor Force

    A = Working Age Population = Population ages 15-64

where

    y = Value added per Capita

    w = Value added per Worker

    e = Employment Rate

    p = Participation rate

    a = Population ages 15-64 / Total Population

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to each of its components (w, e, p, and a):

$$\Delta y = \Delta y^w + \Delta y^e + \Delta y^p + \Delta y^a \tag{Eq. 3}$$

Where Δy^w, Δy^e, Δy^p, Δy^a each represent a marginal contribution of w, e, p, and a, respectively, to Δy while holding other variables constant.

Using the Shapley method, the marginal contribution of productivity per worker (w) to the change in per capita value added (y) from t0 to t1, denoted as $\Delta y^w{}_{t0,\,t1}$, is calculated as:

$$
\begin{aligned}
\Delta y^w_{t0,t1} \\
= \quad & \alpha^w(s,m) \\
* \, & [(w_{t1}e_{t0}\,p_{t0}\,a_{t0}) - (w_{t0}e_{t0}\,p_{t0}\,a_{t0}) + (w_{t1}e_{t1}\,p_{t1}\,a_{t1}) - (w_{t0}e_{t1}\,p_{t1}\,a_{t1}) \\
+ \, & (w_{t1}e_{t1}\,p_{t0}\,a_{t0}) - (w_{t0}e_{t1}\,p_{t0}\,a_{t0}) + (w_{t1}e_{t0}\,p_{t1}\,a_{t0}) - (w_{t0}e_{t0}\,p_{t1}\,a_{t0}) \\
+ \, & (w_{t1}e_{t0}\,p_{t0}\,a_{t1}) - (w_{t0}e_{t0}\,p_{t0}\,a_{t1}) + (w_{t1}e_{t1}\,p_{t1}\,a_{t0}) - (w_{t0}e_{t1}\,p_{t1}\,a_{t0}) \\
+ \, & (w_{t1}e_{t1}\,p_{t0}\,a_{t1}) - (w_{t0}e_{t1}\,p_{t0}\,a_{t1}) + (w_{t1}e_{t0}\,p_{t1}\,a_{t1}) - (w_{t0}e_{t0}\,p_{t1}\,a_{t1})]
\end{aligned}
\tag{Eq. 4}
$$

which simplifies to:

$$
\begin{aligned}
\Delta y^w_{t0,t1} \\
= \quad & \alpha^w(s,m) \\
* \, & [\Delta w(e_{t0}\,p_{t0}\,a_{t0}) + \Delta w(e_{t1}\,p_{t1}\,a_{t1}) + \Delta w(e_{t1}\,p_{t0}\,a_{t0}) + \Delta w(e_{t0}\,p_{t1}\,a_{t0}) \\
+ \, & \Delta w(e_{t0}\,p_{t0}\,a_{t1}) + \Delta w(e_{t1}\,p_{t1}\,a_{t0}) + \Delta w(e_{t1}\,p_{t0}\,a_{t1}) + \Delta w(e_{t0}\,p_{t1}\,a_{t1})]
\end{aligned}
\tag{Eq. 5}
$$

The first term on the right hand side in Eq. 5, $\alpha^w(s,m)$, is a parameter vector which determines the weights of each term in the square brackets. Under the Shapley approach, the parameter values are given by the formula:

$$\alpha^w(s,m) = \frac{s!\,(m - s - 1)!}{m!} \tag{Eq. 6}$$

where

S = number of variables other than w taken at t = t1
m = Total number of variables.

In this case, m=4 (w, e, p, and a), and for the first two terms in the bracket when s is equal to 0 or 3, the coefficient value is 1/4. Equivalently, when s is 1 or 2, the coefficient value is 1/12.

$$\frac{0!\,(4 - 0 - 1)!}{4!} = \frac{6}{24} = \frac{1}{4} \qquad \text{or} \qquad \frac{1!\,(4 - 1 - 1)!}{4!} = \frac{2}{24} = \frac{1}{12}$$

Thus, the Shapley value of the contribution of w to the change in y is given by:

$$
\begin{aligned}
\Delta y^w_{t0,t1} \\
= \frac{1}{4} & [\Delta w(e_{t0}\,p_{t0}\,a_{t0}) + \Delta w(e_{t1}\,p_{t1}\,a_{t1})] \\
+ \frac{1}{12} & [\Delta w(e_{t1}\,p_{t0}\,a_{t0}) + \Delta w(e_{t0}\,p_{t1}\,a_{t0}) + \Delta w(e_{t0}\,p_{t0}\,a_{t1}) + \Delta w(e_{t1}\,p_{t1}\,a_{t0}) + \Delta w(e_{t1}\,p_{t0}\,a_{t1}) + \Delta w(e_{t0}\,p_{t1}\,a_{t1})]
\end{aligned}
\tag{Eq. 7}
$$

And analogously, the Shapley values of the contributions of e, p, and a to changes in y is given by:

$$
\begin{aligned}
\Delta y^e_{t0,t1} \\
= \frac{1}{4} & [\Delta e(w_{t0}\,p_{t0}\,a_{t0}) + \Delta e(w_{t1}\,p_{t1}\,a_{t1})] \\
+ \frac{1}{12} & [\Delta e(w_{t1}\,p_{t0}\,a_{t0}) + \Delta e(w_{t0}\,p_{t1}\,a_{t0}) + \Delta e(w_{t0}\,p_{t0}\,a_{t1}) + \Delta e(w_{t1}\,p_{t1}\,a_{t0}) + \Delta e(w_{t1}\,p_{t0}\,a_{t1}) + \Delta e(w_{t0}\,p_{t1}\,a_{t1})]
\end{aligned}
\tag{Eq. 8}
$$

$$
\begin{aligned}
\Delta y^p_{t0,t1} \\
= \frac{1}{4} & [\Delta p(w_{t0}\,e_{t0}\,a_{t0}) + \Delta p(w_{t1}\,e_{t1}\,a_{t1})] \\
+ \frac{1}{12} & [\Delta p(w_{t1}\,e_{t0}\,a_{t0}) + \Delta p(w_{t0}\,e_{t1}\,a_{t0}) + \Delta p(w_{t0}\,e_{t0}\,a_{t1}) + \Delta p(w_{t1}\,e_{t1}\,a_{t0}) + \Delta p(w_{t1}\,e_{t0}\,a_{t1}) + \Delta p(w_{t0}\,e_{t1}\,a_{t1})]
\end{aligned}
\tag{Eq. 9}
$$

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$$\Delta y_{t0,t1}^a \qquad \text{(Eq. 10)}$$
$$= \frac{1}{4}\left[\Delta a(w_{t0}\, e_{t0}\, p_{t0}) + \Delta a(w_{t1}\, e_{t1}\, p_{t1})\right]$$
$$+ \frac{1}{12}\left[\Delta a(w_{t1}\, e_{t0}\, p_{t0}) + \Delta a(w_{t0}\, e_{t1}\, p_{t0}) + \Delta a(w_{t0}\, e_{t0}\, p_{t1}) + \Delta a(w_{t1}\, e_{t1}\, p_{t0}) + \Delta a(w_{t1}\, e_{t0}\, p_{t1}) + \Delta a(w_{t0}\, e_{t1}\, p_{t1})\right]$$

See Muller (2008), Gutierrez, et al (2007), and World Bank (2009) for more detail.

A typical output table can look like this:

	2000-2018		
	Percent	% Contribution	Notation
Annual Growth per capita Value Added	2.97	100%	Δy
Change in Productivity	2.48	83%	Δy^w
Change in Employment rate	0.06	2%	Δy^e
Change in Participation Rate	0.07	2%	Δy^p
Change in Share of Working Age Population	0.35	12%	Δy^a

Decomposing Changes in Value Added Per Worker – by Sector
To understand the way in which each sector contributed to the aggregate productivity change, we can decompose the value added per worker (Y/E) in (Eq. 2) by sector:

$$\frac{Y}{E} = \sum_{i=1}^{n} \frac{Y^i}{E^i} * \frac{E^i}{E} \qquad \text{or equivalently} \qquad w = \sum_{i=1}^{n} w^i\, \theta^i \qquad \text{(Eq. 11) and (Eq. 12)}$$

where

Y = Total value added
Y^i = Value added in sector i
E = Employment
E^i = Employment in sector i

w = Value added per Worker
w^j = Value added per Worker in sector i
$\theta^i = E^i / E$ = share of sector i in total employment

This tool let's the user select between two ways of decomposing productivty by sector. One method is from the World Bank's Job Generation and Growth (JoGG) Decomposition Tool (World Bank, 2009). We refer to this method as "Shift-share". The second alternative is from de Vries et al. (2015) and we refer to it as the "Canonical" method.

The current Tool is set to use the 'Canonical' method of sectoral decomposition.

Canonical method - de Vries et al. (2015)
Changes in aggregate value added per worker between periods t_0 and t_1 can be decomposed as (see McMillan and Rodrik, 2011):

$$\Delta w = \sum_{i=1}^{n} \Delta w^i * \theta_{to}^i + \sum_{i=1}^{n} \Delta\theta^i * w_{t1}^i \qquad \text{(Eq. 13)}$$

where

Δw = Change in value added per worker
Δw^i = Change in value added per worker in sector i
θ_{t0}^i = Share of employment in sector i in total employment, year t0
$\Delta\theta^i$ = Change in share of employment in sector i in total employment
w_{t1}^j = Value added per worker in sector i in year t1

The first term is the sum of changes in value added per worker in sector i, i=1..n. The Second term can be interpreted as the change in value added per worker due to inter-sectoral employment changes (i.e., net movements of workers between sectors). The inter-sectoral reallocation (i.e. structural change) can be further decomposed into a "static" and a "dynamic portion" (see de Vries et al., 2015):

$$\Delta w = \sum_{i=1}^{n}\left(w_{t1}^i - w_{t0}^i\right) * \theta_{to}^i + \sum_{i=1}^{n}\left(\theta_{t1}^i - \theta_{to}^i\right) * w_{t0}^i + \sum_{i=1}^{n}\left(w_{t1}^i - w_{t0}^i\right) * \left(\theta_{t1}^i - \theta_{t0}^i\right) \qquad \text{(Eq. 14)}$$
$$\text{"within-sector"} \qquad\qquad\qquad \text{"static reallocation"} \qquad\qquad\qquad \text{"dynamic reallocation"}$$

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where

Δw = Change in value added per worker

w_{t0}^i = Value added per worker in sector i in year t0

w_{t1}^i = Value added per worker in sector i in year t1

θ_{t0}^i = Share of employment in sector i in total employment, year t0

θ_{t1}^i = Share of employment in sector i in total employment, year t1

"Static reallocation" shows that workers are moving to sectors with higher productivity growth regardless of whether it is rising or falling. "Dynamic reallocation" measures the joint effects of changes in employment and sector productivity growth. "Dynamic reallocation" is positive if workers are moving to sectors with positive productivity growth.

Shift-share method - JoGGs tool
An alternative way of decomposting productivity by sector is aligned with the original JoGGs tool.

Original JoGGs tool formula:

$$\Delta w = \sum_{i=1}^{n} \Delta w^i \left(\frac{\theta_{t0}^i + \theta_{t1}^i}{2} \right) + \sum_{i=1}^{n} \Delta \theta^i \left(\frac{w_{t0}^i + w_{t1}^i}{2} - \frac{w_{t0} + w_{t1}}{2} \right) \qquad \text{(Eq. 15)}$$

where

Δw = Change in value added per worker

Δw^i = Change in value added per worker in sector i

θ_{t0}^i = Share of employment in sector i in total employment, year t0

θ_{t1}^i = Share of employment in sector i in total employment, year t1

$\Delta \theta^i$ = Change in share of employment in sector i in total employment

w_{t0}^i = Value added per worker in sector i in year t0

w_{t1}^i = Value added per worker in sector i in year t1

w_{t0} = Value added per worker in year t0

w_{t1} = Value added per worker in year t1

The first term is the sum of changes in value added per worker in sector i, i=1..n. The Second term can be interpreted as the change in value added per worker due to inter-sectoral employment changes (i.e., net movements of workers between sectors). That is, labor flows from low productivity sectors to high productivity sectors (compared to the average) should increase aggregate productivity (total value added per worker), and labor flows from high productivity sectors (compared to the average) to low productivity sectors should reduce aggregate productivity.

A typical output table can look like this:

	Canonical		*Shift-Share*	
	Total Period: 2000 to 2016		**Total Period: 2000 to 2016**	
	Percent	**% Contribution**	**Percent**	**% Contribution**
Change in Productivity	3.65	93%	3.65	93%
Contribution of within-sector productivity change	2.69	68%	2.81	71%
Agriculture	0.80	20%	0.68	17%
Industry	0.54	14%	0.61	15%
Services	1.36	34%	1.52	39%
Intersectoral reallocation	0.96	24%	0.85	21%
Agriculture	-0.47	-12%	0.53	13%
Industry	0.69	18%	0.35	9%
Services	0.74	19%	-0.03	-1%
Static reallocation	0.73	19%	.	.
Agriculture	-0.23	-6%	.	.
Industry	0.56	14%	.	.
Services	0.40	10%	.	.
Dynamic reallocation	0.23	6%	.	.
Agriculture	-0.24	-6%	.	.
Industry	0.13	3%	.	.
Services	0.34	9%	.	.

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Decomposing Changes in Employment per Labor Force Employment Rate – by Sector
To understand way in which each sector contributed to the change in employment rate, we can decompose the employment rate
(i.e, employment per labor force) (E/L) in Eq. 2 by sector:

$$\frac{E}{L} = \sum_{i=1}^{n} \frac{E^i}{L}$$ or equivalently $$e = \sum_{i=1}^{n} e^i$$ (Eq. 16) and (Eq. 17)

where
  E = Total employment   e = Total employment rate
  E^i = Employment in sector i e^i = Employment rate in sector i
  L = Total labor force

Changes in aggregate employment rate can be decomposed as:

$$\Delta e = \sum_{i=1}^{n} \Delta e^i$$ (Eq. 18)

where
  Δe = Change in total employment rate
  Δe^i = Change in employment rate in sector i

A typical output table can look like this:

	2000-2018	
	Percent	**% Contribution**
Change in Employment rate	0.06	2%
Agriculture	0.09	3%
Industry	0.00	0%
Services	-0.03	-1%

Read more about the Shapley Decomposition in Gutierrez et al. (2007).

Projection

In Step 4 A the user can run analyses to project the Shapley Decomposition for a selected period. Projected growth rates can include:
  * Growth rates for the currently selected country (Total period, or Period 1, 2, or 3)
  * Projected growth rates from UN data included in this current tool.
    UN data version: File version: PPOP/DB/WPP/Rev.2019/POP/F07-1 (Aug 2019)
    File POP/7-1: Total population (both sexes combined) by five-year age group, major area, region and country, 1950-2100 (thousands)
  * Manually added growth rates

In Step 4 B the user can define scenarios and use a macro to compare scenarios. Currently active scenarios are:
  1 * Increase productivity in one sector to reach growth target (ΔY = 5)
      - In this Scenario 1, results illustrate the relative impact each sector's productivity has on total value added. The
      user sets an annual growth target for total value added. Total employment and employment by sector are
      maintained as in the Base Case. Then the macro changes the value added for one sector at a time until the growth
      target is reached. In effect, this means changing the productivity of one sector at a time. The entire growth target is
      obtained from changes to one sector.
      - In Scenario 1, the default settings assume a target annual value added growth of 1 percentage point over the
      current Base Case. The user can set their own annual growth target manually.

  2 * Move labor between sectors to reach growth target (ΔY = 5). Fixed Productivity: Base Case
      - In this Scenario 2, results illustrate the impact of two sector's productivity differences on total value added. The
      user sets an annual growth target for total value added. Total employment as well as sector productivity are
      maintained as in the Base Case. Then the macro moves people between two sectors at a time until the growth
      target is reached. In effect, this means forcing structural change with constant productivity. The entire growth target
      is obtained from people moving between two sectors at a time.
      - In Scenario 2, the default settings assume a target annual value added growth of 1 percentage point over the
      current Base Case. The user can set their own annual growth target manually.

  3 * Move labor between sectors to reach growth target (ΔY = 5). Selected Productivity: Base Case
      - In this Scenario 3, results illustrate the impact of two sector's productivity differences on total value added. The
      user sets an annual growth target for total value added and selects a base line sector productivity. Total
      employment is maintained as in the Base Case. Then the macro moves people between two sectors at a time until
      the growth target is reached. In effect, this means forcing structural change with constant, but chosen, productivity.
      The entire growth target is obtained from people moving between two sectors at a time.
      - In Scenario 3, the default settings assume a target annual value added growth of 1 percentage point over the
      current Base Case. The user can set their own annual growth target manually.

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> **4 * Projected structural, productivity and demography change to reach growth target (ΔY = 5). Projection assumptions: Base Case and Base Case.**
>> - In this Scenario 4, results illustrate the combined impact on total value added of changing all sectors' employment shares and productivity as well as resulting demography changes. The user sets an annual growth target for total value added. The user also sets: a) maximum values to allow changes in WAP share, labor force participation, and employment rates, b) annual growth rates for sector productivity, and c) annual growth rates for sector share of employment. Then the macro uses three factors to reach the growth target: i) a factor boosting sector productivity, ii) an acceleration factor to speed up or slow down sector productivity, and iii) an acceleration factor to speed up or slow down structural change.
>>> - Scenario 4 - Run 1: Records results from initial assumptions set by user. This may be the same as the Base Case.
>>> - Scenario 4 - Run 2: Changes factor to boost productivity simultaneously in all sectors until growth target is reached.
>>> - Scenario 4 - Run 3: No factor to boost productivity, but changes acceleration factor for both structural change and productivity for all sectors until growth target is reached - while also allowing population demography to change if structural change requires increased employment. Based on the maximum values for demography change provided by the user, the increased employment is calculated to come from several sources: unemployed people, people outside the labor force, increased labor force, dependents outside the working age population, increased working age population, and/or increased population (assumed to be immigration of people of working age).
>>> - Scenario 4 - Run 4: Uses 50% of the factor to boost productivity in Run 2, and then changes acceleration factor for both structural change and productivity for all sectors until growth target is reached. In effect, this means projecting structural and sector productivity change to reach an annual growth target while also allowing population demography to change if structural change requires increased employment.
>> - In Scenario 4, the default settings assume a target annual value added growth of 1 percentage point over the current Base Case. Base Case annual growth rate assumptions are used for share of working age population, labor force participation rate, employment rate, sector employment shares, and sector productivity - with zero productivity boost and no acceleration factors. The user can manually set their own annual growth target, demography changes, employment and productivity assumptions. The default is to assume that the acceleration factors for productivity and structural change are linked 1:1. The user can analyze this manually by revising the functional link between the factors, but it will be overwritten by the macro.

> **Country Comparison**
> By making selections on the 'Country Comparison' sheet, the user can compare the growth decomposition of different countries and periods. The country comparators must have data either in WDI or added manually on the 'Manual Data' sheet. It is recommended that data for all comparators are added using the same units - both for value added and population.

Limitations
> * The choice of components are ad-hoc and based on data availability
> * Further and further decomposition have trade-offs because of implicit assumption of identical dynamic evolutionary process. The user should keep in mind that different components in the decomposition develop at different speed. For example, productivity shifts likely to happen more quickly than demographic shifts.
> * Shapley decomposition forces the component residual to zero. As a result errors are distributed proportionally across all components.

Data Requirements
> The current Excel file includes existing value added and employment data broken down by the following sectors.

Major	Manual	Sector (WDI)
Agriculture	Agriculture	Agriculture
Industry	Mining & Utilities	Industry
Industry	Manufacturing	
Industry	Construction	
Services	Wholesale & Retail	Services
Services	Transport & Communications	
Services	Other Activities etc.	
	Total Value Added	Total GDP or Total GVA
Unit	*million 2010 USD*	*million constant 2010 USD*

> WDI Data: http://databank.worldbank.org/data/home.aspx

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Value Added Data
The current Tool is set to use GDP as a measure for total value added (Option 2).
  Option 1:
    WDI distinguishes between SNA Price Valuation: Value added at basic prices (VAB); Value added at producer prices (VAP)
    Countries reporting basic prices (VAB) use the 'Gross value added at factor cost' (GVA) data series, whereas countries that
    report producer prices (VAP) use the 'GDP' data series.
  Option 2:
    The 'GDP' data series is used as a measure of total value added for all countries. However, in WDI value added data by
    sector are still valued according to each country's SNA Price Valuation (see Option 1). Therefore, the Tool calculates
    the share of value added by sector depending on whether a country is VAB (share of GVA) or VAP (share of GDP).
    These shares which add up to 100% are then multiplied by 'GDP' to obtain value added by sector in dollar-amounts.

Value added by 3 sectors from WDI data are assumed to follow the SNA selection between GVA and GDP. In VAB countries 3-sector
data should add up to the 'Gross value added at factor cost' (GVA) data series, whereas in VAP countries 3-sector data should add up to the
'GDP' data series. The following rules are used:
  Total value added for VAB countries:
  * If total GVA data exists, use it as total value added
  * If there is no GVA data but there are data for 3 sectors, use sum of 3 sectors as total value added
  * If there is no GVA data and data for only 1 or 2 sectors, exclude data point
  Total value added for VAP countries:
  * If total GDP data exists, use it as total value added
  * If there is no GDP data but there are data for 3 sectors, use sum of 3 sectors as total value added
  * If there is no GVA data and data for only 1 or 2 sectors, exclude data point
  Sector share for VAB countries:
  * If data exists for 3 sectors, calculate each secto share as % of sum of 3 sectors
  * If only "Services" data are missing, calculate each sector share as % of total GVA with "Services" as the balancing item
  * If "Services" and total GVA data are missing, exclude data point
  Sector share for VAP countries:
  * If data exists for 3 sectors, calculate each secto share as % of sum of 3 sectors
  * If only "Services" data are missing, calculate each sector share as % of total GDP with "Services" as the balancing item
  * If "Services" and total GDP data are missing, exclude data point

Employment Data
This file includes labor data from WDI broken down by three major sectors of economic activity - measured in thousands of people.
This file also includes population and total employment data from WDI measured in thousands of people. The population aged 15-64
is selected as the working age population in this tool.
Data points are excluded for specific years:
      * If population, labor force, and total employment data are not available
  or * If employment data are not available for all three sectors.
WDI Data: http://databank.worldbank.org/data/home.aspx

Code	Item
NV.AGR.TOTL.KD	Agriculture, value added
NV.IND.TOTL.KD	Industry, value added
NV.SRV.TOTL.KD	Services, value added
NY.GDP.MKTP.KD	GDP
NY.GDP.FCST.KD	Gross value added at factor cost
SP.POP.TOTL	Population, total
SP.POP.1564.TO.ZS	Population ages 15-64 (% of total)
SL.TLF.ACTI.ZS	Labor force participation rate for ages 15-64, total (%) (modeled ILO estimate)
SL.UEM.TOTL.ZS	Unemployment, total (% of total labor force) (modeled ILO estimate)
SL.AGR.EMPL.ZS	Employment in agriculture (% of total employment) (modeled ILO estimate)
SL.IND.EMPL.ZS	Employment in industry (% of total employment) (modeled ILO estimate)
SL.SRV.EMPL.ZS	Employment in services (% of total employment) (modeled ILO estimate)

This file includes projected population data from UN at: Low Fertility, Medium Fertility and High Fertility.
  File POP/7-2: Male & Female population by five-year age group, major area, region and country, 1950-2100 (thousands)
UN Data: http://esa.un.org/unpd/wpp/DVD/

Manual Data
The user may elect to enter their own data for Value Added and employment by sector ensuring that they use million 2010 USD
terms to enable country comparisons to WDI data. Employment data entered manually by the user should be measured in thousands of
people to enable comparisons with WDI data.

The user can also enter manual data for several countries on the 'Manual Data' sheet if all countries have the same sub-sectors,
currency units, and unit of people. If the countries for which there are manual data do not exist in the Country list, up to 5 new countries
can be named in Yellow cells on the 'Manual Data' sheet. For example, this can be used to add manual data for regions of a country and

Documentation
No errors reported in structural check

used on the 'Country Comparison' sheet.

Users who wish to work with alternative sources of Value Added, by sectors, may encounter the variable "Imputed Financial Services" entering as negative in computing value added. In such case, they may want to consider pro-rating such amount, by time period, among the rest of Value Added Sectors, before undertaking the growth decomposition.

Note that many data sources use different notations for the same country. In this tool, country names and 3-letter country codes are standardized to follow WDI's notations for individual countries and aggregates. Some additional countries were added to cover UN data. The table starting Row 630 includes WDI's SNA Price Valuation by country (VAB or VAP).
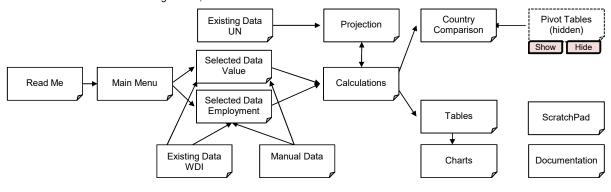
Click to jump to list

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Excel File Structure

This Excel file includes the following sheets, and the arrows illustrate the main flow of data between them.