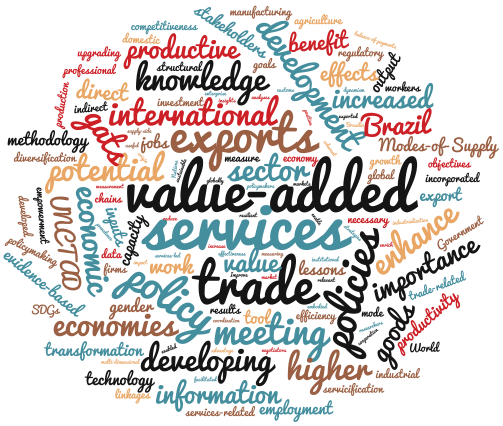

INTERNATIONAL MEETING ON SERVICES VALUE-ADDED IN EXPORTS

Services and trade policies for diversification and upgrading

Brasilia, Brazil, 22-23 October 2019

LAUNCH OF GUIDEBOOK ON METHODOLOGY: MEASURING SERVICES VALUE-ADDED IN DEVELOPING COUNTRIES

Presentation by

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United Nations Conference on Trade and Development (UNCTAD)

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Launch of Guidebook on the Methodology: Measuring Services Value-Added in Developing Countries

International meeting on services value-added in exports: Services and trade policies for diversification and upgrading
Brasília, 22-23 October 2019

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Objectives

Propose (and document) a methodology to measure services value added in Brazilian exports, which can be replicate to other countries

Apply the proposed framework to characterize exports of services value added, concerning partner countries, for both goods and services

The proposed methodology is expected to be useful for countries for which a national input-output matrix is available

The underlying hypothesis is that it would be preferably adopted for countries whose information is not part of integrated world input-output systems (e.g. WIOD, OECD, FIGARO Project)

Outputs

"Step-by-step" guide explaining the input-output methodology adopted to measure services value added in Brazilian exports, which can be replicated to other countries

An Excel file accompanies the document, containing the metadata and outputs regarding the measurement of services value added in exports of all economic sectors in Brazil, and regarding its combination with trade and employment data

The reader can follow the technical report looking at numerical examples taken from the actual data for Brazil

Context

Increasing international fragmentation of production chains and the emergence of global value chains (GVC)

Gross export statistics may be inaccurate to measure a country's participation in international trade:

- Looking directly at gross exports of goods and services may affect how a country chooses priority partners in trade agreement negotiations, and may also bias the impact analysis of international demand shocks, for instance

This inaccuracy is basically led to underestimating (particularly) the contribution of services to exports and employment. This further leads to a general lack of understanding in the true contribution of services to development and policy emphasis on services sectors by policymakers of developing countries.

Context (cont.)

A more appropriate measurement should consider the value added by each country in the production of goods and services that are consumed worldwide

Moreover, if one is interested in sectoral-specific trade policies, it would be important to map the contribution of value added to trade flows by sector or group of sectors (e.g. services) in different countries

Recent initiatives have successfully addressed the data challenge, generating global input-output databases that have been widely used for measuring different dimensions of GVCs

In spite of their enormous contributions, these databases still suffer from lack of detailed information both in terms of country coverage and products and sectoral disaggregation

Global input-output databases

	Sectors	Products	Countries	Years
OECD Inter-Country Input-Output (ICIO) Tables				
ICIO SNA93, ISIC REV.3	34	0	63	1995-2011
ICIO SNA08, ISIC REV.4	36	0	64	2005-2015
World Input-Output Database (WIOD)				
Release: 2013				
World Input-Output Tables	35	0	40	1995-2011
National Supply and Use Tables	35	59	40	1995-2011
Release: 2016				
World Input-Output Tables	56	0	43	2000-2014
National Supply and Use Tables	64	64	43	2000-2014

Example: Coverage of LA countries

OECD database includes seven countries: Argentina, Brazil, Chile, Colombia, Costa Rica, Mexico and Peru

WIOD covers only Brazil and Mexico

Sectoral and product aggregation is another issue

Official SUTs and/or IOTs for different LA countries use more disaggregated levels, for instance:

- Brazil (67 sectors and 127 products); Bolivia (35 sectors and 35 products); Chile (111 sectors and 181 products); Colombia (60 sectors and 392 products); Ecuador (69 sectors and 71 products); Mexico (80 sectors and 80 products)

Who should use it?

This guidebook is intended to be used for those interested in measuring services value added in countries that are not part of one of the global input-output databases, and/or for which more disaggregation at the sectoral/product levels would be needed

As such, it could be viewed as complementary to studies that rely on inter-country input-output systems (e.g. OECD, WIOD)

It may also be useful for many countries with organized national accounts statistics that may not reach the minimum requirements to join world input-output databases

Given the lower intensity in resources – both informational and human – needed to apply the contents of the guidebook, there seems to be room for its use, especially in the developing world

Limitations

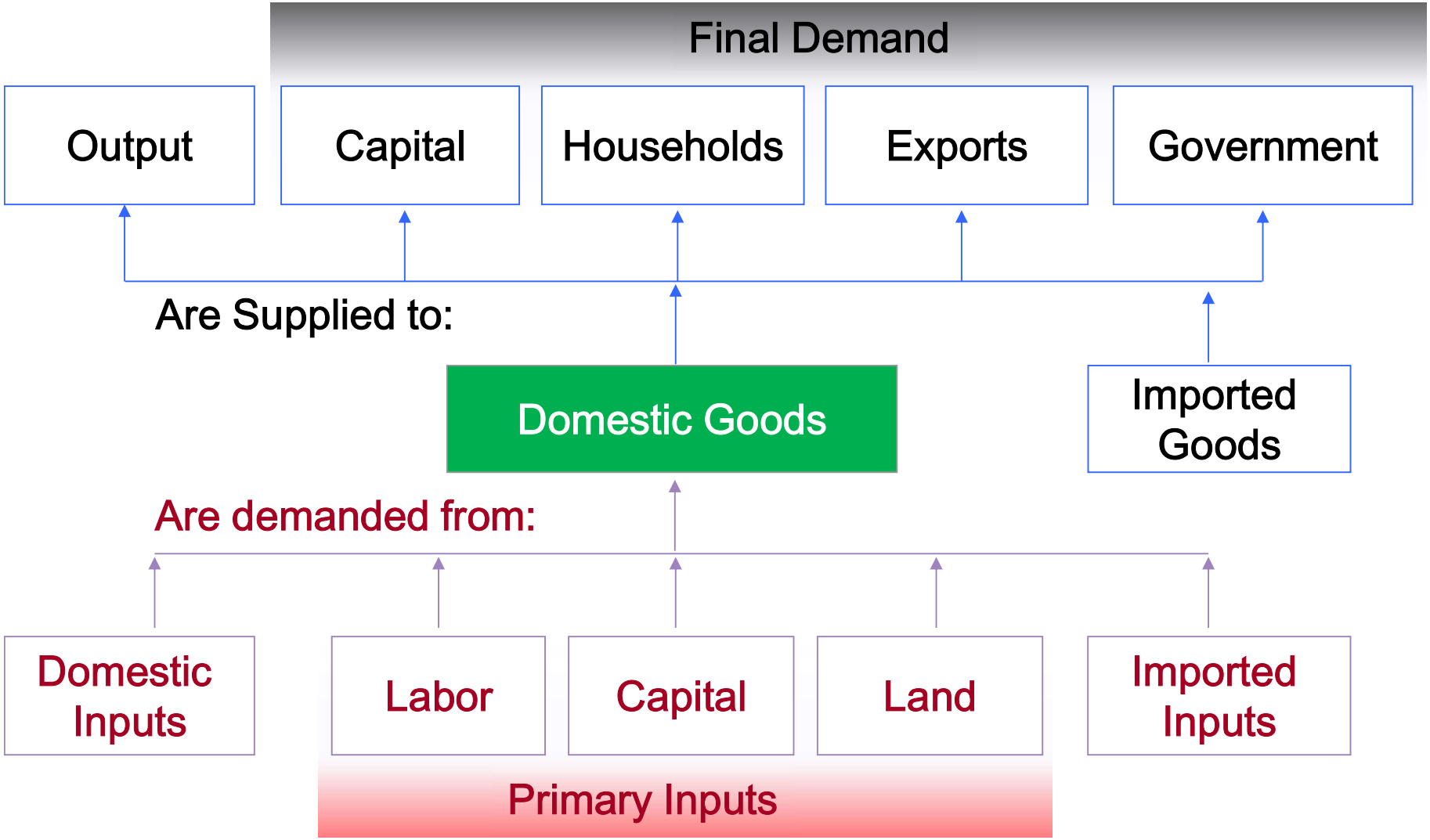
There is a clear disadvantage in using the proposed methodology to measure trade in value added

By using a national model, we treat the rest of the world as an exogenous region, precluding any inter-country feedbacks, which are deemed important to the proper study of GVCs

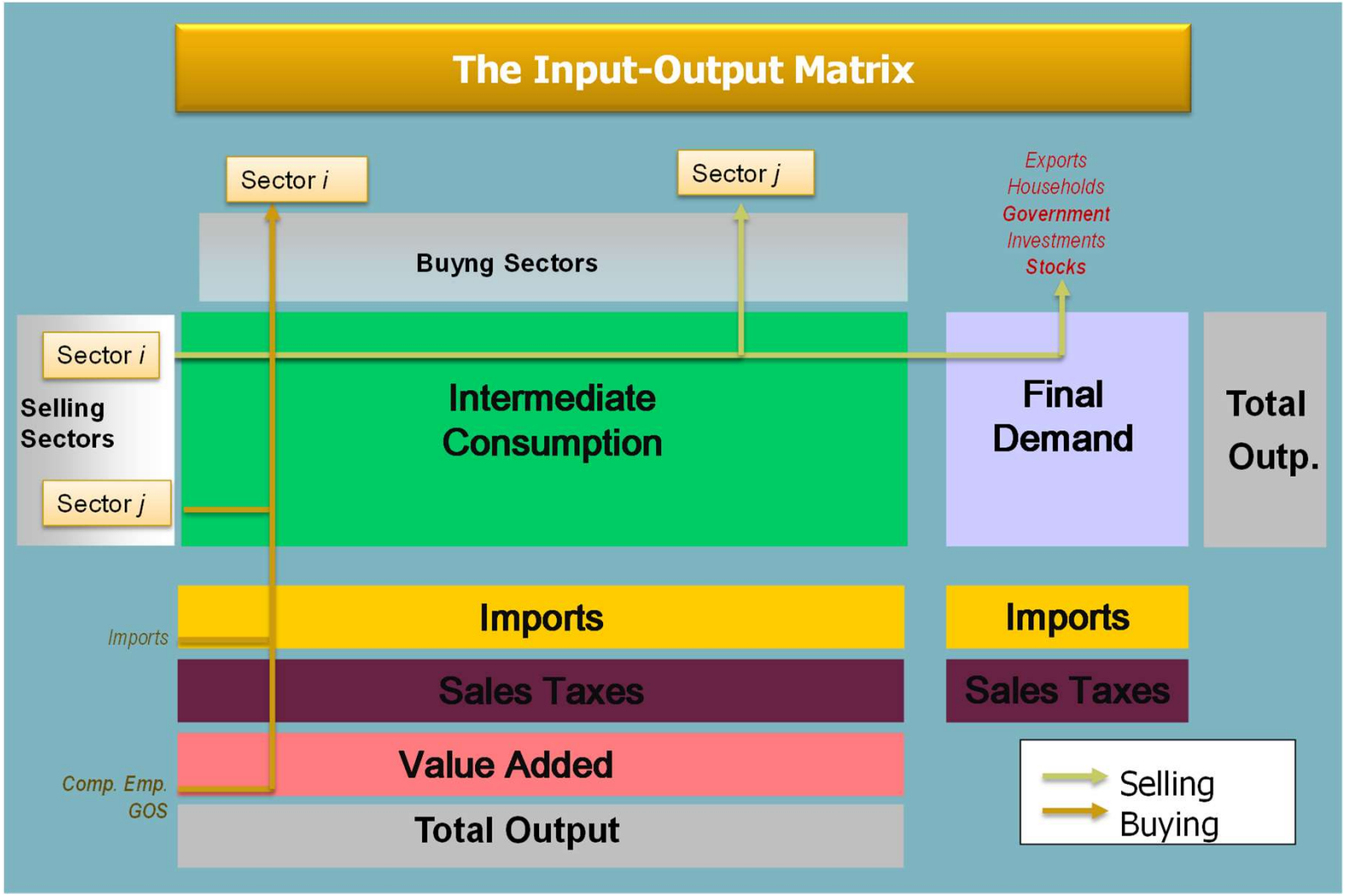
Thus, our estimates of domestic value added (or employment) associated with Brazilian exports will only be partial; the model allows only to look at the domestic value chain in internal loops of international value chains

In a global context, the strength and importance of such inter-country linkages for a country will depend not only on the level of its integration in GVCs, but also on the complexity of the country's production structure

Input-output flows



Input-output table



Basic relations

$$\sum_{j=1}^{n} z_{ij} + y_i \equiv x_i \quad , \quad i = 1,...,n$$

$$a_{ij} = \frac{z_{ij}}{x_j} \quad , \quad i, j = 1,\ldots,n$$

The product-by-industry approach

Using a "product-industry" format, we are able to account for the fact that an industry may produce more than one product

Moreover, using export data at the product level is more appropriate to map the model into published statistics of goods and services trade flows and to properly account for services and non-services value added

	Product	Industry	Final Demand	Total Outputs
Product		**U**	**E**	**Q**
Industry	**V**	**Z**	**F**	**X**
Value Added		**w**		
Total Inputs	**q'**	**x'**		

Matrix decomposition

We initially consider a national input-output model with two different groups of products (goods and services) and two groups of sectors (non-services and services activities)

We also consider the exports (EXP) as a specific column vector in the final demand matrix

$$\begin{bmatrix} \mathbf{x}^1 \\ \mathbf{x}^2 \end{bmatrix} = \left\{ \begin{bmatrix} \mathbf{I} & \mathbf{0} \\ \mathbf{0} & \mathbf{I} \end{bmatrix} - \begin{bmatrix} \mathbf{A}^{11} & \mathbf{A}^{12} \\ \mathbf{A}^{21} & \mathbf{A}^{22} \end{bmatrix} \right\}^{-1} \begin{bmatrix} \mathbf{f}^1 & \mathbf{f}^{1\exp} \\ \mathbf{f}^2 & \mathbf{f}^{2\exp} \end{bmatrix} \boldsymbol{i} = \begin{bmatrix} \mathbf{L}^{11} & \mathbf{L}^{12} \\ \mathbf{L}^{21} & \mathbf{L}^{22} \end{bmatrix} \begin{bmatrix} \mathbf{f}^1 & \mathbf{f}^{1\exp} \\ \mathbf{f}^2 & \mathbf{f}^{2\exp} \end{bmatrix} \boldsymbol{i}$$

$\mathbf{A^{11}}$ and $\mathbf{A^{22}}$ are square matrices accounting for the internal input flows among the non-services and services industries, respectively, and $\mathbf{A^{21}}$ and $\mathbf{A^{12}}$ are rectangular matrices representing input flows between non-services and services sectors

Key equations

Intra-group domestic value added in exports from sub-group 1

$$VA_{11,exp} = \mathbf{v}_1(\mathbf{I}-\mathbf{A})^{-1}\begin{bmatrix}\mathbf{f}^{1\exp}\\ \mathbf{0}\end{bmatrix} \quad (1)$$

Intra-group domestic value added in exports from sub-group 2

$$VA_{22,exp} = \mathbf{v}_2(\mathbf{I}-\mathbf{A})^{-1}\begin{bmatrix}\mathbf{0}\\ \mathbf{f}^{2\exp}\end{bmatrix} \quad (2)$$

Inter-group domestic value added in exports from sub-group 1

$$VA_{21,exp} = \mathbf{v}_2(\mathbf{I}-\mathbf{A})^{-1}\begin{bmatrix}\mathbf{f}^{1\exp}\\ \mathbf{0}\end{bmatrix} \quad (3)$$

Inter-group domestic value added in exports from sub-group 2

$$VA_{12,exp} = \mathbf{v}_1(\mathbf{I}-\mathbf{A})^{-1}\begin{bmatrix}\mathbf{0}\\ \mathbf{f}^{2\exp}\end{bmatrix} \quad (4)$$

Extensions

Focusing on the final demand elements directly related to foreign exports, we can also consider the different components of $\mathbf{f}^{1\exp}$ and $\mathbf{f}^{2\exp}$, which include sub-group exports to *r* different foreign markets, such that matrix $\mathbf{F}$ becomes

$$\mathbf{F} = \begin{bmatrix} \mathbf{f}^{1} & \mathbf{f}^{1\exp^{1}} & \dots & \mathbf{f}^{1\exp^{r}} \\ \mathbf{f}^{2} & \mathbf{f}^{2\exp^{1}} & \dots & \mathbf{f}^{2\exp^{r}} \end{bmatrix}$$

Domestic value added in exports (VA)

We can define the domestic value added in exports (VA) from each component of **F** to region *r*. In this sense, in an input-output system with *m* sub-groups of sectors (e.g. agriculture, manufacturing, services), and with *r* foreign destinations for exports, we can decompose value added in exports (in our case, *m* = 2, and *r* = 13)

from sub-group of sectors	to foreign destination					
	exp^1	exp^2	…	exp^{r-1}	exp^r	exp
1	VA_{1,exp^1}	VA_{1,exp^2}	…	$VA_{1,exp^{r-1}}$	VA_{1,exp^r}	$VA_{1,exp}$
2	VA_{2,exp^1}	VA_{2,exp^2}	…	$VA_{2,exp^{r-1}}$	VA_{2,exp^r}	$VA_{2,exp}$
…	…	…	…	…	…	…
m	VA_{m,exp^1}	VA_{m,exp^2}	…	$VA_{m,exp^{r-1}}$	VA_{m,exp^r}	$VA_{m,exp}$

Extensions (cont.)

Equations (1) to (4) are easily adapted to measure the contents of other variables in export flows

We just need to replace the vector of value added coefficients, **v**, by the other variables' coefficients

We use sectoral employment data to quantify total employment and female employment embedded in Brazilian exports

Many other possibilities: different environmental and socioeconomic indicators

Constraint: data availability at the sectoral level for specific dimensions (e.g. MSME)

Initial contents in exports and multipliers

Information in equations (1)-(4) shows the *total* effects on the Brazilian economy of changes that, in the context of the input-output model, are exogenous to the model of that economy, i.e. exports of goods and services (to different destinations)

They include the initial, direct and indirect effects on value added (total employment and female employment) of elements in **F**, since exogenous foreign exports are pre-multiplied by the multiplier matrix, $(\mathbf{I}-\mathbf{A})^{-1}$. Formally, we can decompose the total effects into three components (initial, direct and indirect)

$$\mathbf{x} = \mathbf{IF} \qquad \text{Initial effect}$$

$$\mathbf{x} = \mathbf{AF} \qquad \text{Direct effect}$$

$$\mathbf{x} = (\mathbf{I}-\mathbf{A})^{-1}\mathbf{F} \qquad \text{Total effect}$$

The notion of multipliers rests upon the difference between the initial effect of an exogenous change and the total effect of that change

Imported value added contents in exports

The underlying hypothesis for the proposed methodology rests on the availability of national input-output tables only

Given this data constraint, we have adapted the methodology to include information on services imports embedded in Brazilian export flows

Despite the fact that we should limit our efforts to the use a national input-output system, our understanding is that using the sectoral import coefficients – usually available from the input-output tables – could provide a first-order approximation of a country's integration in global value-chains in services

In order to measure the "imported" value added embedded in (Brazilian) export flows of goods and services, we can use the sector-by-sector matrix of direct use of imported inputs, $\mathbf{A_m}$

Quick application: Angola, 2012

$$VA_{11,exp} = \mathbf{v}_1(\mathbf{I} - \mathbf{A})^{-1}\begin{bmatrix}\mathbf{f}^{1exp}\\ \mathbf{0}\end{bmatrix}$$

		Exports		
		Goods	Services	Total
Domestic value added embedded in exports	Services	739,295	82,296	821,591
	Non-services	5,262,162	6,169	5,268,332
	Total	*6,001,457*	*88,466*	*6,089,923*
Share in total domestic value added	Services	12.3	93.0	13.5
	Non-services	87.7	7.0	86.5
	Total	*100.0*	*100.0*	*100.0*
Shares in total gross exports	Services	11.1	74.0	12.1
	Non-services	78.8	5.6	77.6
	Total	*89.8*	*79.6*	*89.7*
Gross exports	*Total*	*6,680,338*	*111,150*	*6,791,488*

Quick application: Angola, 2012

$$VA_{22,exp} = \mathbf{v}_2(\mathbf{I} - \mathbf{A})^{-1}\begin{bmatrix}\mathbf{0}\\ \mathbf{f}^{2exp}\end{bmatrix}$$

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Quick application: Angola, 2012

$$VA_{21,exp} = \mathbf{v}_2(\mathbf{I} - \mathbf{A})^{-1}\begin{bmatrix}\mathbf{f}^{1\exp} \\ \mathbf{0}\end{bmatrix}$$

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Thank you!

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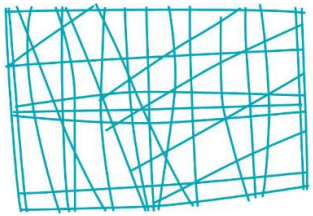

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