The CEQ-IDB Project Training Workshop

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Washington, DC

June 18, 2015

News

Lots has happened since CEQ-IDB phase I and the May 2014 workshop for CEQ-IDB phase II

- Coverage has continued to rise: 34 countries

With funding from the Bill & Melinda Gates Foundation and partnerships with the IDB and WB:

- Important methodological modifications
  - ➤ CEQ Handbook 2016
- Overhaul of presentation of results
  - ➤ MWB 2016
- Automation of calculation and presentation of results
  - ➤ ADO files; Command "putexcel" in Stata 13

- ➤ CEQ Institute, based at Tulane

www.commitmentoequity.org
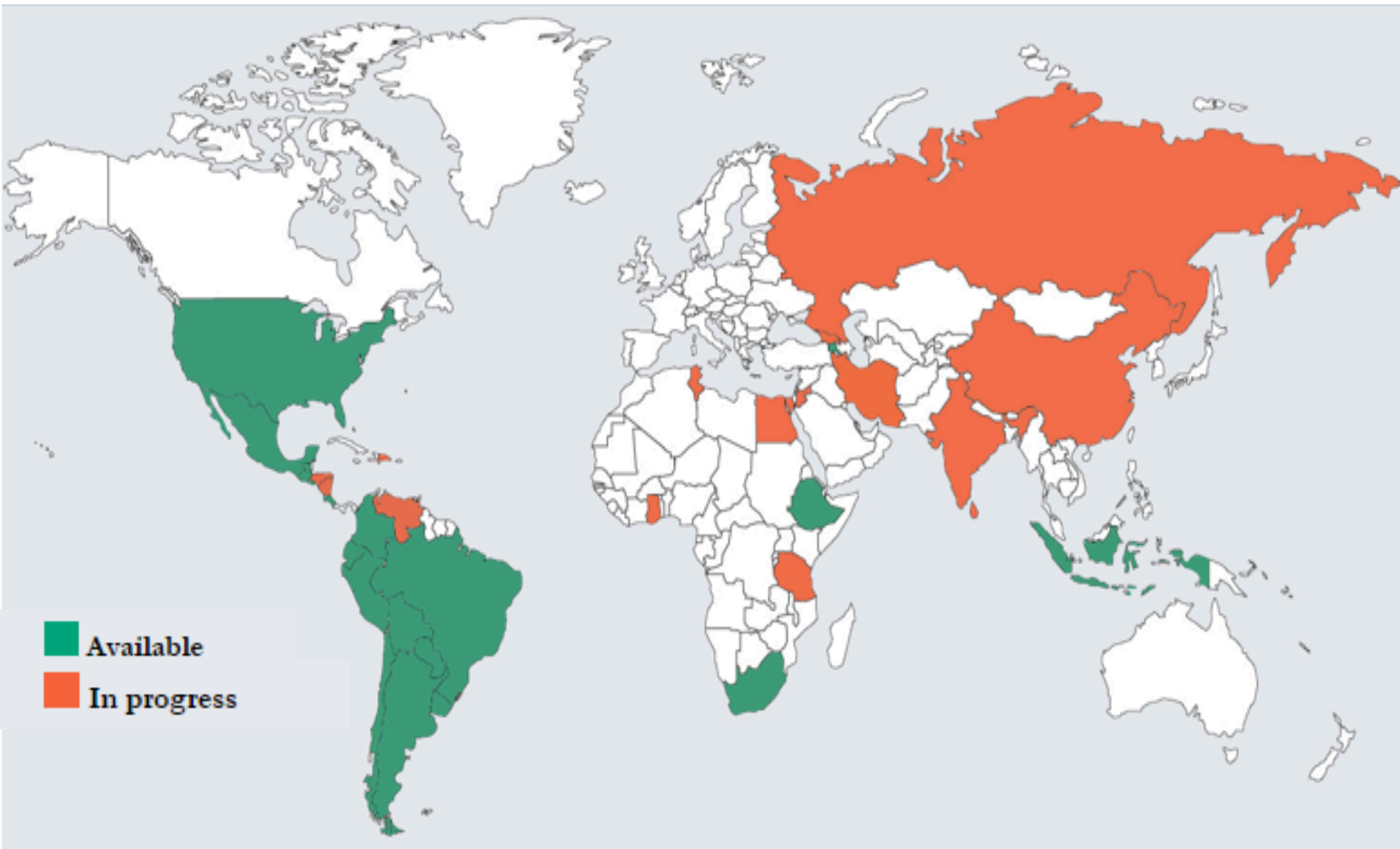
MWB 2016

- Structure (open Contents & three Parts)

- Completion instructions (see Contents file; direct questions to Adam Ratzlaff)

- Software (ADO files and sample Stata code in Handbook 2013; direct questions for Part II to Sean Higgins; for Part III to Rodrigo Aranda)

- Checking protocol (in progress)
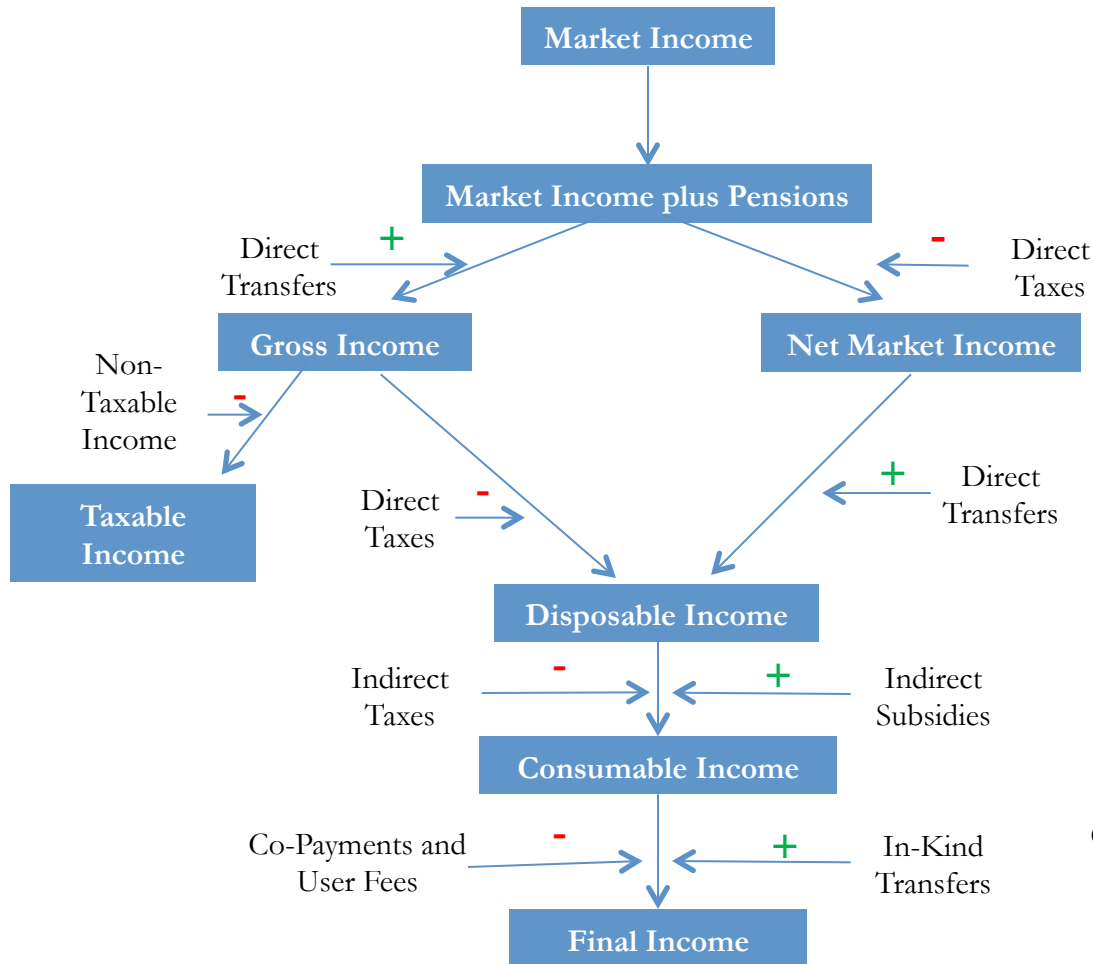
Information Solicited for this Meeting

- Ethno-racial definitions: Sheet F2

- Fiscal Accounts: Sheet A5

- Construction of Income Concepts: Sheet C1
  - ➤ "Heart" of the fiscal incidence analysis

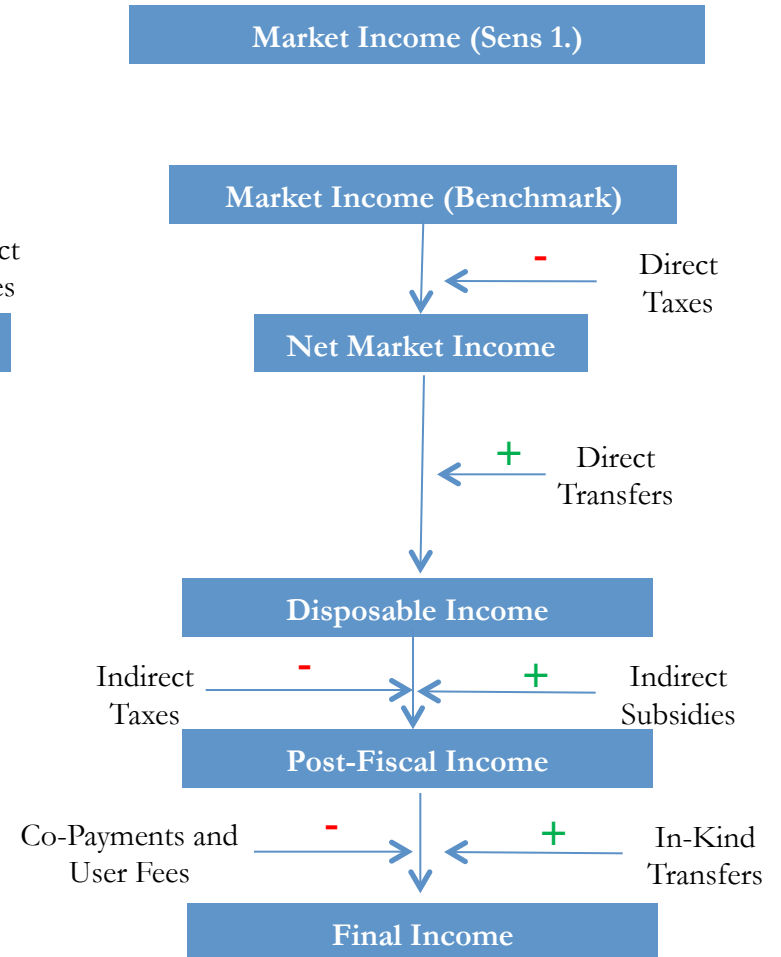# Changes in Methodology and Terminology

- New Income Concepts

- Measuring the effect of a fiscal intervention: Marginal Contribution

- Correction of conversion of poverty lines from PPP to LCU/Sean will introduce; important for teams in CEQ-IDB I.

Income Concepts in the New MWB 2016

New Core Income Concept Definitions

Market Income

↓

Market Income plus Pensions

Direct Transfers **+** → ← **-** Direct Taxes

Gross Income ← **-** Non-Taxable Income

Net Market Income

Taxable Income

Direct Taxes **-** → ← **+** Direct Transfers

Disposable Income

Indirect Taxes **-** → ← **+** Indirect Subsidies

Consumable Income

Co-Payments and User Fees **-** → ← **+** In-Kind Transfers

Final Income

Old Income Concept Definitions

Market Income (Sens 1.)

↓

Market Income (Benchmark)

← **-** Direct Taxes

Net Market Income

← **+** Direct Transfers

Disposable Income

Indirect Taxes **-** → ← **+** Indirect Subsidies

Post-Fiscal Income

Co-Payments and User Fees **-** → ← **+** In-Kind Transfers

Final Income

Analytics of Fiscal Redistribution

This section is based on:

Lustig, Nora, Ali Enami and Rodrigo Aranda. *The Analytics of Fiscal Redistribution.* Chapter in Lustig, Nora and Sean Higgins, editors, Commitment to Equity Handbook: Estimating the Redistributive Impact of Fiscal Policy. (Forthcoming)

If you use materials from this presentation, please cite as shown.

Fiscal Policy and Inequality
Three Key Questions

- Does the net fiscal system decrease inequality?

- Is a particular tax or transfer equalizing or unequalizing?

- What is the contribution of a particular tax or transfers (or any combination of them) to the change in inequality?

Assumptions

➤ **No reranking:** the ordering of individuals in the post-fiscal state is the same as in the pre-fiscal state: i.e., no swapping of places

➤ **Dominance:** pre-fiscal and post-fiscal Lorenz curves do not cross (and the difference is statistically significant)

➤ **Same pre-fiscal (original) income distribution:** rules out comparisons of redistributive or poverty reducing capacity of fiscal systems across countries and over-time

Fiscal Policy and Inequality
Four Key Questions

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- What is the inequality impact if one increases the size of a tax (transfer) or its progressivity?

Does the net fiscal system decrease inequality?

Let's define the Redistributive Effect of the net fiscal system as

$$RE_N = G_x - G_N$$

Where $G_x \; and \; G_N$ are the pre-tax-pre-transfer Gini coefficient post-tax-post-transfer Gini, respectively

Does the net fiscal system decrease inequality?

From Lambert (2001), we know that RE_N is equal to the weighted sum of the redistributive effect of taxes and transfers

$$RE_N = \frac{(1-g)RE_t + (1+b)RE_B}{1-g+b}$$

Where

- RE_t and RE_B are the Redistributive Effect of the tax and the transfer, respectively
- **g** and **b**: size of tax and transfer, respectively.
  That is, total taxes and total transfers divided by total pre-tax and pre-transfer income, respectively

Does the net fiscal system decrease inequality?

For the net fiscal system to be equalizing:

$$RE_N = \frac{(1-g)RE_t + (1+b)RE_B}{1-g+b} > 0$$

Condition 1:

$$\rightarrow RE_t > -\frac{(1+b)}{(1-g)}RE_B$$

Does the net fiscal system decrease inequality?

		Transfer		
		Regressive $K_B < 0$	**Neutral** $K_B = 0$	**Progressive** $K_B > 0$
Tax	**Regressive** $K_T < 0$	Always Unequalizing	Always Unequalizing	Equalizing only if Condition 1 holds
	Neutral $K_T = 0$	Always Unequalizing	No Change in Equality	Always Equalizing
	Progressive $K_T > 0$	Equalizing only if Condition 1 holds	Always Equalizing	Always Equalizing

Condition 1:

$$\rightarrow RE_t > -\frac{(1+b)}{(1-g)} RE_B$$

- The above result is well-known in the literature:

  - ➢ A fiscal system with a regressive tax can be equalizing as long as transfers are progressive and the condition above is fulfilled
  - ➢ A fiscal system with a regressive tax that collects more revenues than a less regressive one may be more equalizing

- However, Lambert's equation has more fundamental implications

Fiscal Policy and Inequality
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Progressivity & Impact on Inequality in a Single Tax (or Transfer) World

➤ A necessary and sufficient condition for a tax or a transfer to be equalizing is to have a positive Kakwani index

➤ A necessary and sufficient condition for a tax or a transfer to be unequalizing is to have a negative Kakwani index

➤ If system has more than one intervention, the above is no longer true

> ➤ For example, a regressive tax based on its Kakwani index can exert an equalizing force (!) in the sense that the reduction in inequality can be larger with the tax than without it

Lambert's Conundrum

	1	2	3	4	Total
Original Income x	10	20	30	40	100
Tax *t*	6	9	12	15	42
Transfer *B*	21	14	7	0	42
Net Income *N*	25	25	25	25	100

Source: Lambert, 2001, Table 11.1, p. 278

Lambert's Conundrum

- The Redistributive Effect of the tax only in this example is equal to -0.05, highlighting the regressivity of the tax

- The Redistributive Effect of the transfer is equal to 0.19

- ➢ Yet, the Redistributive Effect of the net fiscal system is 0.25, higher than the effect without the taxes!

When could a regressive tax exert an equalizing force?

For the reduction in inequality to be higher with the tax than without it, the following condition must hold:

$$RE_N = \frac{(1-g)RE_t + (1+b)RE_B}{1-g+b} > RE_B$$

Condition 2

$$\rightarrow RE_t > -\frac{(g)}{(1-g)}RE_B$$

Is a tax equalizing?
Answer for a system with a tax and a transfer

		System with a Transfer that is		
		Regressive $K_B < 0$	Neutral $K_B = 0$	Progressive $K_B > 0$
Adding a Tax that is	**Regressive** $K_T < 0$	Always More Unequalizing	Always Unequalizing	More Equalizing only if Condition 2
	Neutral $K_T = 0$	Always More Unequalizing	No Change in Inequality	Always More Equalizing
	Progressive $K_T > 0$	More Equalizing only if Condition 2	Always Equalizing	Always More Equalizing

Condition 2

$$\rightarrow RE_t > -\frac{(g)}{(1-g)} RE_B$$

Equalizing Regressive Taxes Exist in Real Life

- The US and the UK had regressive equalizing taxes in the past (O'Higgins & Ruggles, 1981 and Ruggles & O'Higgins, 1981)

- Chile's 1996 fiscal system had equalizing regressive taxes (Engel et al., 1999)
  - Redistributive Effect of Net Fiscal System (taxes and transfers together = 0.0583 (decline in Gini points)
  - Redistributive Effect of System with Taxes only = - 0.0076
  - Redistributive Effect of System with Transfers but without Taxes = 0.0574

- ➢ Note that 0.0583 > 0.0574

- CEQs for Chile 2009 and South Africa 2010 also show that regressive consumption taxes are equalizing

Some Results...

	Brazil	Chile[a]	Colombia	Indonesia[b]	Mexico	Peru	South Africa[c]	Average
Marginal Contributions								
From Market to Post-fiscal Income								
Redistributive Effect	0.0446	0.0370	0.0073	0.0061	0.0308	0.0151	0.0789	0.0306
Direct taxes	0.0171	0.0179	0.0019		0.0140	0.0060	0.0311	0.0125
Direct transfers	0.0382	0.0220	0.0057	0.0043	0.0113	0.0048	0.0711	0.0207
Indirect taxes	-0.0014	0.0027	-0.0017	-0.0028	0.0027	0.0052	0.00001	0.0007
Indirect subsidies	0.0008	0.0004	0.0015	0.0052	0.0047			0.0025
Kakwani[d]								
Direct taxes	0.1738	0.3481	0.1373		0.2411	0.3853	0.1109	0.2328
Direct transfers	0.5310	0.9064	0.9233	0.6248	0.7931	0.9612	0.9955	0.8193
Indirect taxes	-0.0536	-0.0172	-0.1986	-0.0513	0.0129	0.0527	-0.0712	-0.0466
Indirect subsidies	0.8295	0.7978	0.5034	0.0645	0.2457			0.4882

Source: author's calculations based on Brazil: Higgins and Pereira, 2014; Chile: Jaime Ruiz Tagle and Dante Contreras, 2014; Colombia: Melendez, 2014; Indonesia: Jellema et al., 2014; Mexico: Scott, 2014; Peru: Jaramillo, 2013; South Africa: Inchauste et al., 2014.

Generalizing the result to n taxes and m transfers

Is a particular tax or transfer equalizing?

➢ The results shown above can be generalized to *n* taxes and *m* transfers (in chapter but not presented here)

➢ Note that the results do not require for the size of total taxes and total transfers to be the same (see conditions 1 and 2 above)

Path Dependency Underscores the Importance of the Analysis Being Comprehensive

- Obvious reason
  - To capture the full effect of the net fiscal system

- More subtle but fundamental reason

  - ➢ Assessing the progressivity of a tax or a transfer in isolation can give the wrong answer to the question: Is the tax or the transfer equalizing?

  - ➢ Think of the example of Chile and South Africa just shown above

Fiscal Policy and Inequality
Four Key Questions

■ Does the net fiscal system decrease inequality?

■ Is a particular tax or transfer equalizing or unequalizing?

■ **What is the contribution of a particular tax or transfer (or any combination of them) to the change in inequality?**

■ What is the inequality impact if one increases the size of a tax (transfer) or its progressivity?

What is the contribution of a particular tax or transfer to the change in inequality?

- Sequential method
  - May give the wrong answer to the "without vs. with comparison" because it ignores path dependency
- ➢ **Marginal contribution method (same for poverty)**
  - Gives correct answer to the "without vs. with comparison" but does not fulfill the principle of aggregation: i.e., the sum of the marginal contributions will not equal the total change in inequality (except by coincidence)
- Average Contribution with all possible paths considered (Shapley value)
  - Fulfills the principle of aggregation, takes care of path dependency but the sign may be different from the marginal contribution => problematic?

Calculating the Marginal Contribution of a Tax

The marginal contribution of a tax is defined as

$$MC_t = G_{x+B} - G_{x+B-t}$$

Where G_{x+B}, G_{x+B-t} and are the Gini coefficient of income with the transfer but **without** the tax and the Gini coefficient with the transfer and **with** the tax, respectively

If $MC_t > 0$, remember, the tax is equalizing

Sequential vs. Marginal Contribution
Why the sequential method can be misleading

Chile's 1996 fiscal system (Engel et al., 1999)

- Sequential contribution method: -0.0076

- Marginal contribution method: 0.009

Fiscal Policy and Inequality
Four Key Questions

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- Is a particular tax or transfer equalizing or unequalizing?

- What is the contribution of a particular tax or transfer (or any combination of them) to the change in inequality?

- **What is the inequality impact if one increases the size of a tax (transfer) or its progressivity?**

Progressivity vs. Size of Intervention: A System with One Tax and One Transfer

- In a system with one tax and one transfer:

$$MC_T = G_{X+B} - G_{X-T+B} = \ldots = \frac{g\,K_T + b\,K_B}{1 - g + b} - \frac{b}{1+b}K_B$$

- Getting the partial derivatives:

$$\frac{\partial MC_T}{\partial g} = \frac{(1+b)\,K_T + b\,K_B}{(1-g+b)^2}$$

$$\frac{\partial MC_T}{\partial K_T} = \frac{g}{1-g+b}$$

Next Steps: Path Dependency

- Shapley Value

- Where the Shapley value is the weighted average of all posible cases so that we can demostrate the effect of adding one source to the value function

Next Steps: Relaxing Assumptions

- **Reranking**: individuals can swap positions in the post-fiscal income ordering; true of all systems in the real world

- **No dominance:** post-fiscal Lorenz curve crosses the pre-fiscal Lorenz curve; normative parameter must be explicitly introduced (will not be covered today)

- **Different pre-fiscal (original) distributions:** comparing the inequality- and poverty-reducing capacity of fiscal systems across countries and over time (will not be covered today)

References

- Duclos, Jean-Yves and Abdelkrim Araar. 2007. *Poverty and Equity: Measurement, Policy and Estimation with DAD* (Vol. 2). Springer. Chapters 7 and 8. (available online)

- Lambert, Peter J. (2001). *The Distribution and Redistribution of Income: A Mathematical Analysis*. Manchester University Press. Third Edition. Chapter 11. (not available online)

Fiscal Policy and Poverty
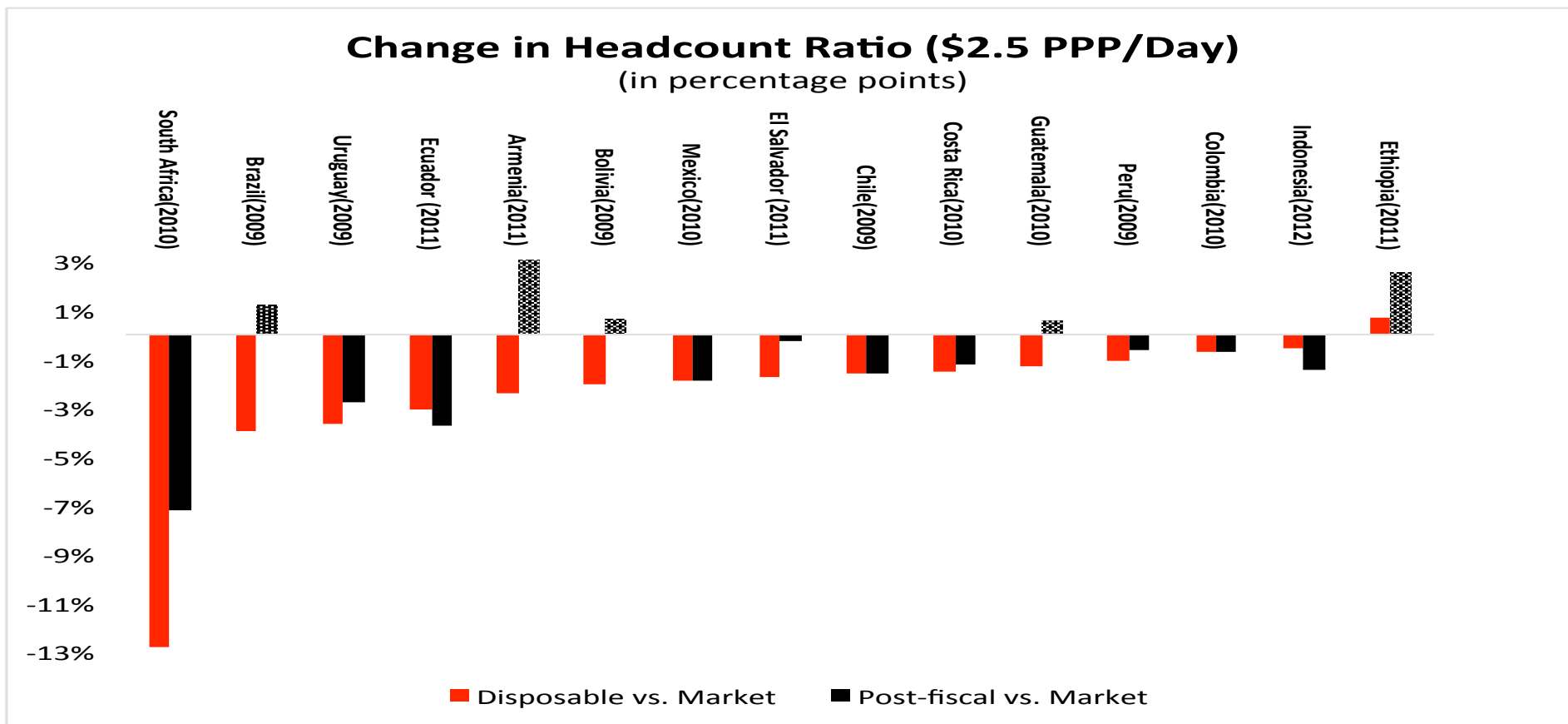# Three Key Questions

- Does the net fiscal system decrease poverty?
  - Standard comparisons of poverty indicators before and after fiscal policy
- Does the net fiscal system make the poor poorer?
  - Fiscal Impoverishment Index; Fiscal Mobility Matrix
- What is the contribution of a particular tax or transfer (or any combination of them) to the change in poverty?
  - Calculate marginal contribution: e.g., headcount ratio without the fiscal intervention of interest but with all other interventions in place minus headcount ratio with the fiscal intervention of interest and the rest

Poverty Impact

- Determining when a fiscal intervention is poverty-reducing
  - Compare standard poverty measures using the marginal contribution approach

- **Fiscal policy can increase poverty to the point that it is left higher than before taxes and transfers**
  - Showed in Session 1 that we found this in five out of thirteen countries in CEQ

# Indirect Taxes increase poverty over and above market income poverty in 5 cases

Change in Headcount Ratio ($2.5 PPP/Day)
(in percentage points)

Categories (left to right): South Africa(2010), Brazil(2009), Uruguay(2009), Ecuador (2011), Armenia(2011), Bolivia(2009), Mexico(2010), El Salvador (2011), Chile(2009), Costa Rica(2010), Guatemala(2010), Peru(2009), Colombia(2010), Indonesia(2012), Ethiopia(2011)

Legend: ■ Disposable vs. Market   ■ Post-fiscal vs. Market

Source: Lustig, Nora. 2015. "Fiscal Policy, Inequality and the Poor in the Developing World.." *CEQ Working Paper No. 23*, Center for Inter-American Policy and Research and Department of Economics, Tulane University and Inter-American Dialogue. Forthcoming.

Poverty Impact

➢ **A tax system can be equalizing but poverty-increasing and poverty can end up above what prevailed before fiscal policy**

- Example Ethiopia

- Do not use word "regressive" for a poverty increasing intervention

Note that Net Indirect Taxes can be equalizing and yet poverty increasing: Ethiopia
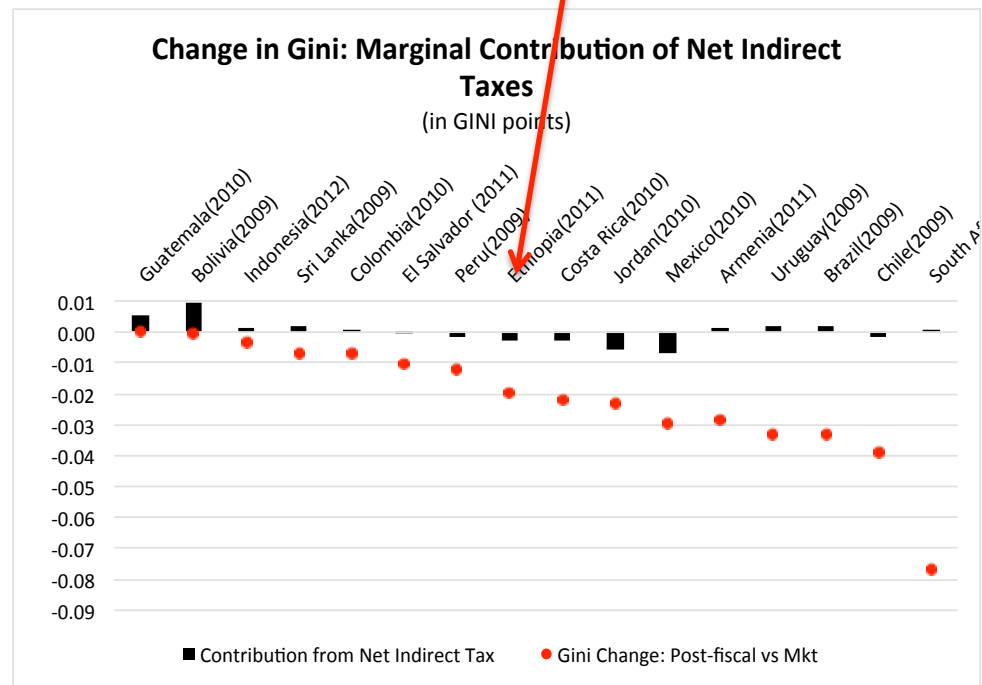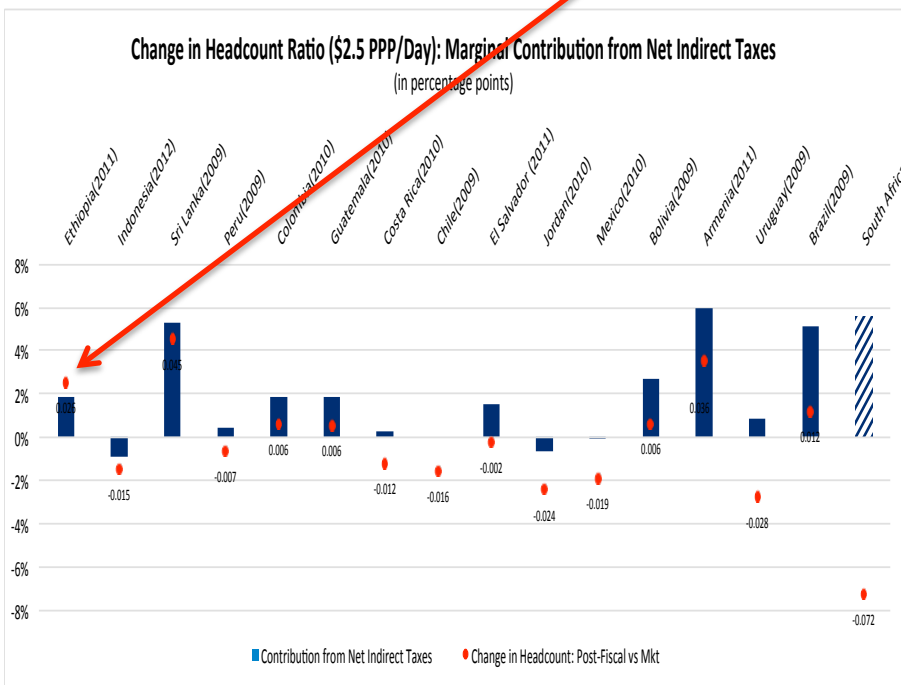
Poverty Impact

- Even if poverty measures do not increase, the poor can be made poorer by the fiscal system and some of the nonpoor can be made poor

- In Brazil, more than a third of the pre-fiscal policy poor are made poorer by fiscal policy (excluding transfers in-kind, of course)

➢ Fiscal Impoverishment Index

   – Higgins, Sean and Nora Lustig. 2015.
[Can a Poverty-Reducing and Progressive Tax and Transfer System Hurt the Poor?](#) CEQ Working Paper No. 33, Center for Inter-American Policy and Research and Department of Economics, Tulane University and Inter-American Dialogue, April 8.

Main messages

➢ To determine whether a fiscal intervention is equalizing or not, one must assess its contribution with the other interventions in place

  ➢ A regressive tax, for example, can exert an equalizing force that is over and above a system without that regressive tax

➢ To measure the size of the contribution, use the marginal contribution method but remember that adding the marginal contributions will not be equal to the total change

➢ The impact of a tax on inequality and poverty can go in opposite directions: e.g., equalizing and poverty increasing

➢ An important proportion of the poor may be left poorer (in cash) by the fiscal system, and current measures may not alert us to this: new measure of *fiscal impoverishment* does

Readings

- Duclos, Jean-Yves and Abdelkrim Araar. 2007. *Poverty and Equity: Measurement, Policy and Estimation with DAD* (Vol. 2). Springer. Chapters 7 and 8. (available online)

- Fullerton, Don, and Gilbert E. Metcalf. 2002. *Tax incidence.* Handbook of Public Economics 4: 1787-1872.

- Lambert, Peter J. (2001). *The Distribution and Redistribution of Income: A Mathematical Analysis*. Manchester University Press. Third Edition. Chapter 11. (not available online)

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Additional Readings

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- Dardanoni, Valentino and Peter Lambert. 2000. *Progressivity Comparisons.* Journal of Public Economics, 86 (2002): 99–122

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Thank you!